Final Environmental Assessment/ Regulatory Impact Review

For

Amendment 12: Revisions to the Fishery Management Plan for the Salmon Fisheries in the EEZ Off the Coast of Alaska

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Abstract: The *Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska* (FMP) manages the salmon fisheries in the United States Exclusive Economic Zone (EEZ; 3 nautical miles to 200 nautical miles offshore) off Alaska. The North Pacific Fishery Management Council developed this FMP under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The FMP is being comprehensively revised to comply with the recent MSA requirements, such as annual catch limits and accountability measures, and to more clearly reflect the Council's policy with regard to State of Alaska management authority for commercial and sport salmon fisheries in the EEZ. This document provides decision-makers and the public with an evaluation of the environmental, social, and economic effects of alternative fishery management plans for the salmon fisheries in the EEZ and addresses the requirements of the National Environmental Policy Act and Executive Order 12866.

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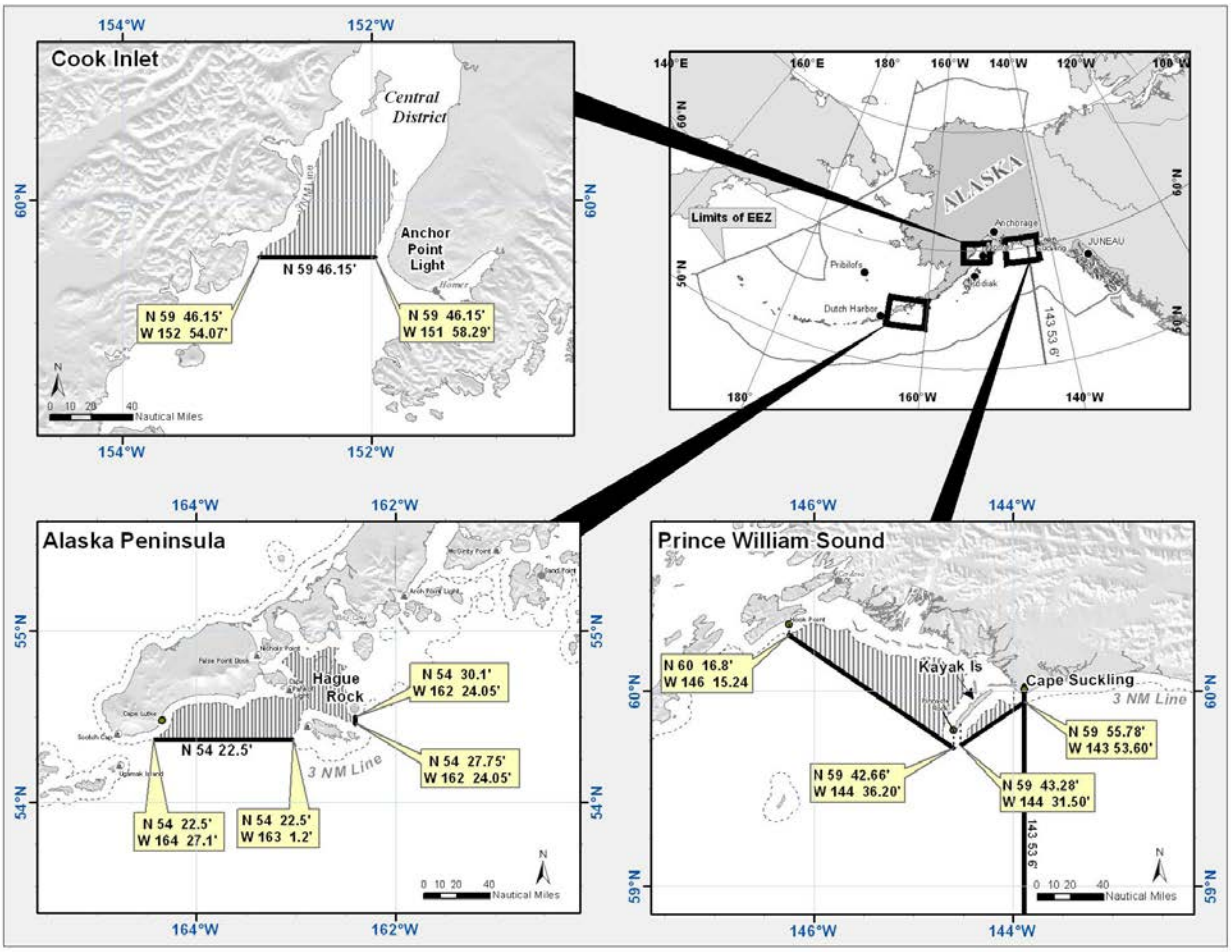
Executive Summary

The North Pacific Fishery Management Council (Council) is considering comprehensively revising and updating the *Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska* (FMP). The Magnuson-Stevens Fishery Conservation and Management Act (MSA) directs each Regional Council to prepare a fishery management plan for each fishery under its authority that requires conservation and management. The fisheries under the authority of the Council are those fisheries that occur in the United States Exclusive Economic Zone (EEZ; 3 nautical miles to 200 nautical miles offshore). The MSA requires that each fishery management plan be consistent with the ten national standards and contain specific conservation and management measures.

The FMP was approved in 1979 and last comprehensively revised in 1990 (NPFMC 1990a). The FMP conserves and manages the Pacific salmon commercial and sport fisheries that occur in the EEZ off Alaska. The FMP establishes two management areas, the East Area and the West Area, with a border at Cape Suckling (Figure ES-1) and addresses commercial salmon fisheries differently in each area. In the East Area, the FMP delegates management of the commercial troll salmon fishery to the State of Alaska (State) and prohibits commercial salmon fishing with net gear. The FMP prohibits commercial salmon fishing in the West Area, except in three defined traditional net areas – Cook Inlet, the Alaska Peninsula, and Prince William Sound. The FMP delegates management of the sport fishery to the State in both areas.

The FMP's unique functions – closing the vast majority of the EEZ to salmon fishing and facilitating State management of the few salmon fisheries in the EEZ – reflect the salmon life cycle. Salmon have a complex life cycle that involves a freshwater rearing period, followed by a period of ocean feeding prior to their spawning migration back to freshwater. Salmon from individual brood years can return as adults to spawn over a 2 to 6 year period. As a result, a single year class can be vulnerable to fisheries for several years. Salmon migrate and feed over great distances during their marine life stage. While there is great diversity in the range and migratory habits among different species of salmon, there also is a remarkable consistency in the migratory habit within stock groups, which greatly facilitates stock-specific fishery planning. Most salmon stocks are vulnerable to harvest by numerous commercial and sport fisheries in marine areas. Many are also taken in rivers and streams during their spawning migration by subsistence, sport, commercial, and personal use fishermen.

Figure ES-1 The FMP's management area, showing the East and West Areas and the three traditional net fishing areas.



The FMP's unique functions also recognize that the State is the appropriate authority for managing Alaska salmon fisheries given the State's existing infrastructure and expertise. The State manages Alaska salmon stocks throughout their range using a management approach that is designed to specifically address the life cycle of salmon, the nonselective nature of fishing in a mixed stock fishery, and the fact that a given salmon stock is subject to multiple fisheries through its migration from marine to fresh waters. Additionally, Chinook salmon harvested in the East Area are managed under provisions of the Pacific Salmon Treaty, an international agreement with Canada that provides for an abundance-based management regime that takes into account the highly mixed stock nature of the harvest. Therefore, the FMP does not contain specific measures to manage the salmon fisheries in the EEZ.

The State's first priority for management is to meet spawning escapement goals in order to sustain salmon resources for future generations. The highest priority use is for subsistence, under both state and federal law. Salmon, surplus to escapement needs and subsistence uses, are made available for other uses. Salmon throughout the entire State are a fully allocated resource; multi-use salmon fisheries (commercial, sport, subsistence, and personal use) compete for a finite resource. To this end, management plans adopted by the State work to minimize and maximize allocations of specific salmon stocks, depending upon the conservation need identified. As such, management plans incorporate conservation burden and allocation of harvest opportunity that affects all users of the resource in Alaska. State management plan provisions such as net mesh size restrictions, weekly fishing periods, and size limits work to reduce the incidental catch of non-target salmon species in the salmon fishery so that stocks are able to achieve their established escapement goals.

The State uses an adaptive management process to achieve these priorities that starts with development of management strategies based on pre-season forecasts, then transitions into evaluation of run strength in season and adjusting management strategy implementation based on in-season performance of annual salmon runs. Pre-season forecasts and management strategies are developed based on guidelines and directives as outlined in state and federal management plans and regulations and in cooperation with federal subsistence managers, fishermen, tribal council representatives, and other stakeholders. Managers use test fisheries, sonar projects, genetic stock identification and age-sex-length composition, and in-season harvest reports to assess and project salmon run timing and run strength in-season to inform management decisions.

Although the FMP has been amended nine times in the last two decades, no comprehensive consideration of management strategy or scope of coverage has occurred since 1990. State fisheries regulations and federal and international laws affecting Alaska salmon have changed since 1990 and the reauthorized Magnuson-Stevens Act expanded the requirements for federal fishery management plans. Additionally, the 1990 FMP is vague with respect to management authority for the three traditional net areas that occur in the West Area. The Council determined that the FMP must be updated in order to comply with the current MSA requirements and that the FMP should be amended to more clearly reflect the Council's policy with regard to the State of Alaska continued management authority over commercial fisheries in the West Area, the Southeast Alaska commercial troll fishery, and the sport fishery.

With this proposed action, the Council is revising the FMP to reflect both its policy for managing salmon fisheries and to comply with MSA. The proposed action has two parts: (1) alternatives for defining the scope of the FMP and determining where federal conservation and management is required, and (2) options for the specific management provisions in the FMP that apply to the fisheries managed under the FMP. The alternatives and options under consideration address the MSA requirements.

Alternatives

The Council identified the following alternatives for the FMP's fishery management unit. Chapter 2 discusses these alternatives, generally explains how the alternatives would function, and identifies and compares important aspects of each alternative.

Alternative 1: No action, no changes to the FMP.

Alternative 2: Maintain the existing geographic scope of the FMP and update the FMP.

Alternative 3: **Preferred Alternative:** Maintain the FMP in the East Area and, in the West Area, modify the FMP to specifically exclude three traditional net commercial salmon fishing areas and the sport fishery from the FMP and update the FMP.

Alternative 4: Maintain the FMP in the East Area only and update the FMP.

Applicable to Alternatives 2 through 4: In areas where the FMP applies, management under any alternative would be delegated to the State of Alaska.[1]

The primary factor in deciding between the alternatives is defining where and for which fisheries federal conservation and management is required. Not every fishery in the EEZ needs management through regulations implementing a fishery management plan. The NS7 guidelines state that the MSA requires Regional Councils to prepare fishery management plans only for overfished fisheries and for other fisheries where regulation would serve some useful purpose and where the present or future benefits of regulation would justify the costs.

Options for FMP Provisions

Chapter 3 discusses the options developed to update the FMP to meet the MSA required provisions for a fishery management plan, using existing state salmon management to the extent possible. Options were developed to address the MSA requirements that are not addressed in the current FMP – annual catch limits and accountability measures, methods to report bycatch and measures to minimize bycatch and the mortality of unavoidable bycatch, and a Fishery Impact Statement. Additionally, options were developed to revise existing FMP provisions – management policy and objectives, status determination criteria, the salmon plan team, federal salmon limited entry permits, and the process for review and appeal of State management measures applicable under the FMP.

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[1]Delegation of management authority occurs in areas where the FMP applies and fishing is authorized. If fishing is not authorized in an area where the FMP applies, the Council and NMFS retain management authority and it is not delegated to the State.

Fishery Impact Statement

The MSA requires that a fishery impact statement assess and analyze the likely effects, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on fishery participants and fishing communities and the safety of human life at sea. Chapter 4 contains a fishery impact statement that provides fishery information for the salmon fisheries that occur in the current FMP's fishery management unit. In the East Area, the commercial troll fishery is the only commercial fishery that operates in the EEZ. In the West Area, the only commercial fisheries in the EEZ are the Cook Inlet drift gillnet, the Prince William Sound drift gillnet, and the South Alaska Peninsula drift gillnet and purse seine fisheries. Limited sport fisheries occur in the EEZ in the East and West Areas. The fishery impact statement details the conservation and management measures that apply to the FMP salmon fisheries and economic and community impacts of the FMP salmon fisheries.

Environmental Assessment

Chapter 5 analyzes the direct, indirect, and cumulative impacts of the proposed action and the alternative management approaches on marine resources – Alaska salmon stocks, Pacific salmon stocks listed under the Endangered Species Act, marine mammals, seabirds, and essential fish habitat. Chapter 5 provides recent information on the interactions of the FMP salmon fisheries with these marine resources and analyzes whether the proposed action or its alternatives would have significant impacts on these marine resources.

The proposed action concerns the application of federal management in addition to the existing State management for the salmon fisheries that occur in the EEZ. None of the alternatives or options under consideration would change the State's management of the salmon fisheries. The proposed action does not substantially change salmon management under the FMP in a way that would change the prosecution of the fisheries. Therefore, the analysis concludes that Alternatives 1, 2, and 3 would have an insignificant impact on Alaska salmon stocks, Pacific salmon stocks listed under the Endangered Species Act, marine mammals, seabirds, and essential fish habitat. Alternative 4, which would remove the majority of EEZ waters from the FMP, could impact salmon abundance and other resources, such as marine mammals, if unregulated fishing occurred in EEZ waters. However, since it is not possible to estimate the potential for or extent of unregulated fishing, or the nature of the impacts of that fishing, the impacts of Alternative 4 are unknown.

Regulatory Impact Review

Chapter 6 evaluates the costs and benefits of potential changes to the federal regulations implementing the FMP. Regulations implementing the FMP are at § 679.1 Purpose and Scope, § 679.2 Definitions, § 679.3 Relation to other laws, § 679.4 Permits, and § 679.7 Prohibitions. To implement the Council's revised FMP, NMFS will need to revise the federal regulations. Regulatory changes necessary to implement a revised FMP under Alternatives 2, 3, or 4 would include (1) updating the regulations on relation to other

laws to reflect the FMP and current laws, (2) removing the salmon permit regulations at § 679.4(h) salmon permits, and (3) revising the prohibition in § 679.7(h) to reflect the removal of § 679.4(h). Alternatives 3 and 4 would also require changing the definition of the Salmon Management Area in § 679.2 Definitions to reflect the FMP's revised management area. In general, the modification of these regulations will have no substantive impact on industry or the public, and will not create any costs. These changes would provide benefits from streamlining and removing obsolete federal regulations. Alternative 2 may require new regulations to facilitate dual federal and state management of the salmon fisheries in the West Area. The requirement for dual federal and state management under Alternative 2 may create additional administrative costs for federal and state agencies, and compliance costs for the public.

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List of Acronyms and Abbreviations

AAC	Alaska Administrative Code
ABC	acceptable biological catch
ACL	annual catch limit
ADF&G	Alaska Department of Fish and Game
ADOL	Alaska Department of Labor
ADOR	Alaska Department of Revenue
AFSC	Alaska Fisheries Science Center
AM	accountability measure
ANILCA	Alaska National Interest Lands Conservation Act
AS	Alaska Statute
BEG	biological escapement goal
BiOp	biological opinion
Board	Alaska Board of Fisheries
BSAI	Bering Sea and Aleutian Islands
CEQ	Council on Environmental Quality
CFEC	Commercial Fisheries Entry Commission
CFR	Code of Federal Regulations
Council	North Pacific Fishery Management Council
CPBD	catch per boat day
CTC	Chinook Technical Committee
CWT	coded-wire tag
DPS	distinct population segment
DSR	demersal shelf rockfish
EDPS	Eastern Distinct Population Segment
E.O.	Executive Order
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	endangered species unit
FMP	fishery management plan
FMU	fishery management unit
FONSI	Finding of No Significant Impact
FPEIS	Final Programmatic Environmental Impact Statement
FR	*Federal Register*
ft	foot or feet
GHL	guideline harvest level
GOA	Gulf of Alaska
IFQ	individual fishing quota
IRFA	Initial Regulatory Flexibility Analysis
ITS	incidental take statement
m	meters
MFMT	maximum fishing mortality threshold
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
MSST	minimum stock size threshold
MSY	maximum sustainable yield

MTA	Mark, Tag and Age Laboratory
NEPA	National Environmental Policy Act
NIOSH	National Institute for Occupational Safety and Health
NMFS	National Marine Fishery Service
NOAA	National Oceanographic and Atmospheric Administration
NPAFC	North Pacific Anadromous Fish Commission
NPFMC	North Pacific Fishery Management Council
NS	National Standard
OEG	optimal escapement goal
OY	optimum yield
PBR	potential biological removal
PSC	prohibited species catch
PSEIS	Programmatic Supplemental Environmental Impact Statement
PWS	Prince William Sound
RFA	Regulatory Flexibility Act
RFFA	reasonably foreseeable future action
RIR	Regulatory Impact Review
RPA	reasonable and prudent alternative
SAFE	Stock Assessment and Fishery Evaluation
SAR	stock assessment report
SBA	Small Business Act
Secretary	Secretary of Commerce
SEIS	Supplemental Environmental Impact Statement
SEG	sustainable escapement goal
SET	sustainable escapement threshold
SPLASH	Structure of Populations, Levels of Abundance, and Status of Humpbacks
SSFP	Sustainable Salmon Fisheries Policy
State	State of Alaska
SWHS	Statewide Harvest Survey
TAC	total allowable catch
UCI	Upper Cook Inlet
U.S.	United States
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VMS	vessel monitoring system
WDPS	Western Distinct Population Segment
WASSIP	Western Alaska Salmon Stock Identification Project

1 Introduction

The North Pacific Fishery Management Council (Council) is in the process of comprehensively revising and updating the *Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska* (FMP). The FMP manages the Pacific salmon fisheries in the United States Exclusive Economic Zone (EEZ; 3 nautical miles to 200 nautical miles offshore) off Alaska. The Council developed this FMP under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Upon approval by the Secretary of Commerce (Secretary), the FMP became effective in 1979 and was last comprehensively revised in 1990 (NPFMC 1990a).[2]

In December 2010, Council staff presented a discussion paper on the FMP that described the scope of the FMP and identified options for, and discussed the issues with, modifying the scope of the FMP (NPFMC 2010). The discussion paper also presented options for updating the FMP to comply with the MSA and the National Standard 1 (NS1) Guidelines requirements for annual catch limits and accountability measures for stocks managed under an FMP.[3] In December 2010, the Council unanimously passed a motion that directed staff to initiate analysis of updates to the FMP based on the Council's draft problem statement, alternatives, and options.

In April 2011, the Council reviewed a preliminary document that, along with a draft of the FMP that combines the 1990 FMP with all of the subsequent amendments, provides a thorough review of the FMP and a basic discussion of how and to what degree federal requirements are addressed in the FMP. That document also provided some preliminary options for modifying FMP provisions and highlighted areas where the Council may want to recommend changes to the FMP's management measures. With this background and suite of possible options, the Council gave further direction on how to move forward with revising and analyzing the FMP and identified a preliminary preferred alternative.

In September 2011, the Council reviewed an initial review draft analysis and a working draft FMP and received public comments on both documents. The Council moved to release the analysis for public review after staff addressed the Scientific and Statistical Committee's comments and comments from the public, to the extent possible.

In December 2011, the Council took final action to recommend Alternative 3 and associated FMP provisions as Amendment 12.

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[2] The 1990 Salmon FMP, with all of the subsequent amendments incorporated, is available at http://www.alaskafisheries.noaa.gov/npfmc/fmp/salmon/SalmonFMP311.pdf.

[3] MSA § 303(a)(15).

Updating the FMP has required extensive exchanges of information and continued coordination among Alaska Department of Fish and Game (ADF&G), NMFS, and Council staff, as well as coordination with the Alaska Board of Fisheries.

1.1 Proposed Action

The proposed action is to revise and update the FMP to reflect the Council's policy for managing salmon fisheries and to comply with the MSA. The proposed action has two parts: (1) identifying the scope of the FMP and determining where federal conservation and management is required, and (2) identifying the specific management provisions in the FMP that apply to the salmon fisheries managed under the FMP. Chapter 2 describes the alternatives that address the scope of the FMP and each alternative represents a different FMP scope. Chapter 3 describes the options for management provisions under each alternative FMP scope.

1.2 Purpose and Need for Action

The purpose of the proposed action is to implement an FMP that achieves the Council's policy for managing salmon fisheries in the EEZ off Alaska. In achieving this policy, the FMP must also comply with the MSA national standards and required provisions for all fishery management plans, as detailed in section 1.4. This proposed action is necessary to meet MSA requirements and to update the FMP.

The following is the Council's problem statement.

> **Problem Statement:**
>
> Although the North Pacific Fishery Management Council's *Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska* (FMP) has been amended nine times in the last two decades, no comprehensive consideration of management strategy or scope of coverage has occurred since 1990. State fisheries regulations and federal and international laws affecting Alaska salmon have changed since 1990[4] and the reauthorized Magnuson-Stevens Fishery Conservation and Management Act (MSA) expanded the requirements for FMPs. The Council recognizes that the FMP is vague with respect to management authority for the three directed commercial salmon fisheries that occur in the EEZ west of Cape Suckling. The FMP must be updated in order to comply with the current MSA requirements, and it should be amended to more clearly reflect the Council's desires with regard to the

[4] Specific examples include: the repeal of the International Convention for the High Seas Fisheries of the North Pacific Ocean/North Pacific Fisheries Act of 1954 (1992), the Sustainable Fisheries Act (1996), the Sustainable Salmon Fisheries Policy for the State of Alaska (2001), and the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (2007).

State of Alaska continued management authority over commercial fisheries in the West Area EEZ, the Southeast Alaska commercial troll fishery, and the sport fishery.

1.3 History of the Salmon FMP

The 1979 *Fishery Management Plan for the High Seas Salmon Fishery off the Coast of Alaska East of 175 Degrees East Longitude* established the Council's authority over the salmon fisheries in the EEZ, then known as the U.S. Fishery Conservation Zone. The Council excluded from FMP coverage the federal waters west of 175° east longitude (near Attu Island) because the salmon fisheries in that area were under the jurisdiction of the *International Convention for the High Seas Fisheries of the North Pacific Ocean*.

The Council divided the U.S. Fishery Conservation Zone covered by the plan into a West Area and an East Area with the boundary at Cape Suckling. It authorized sport salmon fishing in both areas, prohibited commercial salmon fishing in the West Area (except in three traditional net fishing areas managed by the State of Alaska (State)), and authorized commercial troll fishing in the East Area. The prohibition on commercial fishing in the West Area maintained the 1952 prohibition on commercial net salmon fishing and the 1973 prohibition on commercial troll salmon fishing in the West Area. The FMP's primary management measure was to limit entry in the commercial troll fishery in the East Area. Most of the other management measures for the salmon fisheries in the U.S. Fishery Conservation Zone were equivalent to State regulations in the adjacent State waters.

The FMP did not extend the general fishing prohibition to the three traditional net fishing areas because, as the FMP notes, fishing was authorized by other federal law, specifically the *International Convention for the High Seas Fisheries of the North Pacific Ocean*, as implemented by the *North Pacific Fisheries Act of 1954* (1954 Act).[5] Under the authority of the 1954 Act, NMFS issued regulations that set the outside fishing boundaries for salmon net fishing in Alaska as those set forth under State regulations and provided that the federal regulations for any fishing conducted in legal waters outside of State jurisdiction shall be conducted under fishing regulations promulgated by the State.[6]

With time, the 1979 FMP became outdated and some of Alaska's management measures changed. Thus, in 1990, the Council amended the FMP to update it, correct minor errors, and remove itself from routine management of the salmon fisheries in the East Area. Also, a provision of the MSA required that any plan amendment submitted after January 1, 1987, consider fish habitat and accommodate vessel safety. Finally, the FMP needed to incorporate the Pacific Salmon Treaty's restrictions on Alaskan salmon fisheries. The 1990 FMP included these changes in a reorganized and shortened document with a more appropriate title.

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[5] Salmon FMP, Section 2.2.2.
[6] 35 FR 7070, May 5, 1970. 50 CFR 210.1.

In the 1990 FMP, the Council reaffirmed its decision that existing and future salmon fisheries occurring in the EEZ require varying degrees of federal management and oversight. The FMP (1) continued to authorize commercial hand-troll and power-troll salmon fishing in the East Area, (2) allowed sport fishing in both areas, (3) delegated regulation of the sport and commercial fisheries in the East Area to the State, (4) retained the general prohibition on salmon fishing with nets in the EEZ, with the exception of commercial net salmon fisheries that occur in three delineated areas of the EEZ, (5) retained the prohibition on commercial salmon fishing in the West Area, with the exception of commercial net salmon fisheries that occur in three delineated areas of the EEZ, and (6) expanded the scope of the FMP to include the EEZ waters west of 175° east longitude. Since 1990, the Council has adopted eleven FMP amendments to address specific MSA requirements (Table 2-1). Section 2.1 describes the 1990 FMP, as amended.

On October 29, 1992, Congress repealed the 1954 Act and implemented the *North Pacific Anadromous Stocks Act of 1992* (1992 Stocks Act).[7] The 1992 Stocks Act implements the *Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean*, which replaced the *International Convention for the High Seas Fisheries of the North Pacific Ocean*. However, the 1992 Stocks Act and the *Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean* differ from the 1954 Act and *International Convention for the High Seas Fisheries of the North Pacific Ocean* in that they do not extend into the U.S. EEZ. In 1995, as a result of this change in federal law, NMFS repealed the regulations at 50 CFR 210.1 because they were without statutory basis.[8] At that time, the FMP was not amended to reflect these changes in international law.

In 2010, the Council began a comprehensive review of the FMP and consideration of its management strategy and scope of coverage. Since 1990, state fishery regulations and federal and international laws affecting Alaska salmon have changed and the reauthorized Magnuson-Stevens Act expanded the requirements for fishery management plans. The Council also recognized that the FMP was vague with respect to management authority for the three directed commercial salmon fisheries that occur in the West Area. The Council decided to update the FMP to comply with the current Magnuson-Stevens Act requirements and to more clearly reflect the Council's policy with regard to the State of Alaska's management authority over commercial fisheries in the West Area, the commercial troll fishery in the East Area, and the sport fishery. This document reflects the Council's proposed action to revise and update the FMP.

1.4 Magnuson-Stevens Fishery Conservation and Management Act

The MSA contains two primary sections that govern fishery management plans; the ten national standards in section 301 and required contents of fishery management plans in section 303. These sections are

[7] The *North Pacific Anadromous Stocks Act of 1992*, Public Law 102-567, is codified at 16 USC. §§ 5001-5012.
[8] 60 FR 39272, August 2, 1995.

excerpted below.[9] Additionally, NMFS published National Standard Guidelines (NS Guidelines; 50 CFR 600.310-600.355) to provide comprehensive guidance for the development of FMPs and FMP amendments that comply with the MSA national standards.

> **SEC. 301. NATIONAL STANDARDS FOR FISHERY CONSERVATION AND MANAGEMENT**
>
> (a) IN GENERAL.—Any fishery management plan prepared, and any regulation promulgated to implement any such plan, pursuant to this title shall be consistent with the following national standards for fishery conservation and management:
>
> (1) Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
>
> (2) Conservation and management measures shall be based upon the best scientific information available.
>
> (3) To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
>
> (4) Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
>
> (5) Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
>
> (6) Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.
>
> (7) Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
>
> (8) Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.
>
> (9) Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
>
> (10) Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.
>
> **SEC. 303. CONTENTS OF FISHERY MANAGEMENT PLANS**

[9] The complete Magnuson-Stevens Fishery Conservation and Management Act is available at http://www.nmfs.noaa.gov/sfa/magact/MSA_Amended_2007%20.pdf.

(a) REQUIRED PROVISIONS.—Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, shall—

(1) contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are—

(A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery;

(B) described in this subsection or subsection (b), or both; and

(C) consistent with the national standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;

(2) contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;

(3) assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;

(4) assess and specify—

(A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3),

(B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing, and

(C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;

(5) specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, charter fishing, and fish processing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, economic information necessary to meet the requirements of this Act, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;

(6) consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;

(7) describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;

(8) in the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

(9) include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for—

(A) participants in the fisheries and fishing communities affected by the plan or amendment;

(B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants; and

(C) the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery;

(10) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;

(11) establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority—

(A) minimize bycatch; and

(B) minimize the mortality of bycatch which cannot be avoided;

(12) assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;

(13) include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery, including its economic impact, and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors;

(14) to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate, taking into consideration the economic impact of the harvest restrictions or recovery benefits on the fishery participants in each sector, any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery and;

(15) establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.

MSA § 303 note

EFFECTIVE DATES; APPLICATION TO CERTAIN SPECIES.—The amendment made by subsection (a)(10)[16]—

(1) shall, unless otherwise provided for under an international agreement in which the United States participates, take effect—

(A) in fishing year 2010 for fisheries determined by the Secretary to be subject to overfishing; and

(B) in fishing year 2011 for all other fisheries; and

(2) shall not apply to a fishery for species that have a life cycle of approximately 1 year unless the Secretary has determined the fishery is subject to overfishing of that species; and

(3) shall not limit or otherwise affect the requirements of section 301(a)(1) or 304(e) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1851(a)(1) or 1854(e), respectively).

[16] Section 104(a)(10) of P.L. 109-479 added section 303(a)(15).

2 Alternatives for the Scope of the Salmon FMP

The first step in revising the *Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska* (FMP) is defining the FMP's scope, or fishery management unit (FMU). The National Standard (NS) 3 Guidelines state that the choice of a management unit depends on the focus of the fishery management plan's objectives and may be organized around biological, geographic, economic, technical, social, or ecological perspectives.[10] The NS3 Guidelines define the term "management unit" as a fishery or that portion of a fishery identified in an FMP as relevant to the FMP's management objectives.

The scope of the FMP directs how the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and NS Guidelines could be addressed; necessary updates to the FMP to meet these requirements, such as annual catch limits and accountability measures, would be based on the FMP's scope. The North Pacific Fishery Management Council's (Council's) December 2010 motion identified the following four alternatives for the FMP's FMU. In December 2011, the Council took final action to recommended Alternative 3 as the preferred alternative.

Alternatives: Fishery Management Unit

Alternative 1: No action, no changes to the FMP.

Alternative 2: Maintain the existing geographic scope of the FMP and update the FMP.

Alternative 3: **Preferred Alternative:** Maintain the FMP in the East Area and, in the West Area, modify the FMP to specifically exclude three traditional net commercial salmon fishing areas and the sport fishery from the FMP and update the FMP.

Alternative 4: Maintain the FMP in the East Area only and update the FMP.

Applicable to Alternatives 2-4: In areas where the FMP applies, management under any alternative would be delegated to the State of Alaska.[11]

This section discusses these alternatives, generally explains how the alternatives would function, and identifies and compares important aspects of each alternative.

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[10] 50 CFR 600.320(d).

[11] Delegation of management authority occurs in areas where the FMP applies and fishing is authorized. If fishing is not authorized in an area where the FMP applies, the Council and NMFS retain management authority and it is not delegated to the State.

Once the scope of the FMP is determined, the Council would then determine the appropriate FMP provisions applicable in that FMU. Chapter 3 provides an assessment of each FMP provision and a discussion of the options identified. Chapter 3 also provides a discussion of the MSA requirements that are not addressed by the 1990 FMP or subsequent amendments.

2.1 Alternative 1: No changes to the FMP

Under this "no action" alternative, the Council would make no changes to the FMP—no updates for the requirements of the MSA or NS Guidelines, and no modifications to the management approach. Importantly, the FMP's function in the three traditional net areas in the West would remain vague and would not reflect the Council's policy with respect to these areas. As a result, the FMP would remain in its current state, which is not a viable option. Chapter 3 identifies the MSA requirements that are not addressed in the FMP: annual catch limits and accountability measures, methods to report bycatch and measures to minimize bycatch and the mortality of unavoidable bycatch, and a Fishery Impact Statement. Chapter 3 also highlights the FMP provisions that should be extensively revised to reflect current management and the FMP provisions that could be removed.

2.1.1 Scope of the Salmon FMP

The fishery management unit of the FMP is composed of all waters of the EEZ off Alaska and the salmon fisheries that occur there (Figure 2-1).[12] The original FMP (1979) established federal authority over salmon fisheries in the EEZ but excluded that portion of the EEZ west of 175° E. longitude. Amendment 3 (1990) to the FMP extended jurisdiction to the area of the EEZ west of 175° E. longitude and expressly deferred regulation of the sport fishery and the Southeast Alaska commercial troll salmon fishery to the State. Commercial and sport salmon fisheries occurring in the EEZ are governed by State regulations.[13] Although the Council and NMFS are removed from routine management of salmon fisheries in the EEZ, the FMP asserts and reserves federal authority and general NMFS and Council participation in and oversight of salmon management in the EEZ.

The FMP includes all five species of Pacific salmon in the EEZ:

Chinook salmon (king), *Oncorhynchus tshawytscha*;

Coho salmon (silver), *Oncorhynchus kisutch*;

Pink salmon (humpy), *Oncorhynchus gorbuscha*;

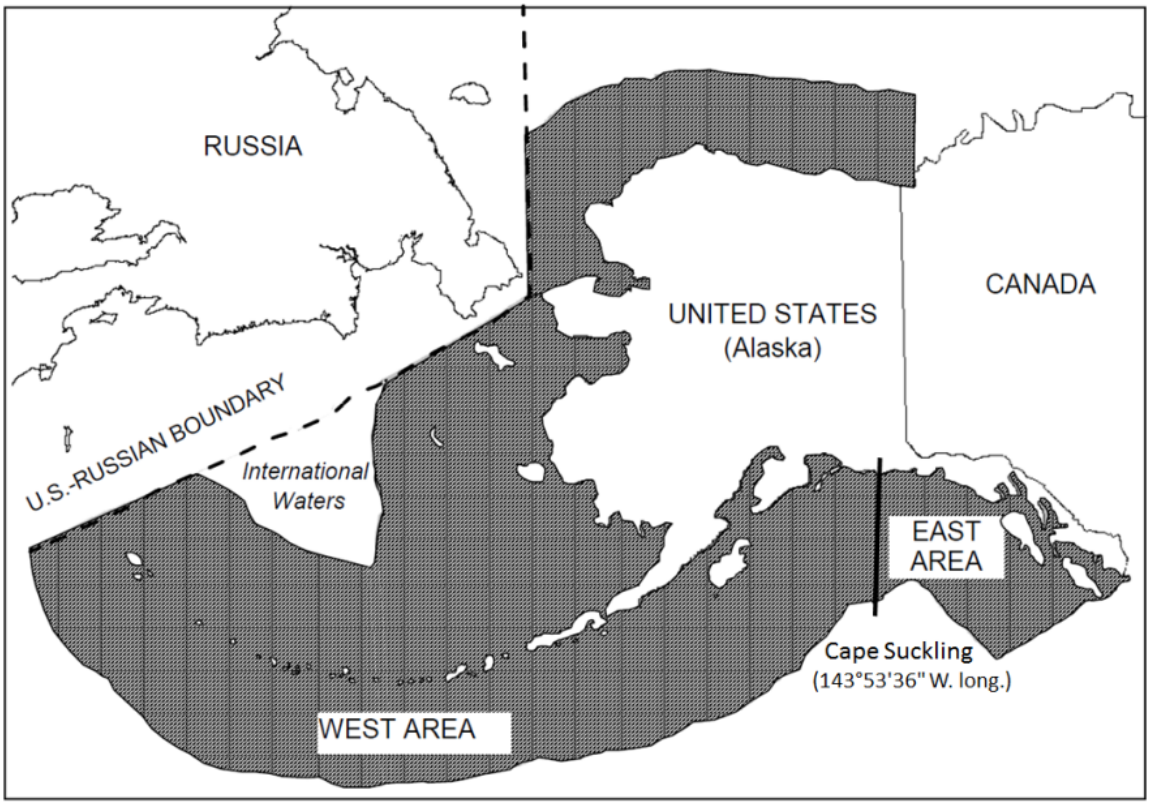
Sockeye salmon (red), *Oncorhynchus nerka*; and

Chum salmon (dog), *Oncorhynchus keta*.

[12] Salmon FMP, Section 2.1.
[13] Salmon FMP, Section 2.2.

The FMP establishes two management areas within its fishery management unit, the East Area and the West Area. The border between the two areas is at the longitude of Cape Suckling, at 143°53'36" W. longitude. The FMP addresses commercial salmon fisheries differently in the East and the West Areas, as described below.

Figure 2-1 The FMP's management area, showing the East and West Areas.



East Area

The East Area is that portion of the EEZ off Alaska east of Cape Suckling.[14] The Southeast Alaska commercial salmon troll fishery is the only commercial fishery authorized in the East Area. The Southeast Alaska commercial troll fishery in the EEZ is a mixed-stock, mixed-species fishery that primarily targets Chinook and coho salmon; pink, chum, and sockeye salmon are also taken. The FMP sets forth the Council's management goals and objectives for the salmon fisheries in the East Area, which accordingly focus on the Southeast Alaska commercial troll fishery.[15] The FMP defers management of

[14] Note that the East Area is outside of Alexander Archipelago and does not include the waters between the islands and the mainland, per MSA § 306(a)(2)(C).
[15] Salmon FMP, Section 4.2, including subsections.

the Southeast Alaska troll fishery to the State. Commercial salmon fishing with net gear is prohibited in the East Area.

The troll fishery operates in both State and federal waters, although the majority of the catch and effort occurs in State waters. The State collects fisheries information from the troll fishery as a whole and does not separate the fishery in the EEZ from the state-waters fishery. The troll fishery harvests less than one percent of the total harvest of pink, chum, and sockeye salmon occurring in southeast waters. The troll fishery has two seasons, the winter season, October 11 through April 30, and the summer season, May 1 through September 30. The winter troll fishery is limited to within State waters; the summer troll fishery occurs in federal and State waters. More information on this fishery is provided in the Fishery Impact Statement in Chapter 4.

West Area

The West Area is that portion of the EEZ off Alaska west of Cape Suckling. It includes the EEZ in the Bering, Chukchi, and Beaufort Seas, the Arctic Ocean, and North Pacific Ocean west of Cape Suckling. The FMP prohibits commercial salmon fishing in most of the West Area, but permits commercial fishing for salmon with nets in three small areas of the EEZ adjacent to State net fisheries. The FMP describes these areas in Section 2.2.2 and Appendix C of the FMP as the Alaska Peninsula area (Figure 2-2), the Prince William Sound area (Figure 2-3), and the Cook Inlet area (Figure 2-4). More information on these fisheries is provided in the Fishery Impact Statement in Chapter 4.

The FMP is vague on the function of the FMP in these areas. Although the FMP broadly includes these three areas and the salmon and fisheries that occur there within the fishery management unit and states that management of these areas is left to the State under other federal law, the FMP does not explicitly delegate management of these salmon fisheries to the State.[16] The FMP does not contain any management goals or objectives for these three areas or any provisions with which to manage salmon fishing. The FMP only refrains from extending the general fishing prohibition to those areas, where, as the FMP notes, fishing was authorized by other federal law, specifically the *International Convention for the High Seas Fisheries of the North Pacific Ocean* as implemented by the *North Pacific Fisheries Act of 1954* (1954 Act).[17] However, in 1992, Congress repealed the 1954 Act and implemented the *North Pacific Anadromous Stocks Act of 1992* (1992 Stocks Act).[18] The 1992 Stocks Act implements the *Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean*, which replaced the *International Convention for the High Seas Fisheries of the North Pacific Ocean*. The 1992 Stocks Act and the *Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean* differ from the 1954 Act and *International Convention for the High Seas Fisheries of the North Pacific Ocean* and do

[16] Salmon FMP, Section 2.2.2.
[17] Salmon FMP, Section 2.2.2.
[18] The *North Pacific Anadromous Stocks Act of 1992*, Public Law 102-567, is codified at 16 USC. §§ 5001-5012.

not extend into the U.S. EEZ as did the 1954 Act. Therefore, the other federal law that authorized state management of the net fisheries, in lieu of the FMP, no longer exists.

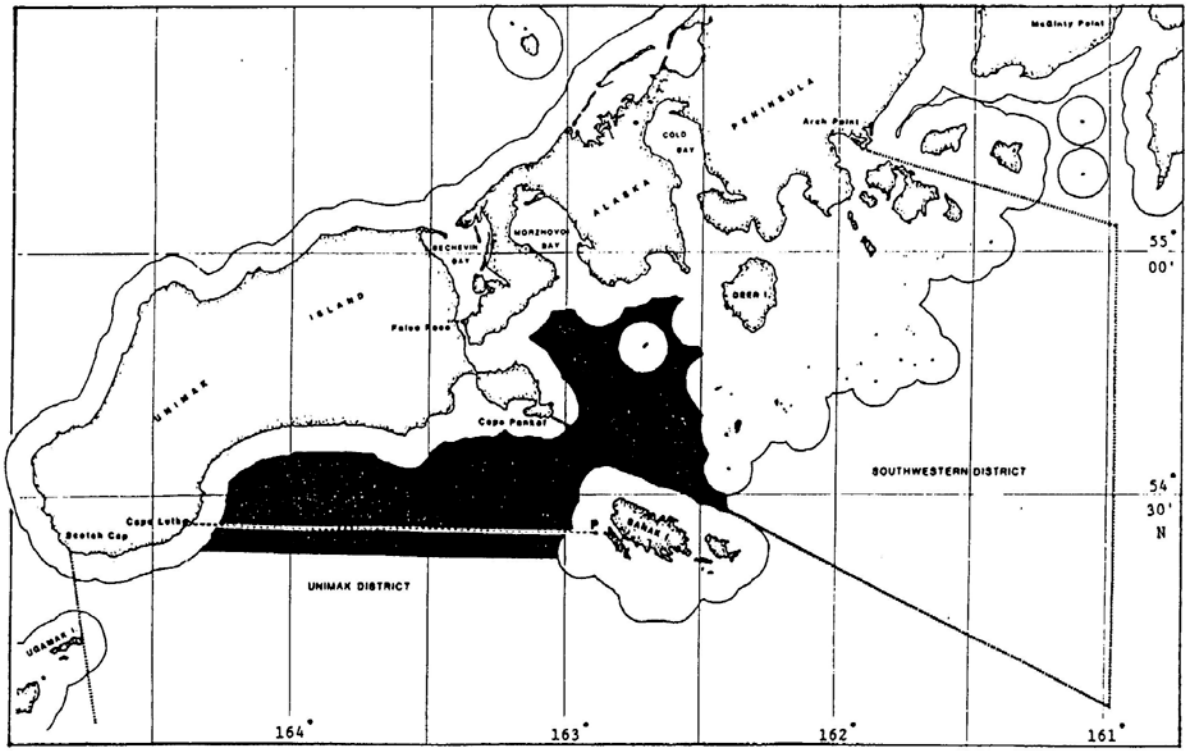


Figure C.2. Location of the historical net-fishing area in the False Pass area (shaded area). The hatched lines separate the Unimak and Southwestern Districts of the Alaska Peninsula Area. The seaward boundary of the traditional net-fishing area is a line 3 miles seaward of the dashed line running between Cape Lutke and point P on the west side of Sanak Island at 54°26'45 N. lat., 162°53' W. long. (5 AAC 09.301).

Figure 2-2 1990 FMP map of the South Alaska Peninsula traditional net fishing area.

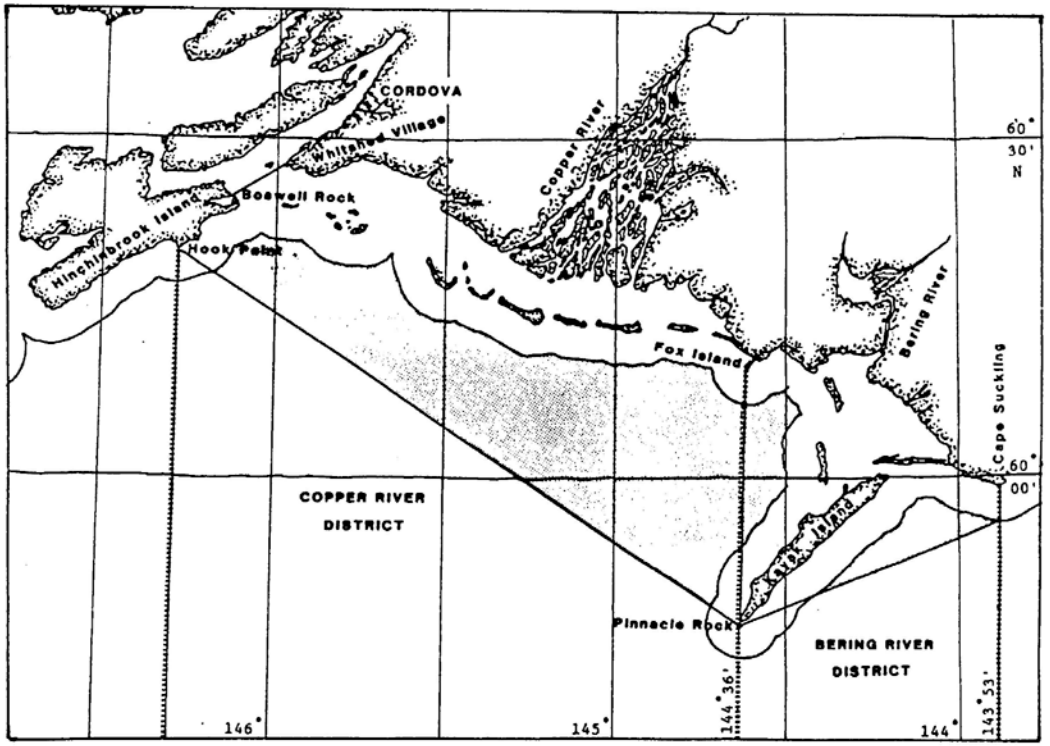


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Figure C.3. Location of the historical net-fishing area in the Copper River area (shaded area). The hatched lines separate the Copper River and Bering River districts of the Prince William Sound Area. The seaward boundary of the traditional net-fishing area is a line 3 miles seaward from a line from Cape Suckling to the southernmost tip of Pinnacle Rock to the tip of Hook Point on Hinchinbrook Island.

Figure 2-3 1990 FMP map of the Prince William Sound traditional net fishing area.

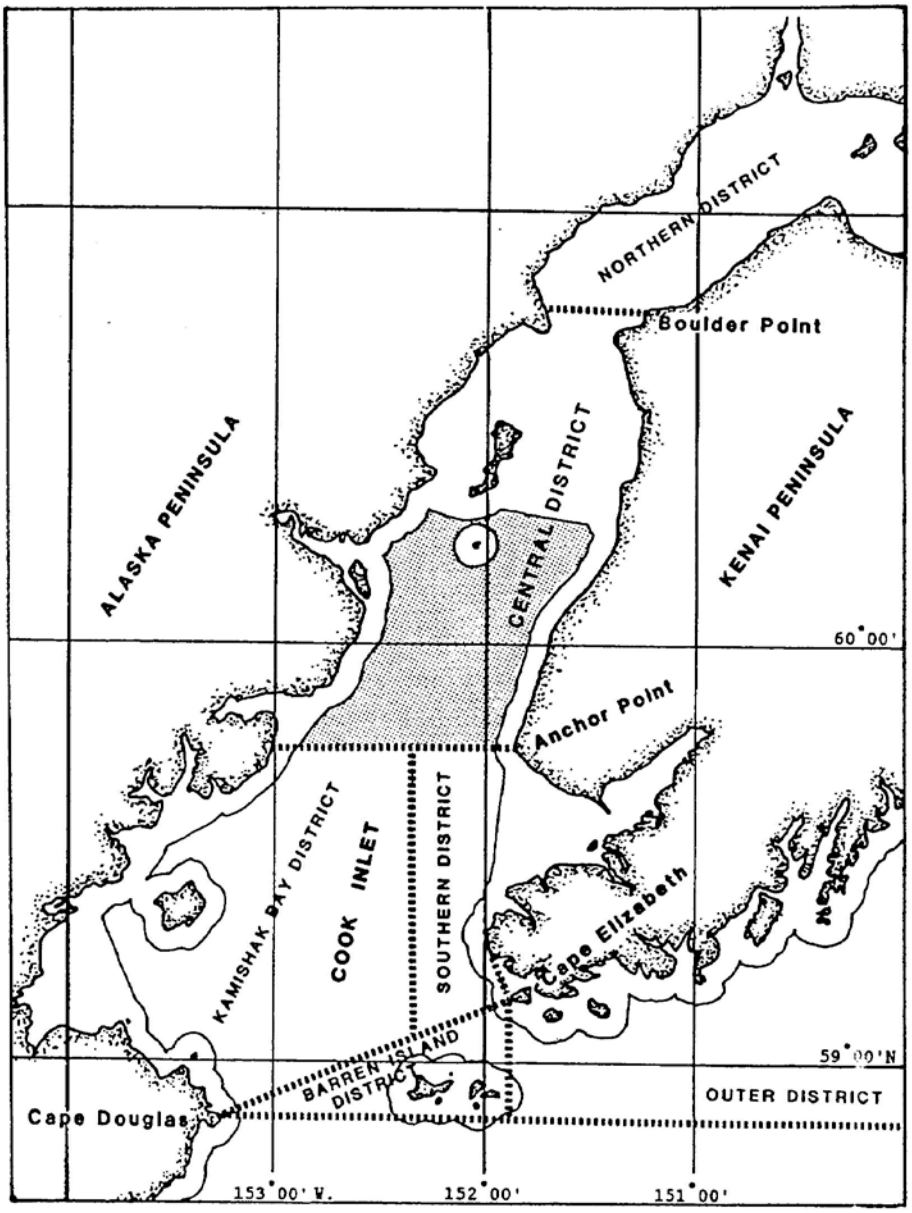

Figure C.1. Location of the historical net-fishing area in the Cook Inlet area (shaded). The hatched lines separate ADF&G fishing districts.

C - 4

Figure 2-4 1990 FMP map of the Cook Inlet traditional net fishing area.

2.1.2 FMP Delegates Salmon Management to the State of Alaska

The intended effect of the FMP is to conserve and manage the salmon resources in the North Pacific Ocean and to allow the fisheries that occur in State and EEZ waters to be managed as one fishery. The FMP explicitly delegates management of the commercial troll and sport fisheries to the State, to manage consistent with State and federal laws, including the Pacific Salmon Treaty[19] between the United States and Canada. The Fishery Impact Statement, in Chapter 4, provides detailed information on the salmon fisheries managed under the FMP.

State management of the salmon fishery is based, by direction from the State constitution, on the sustained yield principle (Alaska Constitution Article VIII, section 4). Regulations for the Alaska salmon fishery are made by the Alaska Board of Fisheries (Board, AS 16.05.251). The Board has the authority to allocate salmon available for harvest among different user groups (AS 16.05.251(e)). The Alaska Department of Fish and Game (ADF&G) manages the fishery in-season and issues emergency regulations to achieve conservation objectives and to implement allocation policies established by the Board (AS 16.05.060). ADF&G reviews salmon escapement goals and stock status for each salmon management area on a three-year cycle, consistent with the Board's regulatory review cycle (5 AAC 39.223(b)(6)). Escapement goal and stock status reviews are prepared prior to Board review.

The State has many decades of sustainable salmon management, utilizing escapement goals and in-season management decisions by local managers. Alaska salmon fisheries are conservatively managed by allowing fishing with specific gears, in specific areas, at specific times. Alaska salmon fisheries generally occur in areas terminal or near-terminal to natal spawning systems, where the fish are highly concentrated and stock of origin is discernible. Generally, run times are consistent and predictable from one year to the next; salmon run sizes, however, are highly variable.

Under State management, salmon fishery openings are set pre-season through regulations adopted by the Board or in-season through management authority that has been delegated to ADF&G. Salmon fishery openings are managed and adjusted in-season through emergency orders in response to escapement goal level and run size. State escapement enumeration programs are in place, with direct or indicator stock escapement monitoring for most salmon stocks. Fishing is allowed to continue only if in-season assessment of run strength indicates a harvestable surplus; the level of fishing depends on the strength of the in-season run. Local area managers, under authority delegated by the ADF&G Commissioner, open and close the fisheries in response to in-season assessments of the strength and timing of runs. In-season, emergency order management strives to avoid the principle overfishing threat: intense fishing activity during weak runs.

[19] http://www.psc.org/pubs/Treaty.pdf

State of Alaska Policy for the Management of Sustainable Salmon Fisheries

The Board's Policy for the Management of Sustainable Salmon Fisheries is an integral part of its tri-yearly review of State salmon fisheries.[20] The policy contains five fundamental principles for sustainable salmon management, each with criteria used to evaluate salmon fisheries and to address conservation issues. The five fundamental principles of the policy are as follows:

- Wild salmon stocks and their habitats should be maintained at levels of resource productivity that assure sustained yields.
- Fisheries shall be managed to allow escapements within ranges necessary to conserve and sustain potential salmon production and maintain normal ecosystem functioning.
- Effective salmon management systems should be established and applied to regulate human activities that affect salmon.
- Public support and involvement for sustained use and protection of salmon resources should be sought and encouraged.
- In the face of uncertainty, salmon stocks, fisheries, artificial propagation, and essential habitats shall be managed conservatively.

The Sustainable Salmon Fisheries Policy requires that ADF&G describe the extent to which salmon fisheries and habitats conform to the policy's explicit principles and criteria. In response, the Board must review fishery management plans or draft new plans. If a concern with a particular salmon stock is identified in the course of this review, an action plan with measures that include needed research, habitat improvements, or new regulations, must be developed to address the concern. The Sustainable Salmon Fisheries Policy is implemented by the Board and ADF&G in the course of the Board's normal regulatory cycle.

2.1.3 Sport Salmon Fisheries

The FMP allows sport (also referred to interchangeably as recreational) fishing for salmon in the EEZ off Alaska. The FMP delegates management of the sport salmon fishery in the EEZ to the State to manage along with the sport fishery inside State waters. The sport salmon fishery, and management measures for the sport fishery, were included in the 1979 FMP, but no information exists explaining why the Council decided to impose federal management on salmon sport fishing in the EEZ. When the FMP was revised in 1990, the Council decided to delegate routine management of the sport fishing in the EEZ to the State, with federal oversight, and removed all sport fishery management measures from the FMP.

The majority of sport fishing for salmon takes place in State waters. ADF&G Division of Sport Fish is responsible for the State's recreational fishery resource, which includes the conservation of self-

[20] 5 AAC 39.222.

perpetuating populations of fish; management of sport fisheries in both salt and fresh water; and hatchery production and release of enhanced fish for sport fishing. The goals of the division are to conserve naturally reproducing populations of sport fish species, provide a diverse mix of sport fishing opportunities, and optimize the social and economic benefits of Alaska's recreational fisheries. The Fishery Impact Statement, in Chapter 4, provides detailed information on the sport salmon fisheries managed under the FMP.

2.1.4 Amendments to the Salmon FMP

The FMP has been amended nine times since 1979 and two amendments are pending Secretarial approval. Each amendment to the FMP is detailed in Table 2-1.

Table 2-1. Amendments to the Salmon FMP.

Amendment	Year Approved	Pertinent Function(s)	Federal Register document
FMP for the High Seas Salmon Fisheries off the Coast of Alaska East of 175 Degrees East Longitude	1979 - 1981	• Establishes Council and NMFS authority over the salmon fisheries in federal waters from 3 to 200 miles seaward. • Excluded waters west of 175°E. long. from FMP.	
Amendment 3 FMP for the Salmon Fisheries in the EEZ off the Coast of Alaska	1990	• Extends jurisdiction of FMP to EEZ west of 175°E. long. • Defers regulation of sport and commercial fisheries to State. • Effectively removes Council and NMFS from routine management but expressly maintained federal participation, oversight, and final authority.	55 FR 47773
Amendment 4 (modified by Amend 6)		• Provides a definition of overfishing, as required by NOAA regulations at 50 CFR 602.	56 FR 12385
Amendment 5 (superseded by Amend 7)	1998	• Implements Essential Fish Habitat (EFH) provisions contained in the MSA and 50 CFR 600.815. • Describes and identifies EFH fish habitat for anadromous fish. • Describes and identifies fishing and non-fishing threats to salmon EFH, research needs, habitat areas of particular concern, and EFH conservation and enhancement recommendations.	65 FR 20216
Amendment 6 Revise Definitions of Overfishing, MSY, and OY	2002	• Updates the FMP with new definitions of overfishing in compliance with the MSA, consistent with the NS Guidelines and State and federal cooperative management, and based on the State's salmon management and the Pacific Salmon Treaty. • Implements an maximum sustainable yield control rule, maximum fishing mortality rate, and minimum stock size threshold for the Southeast Alaska troll fishery	67 FR 1163
Amendments 7 and 8 Essential Fish Habitat and Habitat Areas of Particular Concern	2006	• Amendment 7 supersedes Amendment 5 • Updates descriptions of EFH and Habitat Areas of Particular Concern (HAPC) within the FMP • Makes conservation and enhancement recommendations for EFH and HAPCs • Identifies and authorizes protection measures for EFH and HAPCs	71 FR 36694
Amendment 9 Aleutian Islands Habitat Conservation Area	2008	• Revises the boundaries of the Aleutian Islands Habitat Conservation Area described in the FMP	73 FR 9035
Amendment 10 Permit Fees	Under Review	• Establish a system to collect fees for permits	Under Development
Amendment 11 Essential Fish Habitat	Under Review	• Updates description of EFH impacts from non-fishing activities, and EFH conservation recommendations for non-fishing activities. • Revises the timeline associated with the HAPC process to a five-year timeline. • Updates EFH research priority objectives.	Under Development

2.2 Alternative 2: Maintain the existing geographic scope of the FMP

Under Alternative 2, the FMP would maintain the current "status quo" scope of the FMP, as described in Section 2.1.1. The FMP would be updated and revised to meet MSA requirements and NS Guidelines. These specific management measures are discussed in Chapter 3.

East Area

Under Alternative 2, the FMP would continue to impose federal management over the Southeast Alaska troll and sport fisheries, but delegate management of these fisheries to the State. Under MSA § 306(a)(3)(B), this gives the State authority to regulate fishing vessels outside the boundaries of the State.[21]

Maintaining the FMP in the East Area would leave existing management structures in place, recognizing that the FMP is the nexus for the application of the Pacific Salmon Treaty and Endangered Species Act and that NMFS's primary role in salmon management is through the Pacific Salmon Commission. Delegation of salmon fishery management authority to the State requires the Council and NMFS to stay apprised of State management measures governing the commercial and sport salmon fisheries in the East Area and to review these measures for consistency with the FMP, as necessary. Review of State management measures is facilitated through reports received from the State at regularly scheduled Council meetings. In addition, the Council and NMFS have the opportunity to participate in the State's regulatory process during scheduled Board meetings.

NMFS issued an *Endangered Species Act Section 7(a)(2) Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation on the Approval of Revised Regimes under the Pacific Salmon Treaty and the Deferral of Management to Alaska of Certain Fisheries Included in those Regimes* (2008 BiOp, NMFS 2008a). The 2008 BiOp concluded no jeopardy and included an Incidental Take Statement (ITS) that covers the Pacific Salmon Treaty, and the deferral of management to the State for the duration of this management program, subject to the conditions that require re-initiation of consultation (NMFS 2008a). Additionally, NMFS prepared the *Final Programmatic Environmental Impact Statement for the Pacific Salmon Fisheries Management off the Coasts of Southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin* (FPEIS, NMFS 2003). The primary federal action considered in the FPEIS for the Southeast Alaska salmon fishery was the annual decision regarding continued delegation of management to the State and the issuance of an ITS through the Endangered Species Act Section 7 consultation process.

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[21] MSA § 306(a)(3)(B) A State may regulate a fishing vessel outside the boundaries of the State in the following circumstances:…(B) The fishery management plan for the fishery in which the fishing vessel is operating delegates management of the fishery to a State and the State's law and regulations are consistent with such fishery management plan. …

West Area

Under Alternative 2, the Council would need to clarify the FMP's management policy and objectives for the commercial salmon fisheries in the West Area. New management measures would need to be developed to address MSA provisions that are not currently developed for the fisheries in the West Area, including status determination criteria, a mechanism for specifying annual catch limits, a mechanism for standardized bycatch reporting, and measures to minimize bycatch to the extent practicable. These management measures are discussed in Chapter 3. Additionally, the Council or NMFS may decide that it is necessary to apply additional federal requirements to salmon vessels fishing in the EEZ, such as on-board observers, recordkeeping and reporting requirements, or vessel monitoring systems.

Key to this alternative is defining the FMP's role in the three traditional net fishing areas. Some public comments have expressed interest for the FMP's role to be limited to oversight of State management measures that apply to all of the salmon fisheries in the region, including measures that only apply to salmon fisheries in State waters. Specifically, these public comments request oversight of escapement goals and decisions to allocate salmon among user groups (subsistence, personal use, sport, and the different commercial gear types). However, it is not possible to have an FMP that only serves an oversight function and does not contain management measures for FMP fisheries that address the MSA requirements. Additionally, under the MSA, an FMP only has authority to manage the fisheries that occur in the EEZ. The MSA is clear that nothing in the MSA shall be construed as extending or diminishing the jurisdiction or authority of any state within its boundaries.[22] Absent formal preemption in accordance with MSA § 306(b), the MSA does not provide authority for the Council to manage fisheries in state waters, which would be required for the Council to change escapement goals or to allocate more salmon to a specific gear group, or to direct the Board to make these types of changes.

In other instances where a fishery occurs in both state and federal waters, federal management of the federal portion of the fishery is responsive to state management of the portion in state waters. An example of this occurs in the Pacific cod fisheries in the Gulf of Alaska and Aleutian Islands. The federal Pacific cod total allowable catch is set taking into account the State guideline harvest level so that total catch does not exceed the Pacific cod annual catch limit.

The Council does have two other FMPs that delegate much of the management of those fisheries to the State, with federal oversight – the *Fishery Management Plan for the Bering Sea/Aleutian Islands King and Tanner Crabs* (crab FMP) and the *Fishery Management Plan for the Scallop Fisheries off Alaska* (scallop FMP). These fishery management plans implement federal management measures and delegate specific categories of management measures to the State. These fishery management plans have provisions, either implemented by NMFS or the State, that address each requirement in MSA § 303(a),

[22] MSA § 306(a) IN GENERAL. – (1) Except as provided in subsection (b), nothing in this Act shall be construed as extending or diminishing the jurisdiction or authority of any State within its boundaries.

and many other federal requirements, such as a federal limited access program, up to 100% observer coverage, and mandatory vessel monitoring system.

As noted above, the MSA does provide the Secretary the ability to preempt state management and assume responsibility for the regulation of a fishery in state waters under two conditions.[23] First, the fishery must occur predominantly within the EEZ. Second, the results of the state's action or inaction must substantially and adversely affect the carrying out of the fishery management plan. Both of these criteria must be met for preemption of state management. If both these criteria were met, NMFS would need to determine how it would regulate the salmon fisheries in state waters and the information it would use to make management decisions. Federal fisheries regulations require data, analysis, and an extensive process. NMFS does not have the information, expertise, or infrastructure necessary to manage Alaska salmon fisheries in federal or State waters, at present. If preemption were required, and in the absence of these key components to management, NMFS may have no other choice but to close the salmon fisheries off Alaska until it could develop the necessary expertise and infrastructure to manage Alaska salmon fisheries in accordance with applicable federal law.

2.3 Alternative 3 (Preferred Alternative): Modify the FMP to exclude the three traditional fishing areas and the sport fishery in the West Area

Alternative 3 would maintain the primary functions of the FMP – closing the vast majority of the EEZ to salmon fishing and facilitating State management of the few salmon fisheries that occur in the EEZ. Alternative 3 is similar to Alternative 2, except in the way it would achieve the policy goal of facilitating State management of the traditional salmon fisheries in the West Area. Instead of imposing federal management of the salmon fisheries in the West Area and delegating management to the State, these fisheries would no longer be included in the FMP, thereby allowing the State to manage these fisheries independently and not through a federal delegation of management authority.

East Area

Alternative 3 is the same as Alternative 2 in the East Area. The FMP would continue to impose federal management authority over commercial and sport salmon fisheries in the EEZ and continue to delegate management of the Southeast Alaska troll fishery and sport fisheries to the State. The sport fishery would remain in the FMP to enable management of all Chinook harvests under the Pacific Salmon Treaty. The

[23] MSA § 306(b) EXCEPTION. – (1) If the Secretary finds, after notice and an opportunity for a public hearing … that (A) the fishing in a fishery, which is covered by a fishery management plan implemented under this Act, in engaged in predominately within the exclusive economic zone and beyond such zone; and (B) and State has taken action, or omitted to take any action, the results of which will substantially and adversely affect the carrying out of such fishery management plan; the Secretary shall promptly notify such State and the appropriate Council of such finding and of his intention to regulate the applicable fishery within the boundaries of such State (other that internal waters), pursuant to such fishery management plan and the regulations promulgated to implement such plan.

FMP would also need to be updated and revised to meet MSA requirements and NS Guidelines. This would include developing management measures to address MSA provisions, such as a mechanism for specifying annual catch limits and accountability measures. Options for these management measures are discussed in Chapter 3, along with the preferred options identified by the Council.

As with Alternative 2, Alternative 3 would maintaining the FMP in the East Area and leave existing management structures in place, recognizing that the FMP is the nexus for the application of the Pacific Salmon Treaty and Endangered Species Act and that NMFS's primary role in salmon management is through the Pacific Salmon Commission. Delegation of salmon fishery management authority to the State requires the Council and NMFS to stay apprised of State management measures governing the commercial and sport salmon fisheries in the East Area and to review these measures for consistency with the FMP, as necessary. Review of State management measures is facilitated through reports received from the State at regularly scheduled Council meetings. In addition, the Council and NMFS have the opportunity to participate in the State's regulatory process during scheduled Board meetings.

NMFS issued the 2008 BiOp (NMFS 2008a) that concluded no jeopardy and included an ITS that covers the Pacific Salmon Treaty, and the deferral of management to the State for the duration of this management program, subject to the conditions that require re-initiation of consultation (NMFS 2008a). Additionally, NMFS prepared the FPEIS (NMFS 2003) that considered as the primary federal action the annual decision regarding continued delegation of management to the State and the issuance of an ITS through the Endangered Species Act Section 7 consultation process.

West Area

Alternative 3 would modify the FMP's management area to remove the three traditional net areas (Figure 2-5, Figure 2-6, and Figure 2-7) from the West Area. Removing these three areas from the FMP's management area would exclude the salmon fisheries that occur in those areas from federal fisheries management. Any commercial fishing for salmon by State registered vessels in the EEZ in these three areas would be managed by the State. Under Alternative 3, the FMP would continue to prohibit commercial salmon fishing in the redefine West Area. Alternative 3 would also remove the sport fishery in the West Area from federal management. Any sport fishing for salmon by State registered vessels in the EEZ west of Cape Suckling would be managed by the State.

Removing the three traditional net fishing areas and the sport fishery in the West Area from the FMP would result in EEZ waters, where salmon fisheries occur, that are not under the FMP. The State would continue to manage these salmon fisheries in the EEZ waters and sport fishing in the EEZ. The MSA § 306(a)(3)(A) provides that a state may regulate a fishing vessel outside the boundaries of the state if the fishing vessel is registered under the law of that state and there is no fishery management plan or other

applicable federal fishing regulations for the fishery in which the vessel is operating.[24] Under this alternative, management of these fisheries would not be delegated to the State under the FMP as there would be no assertion of federal authority over the commercial fisheries in these areas or the sport fishery that could be delegated. The State has the authority to regulate state registered vessels and there would be no federal management scheme for these areas or the sport fishery in the West Area. Note that this change to the Salmon FMP would not impact groundfish fisheries management or salmon taken as prohibited species catch in the groundfish fisheries.

[24] MSA § 306(a)(3) A State may regulate a fishing vessel outside the boundaries of the State in the following circumstances: (A) The fishing vessel is registered under the law of that State, and (i) there is no fishery management plan or other applicable Federal fishing regulations for the fishery in which the vessel is operating;…

Figure 2-5 Cook Inlet Area – The EEZ waters that are excluded from the management area are those waters north of the line from Anchor Point.

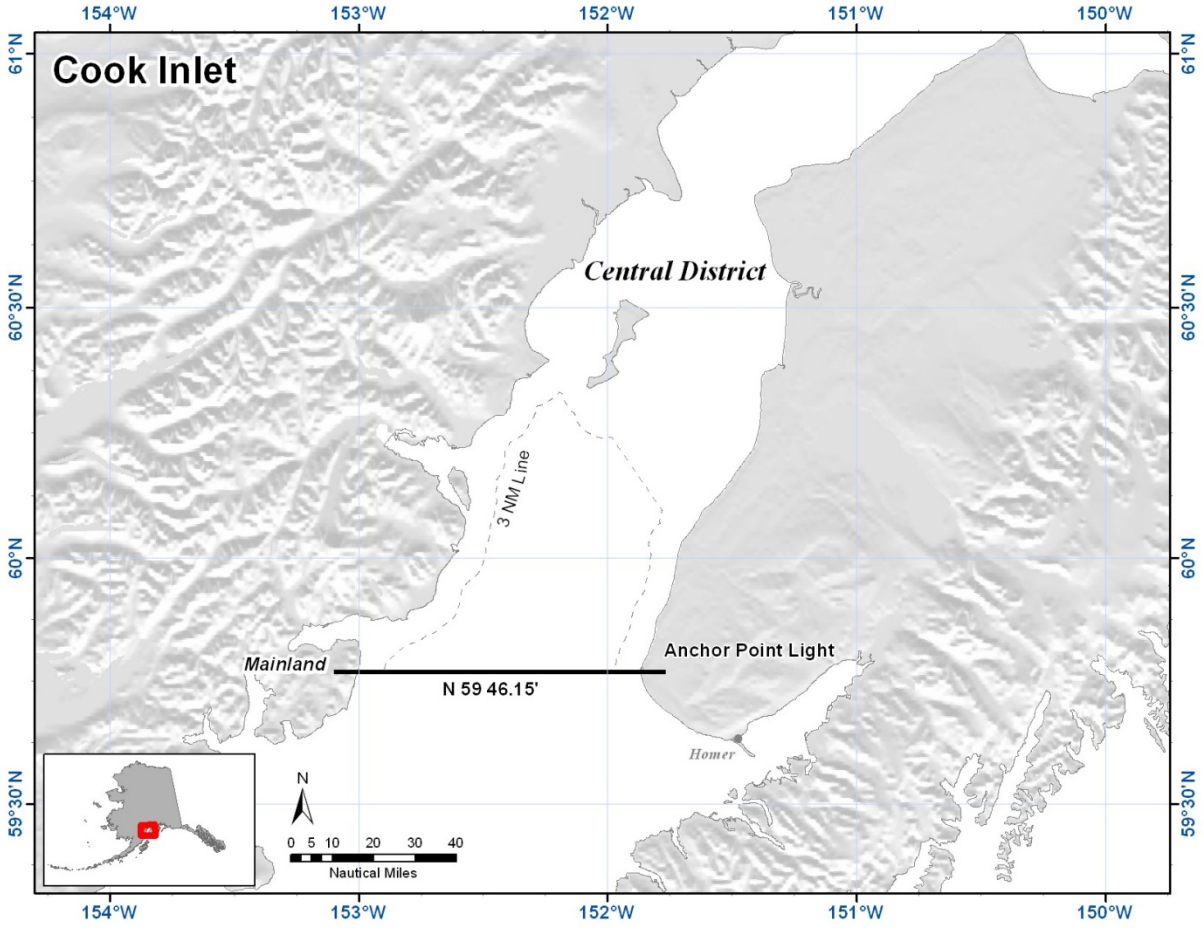


Figure 2-6 Prince William Sound Area– The EEZ waters that are excluded from the management area are shoreward of the line from 3 miles south of Hook Point to 3 miles south of Pinnacle Rock and from a line at state waters at Pinnacle Rock to 3 miles south of Cape Suckling.

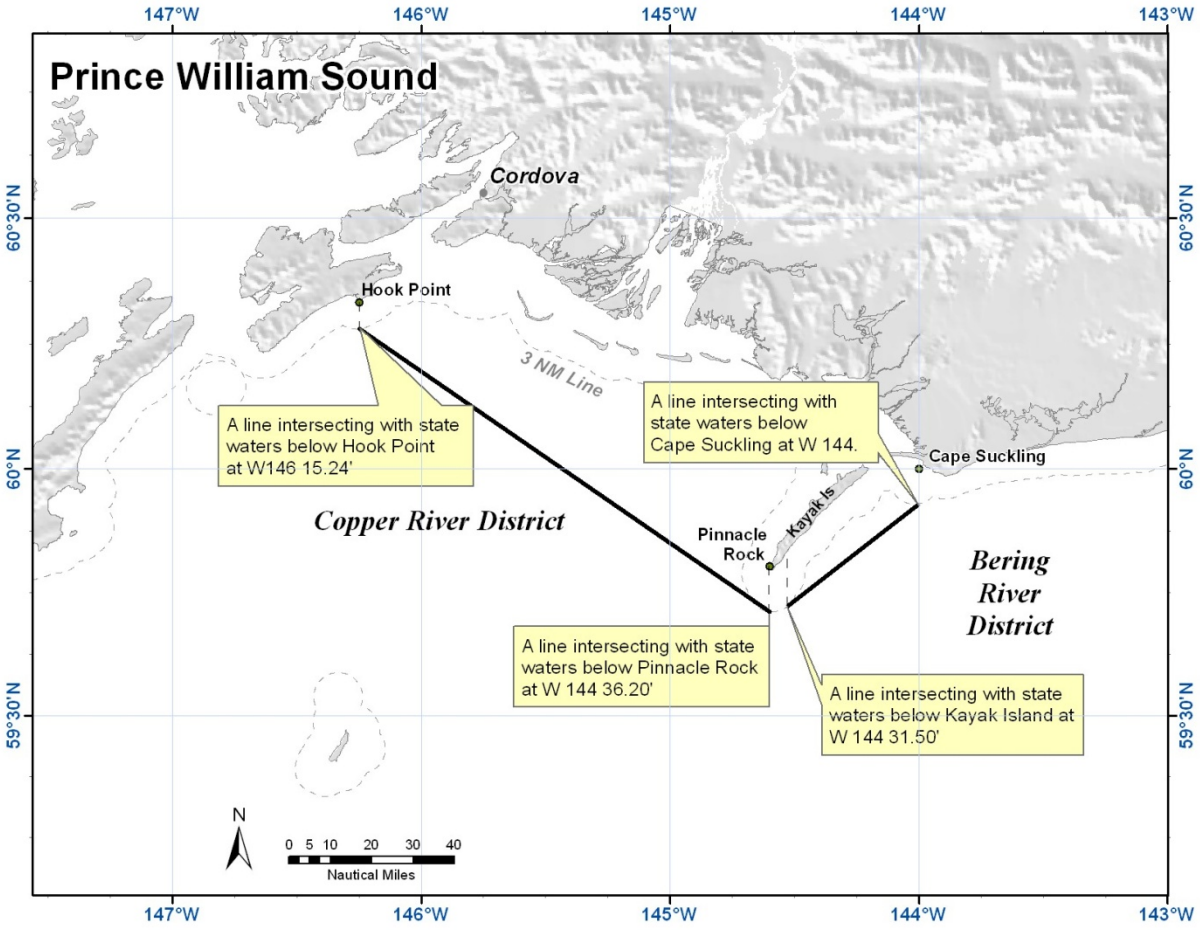
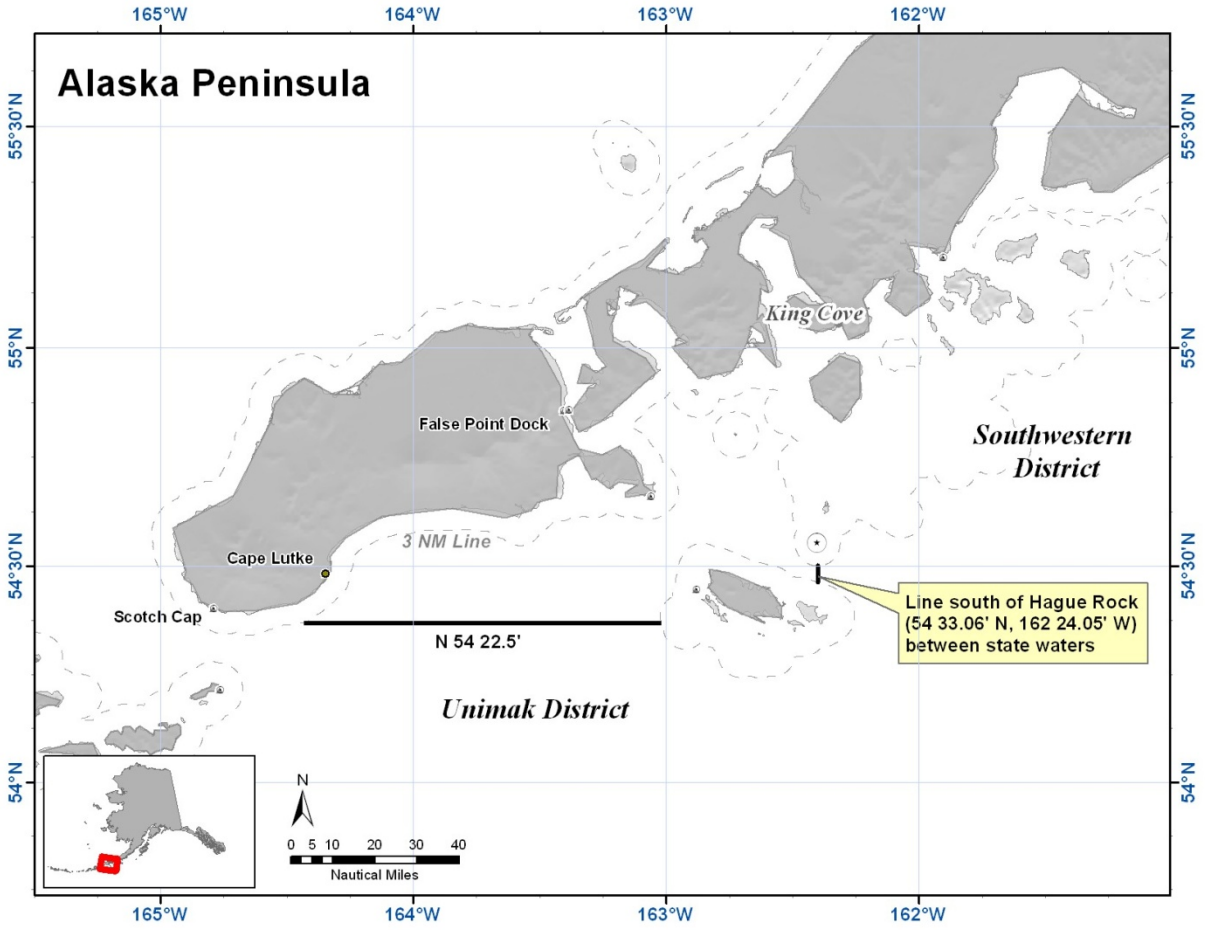


Figure 2-7 Alaska Peninsula Area – The EEZ waters that are excluded from the management area are shoreward starting from the line at 54°22.5' and a line south of Hague Rock between state waters.



2.4 Alternative 4: Maintain the FMP in the East Area only

Under Alternative 4, the scope of the FMP would be modified to maintain federal management in the East Area, but remove the West Area from the FMP. The FMP would continue to delegate management of the Southeast Alaska troll fishery and sport fisheries to the State. Termination of federal management in the West Area would remove the FMP's prohibition on commercial salmon fishing in the West Area. The State could prohibit commercial salmon fishing in the West Area for State registered vessels or it could

expand commercial fishing in the EEZ. Additionally, the Council would need to consider whether it wanted to amend the Fishery Management Plan for Fish Resources of the Arctic Management Area to close the Arctic to commercial salmon fishing. Currently, salmon fishing in the Arctic EEZ is prohibited by the Salmon FMP.

Note that, for many reasons detailed in this analysis, Alternative 4 is not a viable alternative and mainly serves to explore what could happen if the FMP were removed from the West Area. This was a key question in the early stages of this project, and in looking at what could happen if the FMP, and its prohibition on commercial fishing in the West Area, were removed from the West Area reaffirmed why an FMP is necessary and that the function of the FMP, to prohibit commercial fishing, is vital for optimal management of the salmon fisheries.

Maintaining the FMP in the East Area would leave existing management structures in place, recognizing that the FMP is the nexus for the application of the Pacific Salmon Treaty and Endangered Species Act. NMFS issued the 2008 BiOp, including an ITS, that covers the Pacific Salmon Treaty and the deferral of management to the State for the duration of this management program, subject to the conditions that require re-initiation of consultation (NMFS 2008a). Additionally, NMFS prepared the FPSEIS (NMFS 2003). The primary federal action considered in the FPEIS for the Southeast Alaska salmon fishery was the annual decision regarding continued deferral of management to the State and the issuance of an ITS through the Endangered Species Act Section 7 consultation process.

2.5 Comparison of Alternatives

The two primary factors in deciding between the alternatives are (1) defining where and for which fisheries federal conservation and management is required and (2) understanding the risks of removing areas or fisheries from the FMP and the requirements of continuing federal management of areas and fisheries governed by the FMP. The NS7 guidelines state that the MSA requires that Regional Councils to prepare FMPs only for overfished fisheries and for other fisheries where regulation would serve some useful purpose and where the present or future benefits of regulation would justify the costs. In addition to the information provided in this section, Chapter 5 provides a comparison of the environmental impacts of the alternatives on marine resources and Chapter 4 and 5 provide analysis of the economic impacts of the alternatives.

2.5.1 Is federal conservation and management required?

The NS3 Guidelines provide guidance on structuring appropriate management units for stocks and stock complexes.[25] A fish stock, to the extent practicable, must be managed as a unit throughout its range, and interrelated stocks must be managed as a unit or in close coordination. A management unit that is less

[25] 50 CFR 600.320.

than the range of the stock may be justified if complementary management exits; or if it is planned for a separate geographic area or a distinct use of the stocks; or if the unmanaged portion of the resource is immaterial to proper management.

The NS7 Guidelines provide guidance on the criteria for deciding whether a fishery needs management under an FMP.[26] The Guidelines state that the principle that not every fishery needs management through regulations implementing an FMP is implicit in NS7. The NS7 Guidelines provide the following general factors that should be considered, among others, in deciding whether a fishery needs management through regulations implementing an FMP—

> (i) The importance of the fishery to the Nation and to the regional economy.
>
> (ii) The condition of the stock or stocks of fish and whether an FMP can improve or maintain that condition.
>
> (iii) The extent to which the fishery could be or is already adequately managed by states, by state/federal programs, by federal regulations pursuant to FMPs or international commissions, or by industry self-regulation, consistent with the policies and standards of the MSA.
>
> (iv) The need to resolve competing interests and conflicts among user groups and whether an FMP can further that resolution.
>
> (v) The economic condition of a fishery and whether an FMP can produce more efficient utilization.
>
> (vi) The needs of a developing fishery, and whether an FMP can foster orderly growth.
>
> (vii) The costs associated with an FMP, balanced against the benefits.

The section compares how each alternative addresses NS3 and each NS7 factor.

Managing fish stocks as a unit throughout their range

Under all of the alternatives, salmon stocks would continue to be managed as a unit throughout their range. The primary difference among the alternatives is the scope of the management unit within the FMP. In the East Area, while the FMP only authorizes the commercial troll fishery and the sport fishery, it relies on the combination of State management and management under the Pacific Salmon Treaty to ensure that salmon stocks, including trans-boundary stocks, are managed as a unit throughout their ranges and interrelated stocks are managed in close coordination.

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[26] 50 CFR 600.340.

In the West Area, Alternative 2 would require a federal management regime for the portions of the commercial fisheries that occur in the traditional net areas of the EEZ. The FMP would not be able to rely on the measures in the Pacific Salmon Treaty, like in the East Area, and would instead need provisions that explicitly address each requirement in the MSA. This alternative would require that dual management be created and imposed and, in order to maintain management as a unit, federal management of the EEZ portion would need to be responsive to the State's management in the state water fisheries, just as it presently does for Pacific cod and sablefish, among other species. Duel management would be the only way to prevent overfishing and ensure that escapement goals are met and that interrelated stocks are managed in close coordination. Duel management could create inefficiencies as the federal process is inherently a much more lengthy process and is not responsive to inseason abundance information. For example, under the federal system, harvest limits are set in advance through notice and comment rule making, which would result harvests being restricted in years when returns were above forecast and harvests too high in years when returns were below forecast. Efficient and effective fisheries management would be sacrificed under any scenario in which a single component of the multi-use salmon fishery was managed independent of the other components.

Under Alternative 3, excluding the three net fisheries and the sport fishery in the West Area from the scope of the FMP would allow the State to manage Alaska salmon stocks seamlessly throughout their range. In recommending Alternative 3, the Council provided a rationale for removing these three areas and the sport fishery from the FMP. The Council determined that federal conservation and management are not necessary, consistent with the MSA. NS3 states that, to the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination. NS3 Guidelines provide guidance on structuring appropriate management units for stocks and stock complexes. The Council determined that prohibiting commercial fishing in the redefined West Area and excluding the existing net fisheries in the three net fishing areas and the sport fishery from the scope of the FMP, would achieve the Council's policy to facilitate State management of Alaska salmon stocks and to manage salmon as seamlessly as practicable throughout their range, rather than imposing dual management, as would happen if the FMP were retained in these areas. The Fishery Impact Statement, in chapter 4, provides more information on the commercial salmon fisheries and sport salmon fishery in the West Area.

Alternative 3 recognizes that FMP management would only apply to the portion of the fisheries in the EEZ and that salmon are more appropriately managed by the State as a unit in consideration of all fishery removals to meet in-river escapement. While the exact amounts of non-Alaska salmon caught in the fisheries in the three traditional net areas are unknown, the percent of non-Alaska salmon caught is believed to be very small. In Prince William Sound, where genetic work is ongoing, typically less that 5% of the Chinook salmon harvest is from the broad reporting group that includes Southeast Alaska, British Columbia, Washington, and Oregon. Section 5.3 provides more information on non-Alaska salmon caught in EEZ salmon fisheries.

Alternative 3 only addresses the Council's and NMFS's management of the salmon fisheries that occur in limited areas of EEZ waters. Alternative 3 would not impact in any way the federal management of federal lands and in-land waters and the resources there within, including salmon. Likewise, Alternative 3 would not impact in any way the federal government's involvement in or enforcement of international agreements. The State of Alaska would continue its ongoing work with its federal counterparts on a broad range of issues regarding salmon, including habitat and invasive species. The primary difference between Alternative 2 and 3 is that, under Alternative 3, the State would start to work with the Council and NMFS in the management of the drift gillnet fisheries that occur in the federal waters adjacent to Cook Inlet, Prince William Sound, or the Alaska Peninsula.

Under Alternative 4, the State's ability to manage the salmon stocks as a unit could be compromised if U.S. vessels, that are not registered under the laws of the State, harvest salmon in the West Area. Likewise, Alternative 4 could impact returns of non-Alaska stock to the Pacific Northwest as fishing in the EEZ would occur in the open ocean where stock from many regions mix. Therefore, Alternative 4 would not promote management of salmon stocks as a unit and could compromise existing salmon management.

Importance of the fishery to the Nation and to the regional economy

The commercial and sport salmon fisheries in each area under discussion are important to their regional economies. Chapter 4 provides detailed information on the importance of each salmon fishery in the EEZ. Alternatives 2 and 3 would not change the extent that the fisheries contribute to their regional economy and the Nation. Removing the three traditional net fishing areas and the sport fishery in the West Area from the FMP (Alternative 3), or maintaining them in the FMP (Alternative 2), would not change the importance of these fisheries in their regional economies or for the Nation because the State would remain as the primary manager of these fisheries and the vast majority of the EEZ would remain closed to commercial salmon fishing.

Under Alternative 4, State-managed salmon fisheries, and salmon fisheries in other regions, could experience a decline in harvest if sufficient amounts of salmon in the West Area are harvested by U.S. vessels that are not registered under the law of the State.

Condition of the salmon stocks and whether an FMP can improve or maintain that condition

Section 5.1 describes the condition of the Alaska salmon stocks that are governed by the FMP, including the status of the salmon stocks in the East Area relative to the FMP's status determination criteria. According to this information, Alaska salmon are not overfished and overfishing is not occurring. The State is in a unique position to manage Alaska salmon as a unit in consideration of all fishery removals and to meet escapement goals. The condition of each salmon stock is a result of many factors, including harvest by a number of fisheries that target salmon throughout their range.

Under all of the alternatives, the FMP would remain in place in the East Area. In the East Area, the Pacific Salmon Treaty controls the total Chinook salmon harvest and the FMP is the nexus for implementing the Treaty, so an FMP is integral to maintaining the condition of transboundary salmon stocks. Additionally, ESA-listed stocks are closely managed and the FMP is the nexus for implementing the ESA, as detailed in section 5.3. Therefore, the FMP is necessary to maintain the condition of the salmon stocks in in the East Area.

Per the MSA, under Alternatives 1 and 2, FMP management in the West Area would only apply to the EEZ and that portion of the salmon fisheries that occur in the EEZ in each traditional net fishing area. In the three traditional net areas, there are approximately 80 stocks (of the 289 statewide) with established salmon escapement goals. Of those stocks, only eight salmon stocks of concern are designated. Stocks of concern and the conditions which trigger concern designations are defined in the State's Policy for the Management of Sustainable Salmon Fisheries. Where Alaska salmon stocks have fallen below their escapement goals and concern designations have been established, the State has developed action plans, management plans, and research plans to achieve stock rebuilding goals. Often, these action plans involve time and area restrictions.

FMP management would not be able to control harvests in state waters and would have to be responsive to harvests in state waters. In other words, the EEZ portion of the fishery would only occur if there was harvestable surplus after accounting for removals in state waters, just as is done in the case of Pacific cod, pollock, etc. Additionally, the federal management system is not as flexible as the State's system and could inhibit the State's ability to respond in-season to the best available information in managing salmon stocks. For example, if the EEZ harvest level was set by NMFS preseason, and could not be adjusted based on inseason abundance information, the EEZ harvest would be constrained when salmon returns are greater that the preseason forecast. Including these areas in the FMP would not improve the condition of the salmon stocks since the FMP could not control harvests in state waters or ensure escapement goals are met. The FMP would, however, have the ability to prevent any influx of fishing effort not subject to State management from engaging in the harvesting of salmon in these three areas. However, as discussed in the subsequent section, the risk of this occurring is low. For these reasons, an FMP would not improve or maintain the condition of the salmon stocks in the three traditional net fishing areas.

Under Alternatives 1, 2, and 3, prohibiting directed commercial salmon fishing in most of the federal waters in the West Area would prevent overfishing by recognizing that the principal overfishing risk for salmon in comes from allowing intensive fishing during periods with weak returns. Managing the fisheries nearshore enables the State to manage mixed-stock fisheries for weak runs. Similarly, salmon stocks that return to the Pacific Northwest are managed to prevent overfishing. Because salmon abundance cannot be effectively estimated in advance, regional in-season estimates of abundance, and subsequent management actions taken, seek to ensure escapement goals are met and optimum production is achieved. Therefore, the FMP maintains the condition of the salmon stocks that spend a part of their

life in the West Area by prohibiting fishing and thus enabling fishery management at the appropriate scale.

Extent to which the fishery is already adequately managed by the State, consistent with the policies and standards of the Magnuson-Stevens Act

The State has managed the salmon fisheries since statehood in 1959 and the Council has relied on state management of the salmon fisheries in the EEZ since 1979. As such, the Council has determined that salmon fisheries are adequately managed by the State; therefore, the Council is only considering the role of federal management given existing State management. State salmon management is consistent with the policies and standards of the MSA, as explained throughout this document. The State actively manages Alaska salmon stocks in every region of the state through its use of escapement-based management. Escapement-based management takes into consideration the unique life history of Pacific salmon and escapement goals maintain spawning levels that provide for maximum surplus production. For these reasons, the primary issue then is whether federal conservation and management in required in addition to State management for those salmon fisheries where a portion of the harvest is from EEZ waters.

Need to resolve competing interests and conflicts among user groups and whether an FMP can further that resolution

Competing interests and conflicts exist among user groups that harvest salmon throughout its range. The Fishery Impact Statement in Chapter 4 describes the multiple salmon fisheries managed by the State. However, the FMP only applies in the EEZ, where the commercial fishery is the predominant user group and the FMP has no authority over the harvest of salmon within State waters by various user groups absent a successful action by the Federal government to preempt state management of salmon within state waters.

Therefore, in the West Area, an FMP (Alternative 2) would not further the resolution of the State's difficult task of allocating salmon to the multiple user groups - subsistence, sport, personal use, and different commercial gear types - that harvest salmon from EEZ waters though to headwaters of Alaska streams and rivers.

Under Alternatives 1, 2, and 3, prohibiting commercial salmon fishing in the vast majority of the EEZ enables salmon form different regions to return to their natal region and be subject to harvest by various usergroups in those areas. Again, this recognizes that salmon are best managed relatively nearshore where competing interests and conflicts among usergroups can be resolved by the appropriate management authority.

Economic condition of a fishery and whether an FMP can produce more efficient utilization

The Fishery Impact Statement in Chapter 4 describes the economic conditions of the FMP salmon fisheries in each area. The economic conditions of the fishery and the efficiency of the utilization are more closely tied to State salmon management. In the East Area, all of the alternatives would maintain the FMP's primary function to delegate management to the State and thus maintaining efficient utilization under the Pacific Salmon Treaty. Under Alternative 3, removing the three traditional areas and the sport fishery in the West Area from FMP management would not change the economic conditions of these fisheries or change the efficiency of the utilization of salmon resources. Alternative 4, which would remove the entire West Area from the FMP, could negatively impact the economic condition of the fishery to the extent that unregulated fishing becomes possible, which, if realized, would affect escapement and curtail state-managed fisheries. Under Alternatives 1, 2, and 3, prohibiting directed commercial salmon fishing in most of the federal waters in the West Area would enable efficient utilization and maintain the economic conditions of the existing salmon fisheries through State management.

Needs of a developing fishery, and whether an FMP can foster orderly growth

The salmon fisheries in the EEZ are fully developed. The FMP fosters orderly growth of salmon fishing in State waters, and in natal regions, by predominantly closing EEZ waters. Under all of the alternatives, only the commercial salmon troll and sport fishery would be permitted in the East Area. In the West Area, Alternatives 1, 2, and 3 would maintain the prohibition on commercial salmon fishing in the vast majority of the EEZ, with the exception of the three traditional net fishing areas. Only Alternative 4 would not foster orderly growth, because any salmon fishing in the EEZ, outside of state managed salmon fisheries, would be unregulated.

Costs associated with an FMP, balanced against the benefits

The most costly alternative would be Alternative 2, under which a new federal/state management regime would need to be created and implemented for the salmon fisheries in the three traditional net fishing areas and the sport fishery in the West Area. Specific objectives and management measures would be required in the FMP to provide sufficient framework to define state and federal roles under a delegated management program in the West Area. Specific objectives and management measures for the West Area would need to be established, in a manner similar to those in the crab and scallop fisheries, in order to comply with the MSA, define roles, and address concerns that may arise under delegated management in the West Area. Additionally, the costs and time associated with developing explicit objectives and management measures for an FMP that does not delegate authority to the State could be significant (outside current range of alternatives, see section 2.6).

To date, neither the Council nor NMFS have identified any benefits of an additional layer of federal management on top of State salmon management for these fisheries. As discussed in Chapter 5, an FMP

in these areas would not further NMFS's obligations under the Marine Mammal Protection Act and Endangered Species Act, or for Essential Fish Habitat, and therefore is not beneficial from the perspective of other marine resources. An FMP would not benefit the condition of salmon stocks in these areas, as discussed above. While there is the perception that an FMP could benefit certain salmon fishermen in the EEZ relative to other salmon user groups, that perception is not supported by current federal management practices. Therefore, the Council recognized that applying federal management would be costly, redundant, and not provide any conservation or management benefits.

2.5.2 What are the risks of removing certain federal waters and the West Area sport fishery from the FMP?

Under Alternatives 3 and 4, there is a risk that vessels not registered with the State could harvest salmon without regulation in those EEZ waters not covered by the FMP. The assessment of risk is largely dependent on the modification being considered: the Council, NMFS, and the State would have to understand the risks associated with removing the entire West Area (Alternative 4) or only those areas where the traditional net fisheries occur (Alternative 3).

Removing areas from the FMP could create an opportunity for unregulated commercial salmon fishing activity by US vessels in those areas. Concerns with unregulated commercial fishing vessels would be greatly reduced if only the three specific areas are removed from the FMP, because the opportunity for fishing without being detected would be limited when compared to the entire West Area. An unregistered vessel may be able to circumvent State regulations if the vessel never enters State waters or has no contacts with the State. The primary concern would be with a catcher processor, or other processing platform that could support several partner catcher vessels, entering into unregulated EEZ waters. If the FMP were lifted only from the traditional net areas, such a scenario is thought to be unlikely due to the risk and limitations associated with a business plan dependent on fishing relatively small pockets of salmon fishing grounds separated by substantial distance, avoiding entry into state waters under any circumstance, and shedding all state permits and licenses. According to the State, if a vessel involved in unregulated fishing entered state waters for fuel, supplies, or a mechanical or medical emergency, the vessel would be subject to state enforcement – greatly increasing risk of failure for such a business plan.

Removing the sport fishery from the Salmon FMP for the West Area creates a somewhat similar circumstance; State regulations would apply to sport fishing activity in the EEZ, unless a vessel does not register with the State and never enters state waters in support of their fishing activity. The risk of unregulated sport fishing similar to circumstances described above is thought to be negligible since any financial incentive would be much lower and anglers fishing waters off Alaska uniformly do so from an Alaskan port and on vessels dependent on State waters and ports for fishing, transit, moorage, and supplies.

Inherent in the choice of Alternative 3 is the conclusion that commercial and sport salmon fishermen will continue to be registered with the State when fishing for salmon in these areas and therefore be subject to

the laws of the State governing commercial and sport salmon fishing. Based on the logistical complications and business risks identified in the preceding paragraphs, it is reasonable to expect that salmon fishing occurring in these areas will be by vessels registered with the State and that fishing in these areas will be regulated by the State. The intent of Alternative 3 is for continued State regulation of salmon fishing in these areas. Removal of federal management in these areas does not indicate the Council's intent for unregulated salmon fishing to occur in these areas. If a vessel owner or group of vessel owners decides to cut all ties with the State and fish in these areas unregulated by the State, the Council could take action to regulate salmon fishing in these areas. While it is premature to specify the precise action the Council would take in this situation, when faced with a similar situation in the past the Council has immediately closed EEZ waters to fishing, while it works to develop a long-term management solution. It is reasonable to assume that the Council would undertake a similar course of action in these areas (i.e., immediately close these areas to fishing for salmon while developing a long-term management solution) if fishing for salmon by vessels not regulated by the State occurs. Closing these areas would, of course, impose costs on all operations utilizing these salmon fishing areas, including the participants in the traditional net fisheries. As previously stated, the federal regulatory process is significantly slower and more complex than state management processes. Council action to re-instate FMP control over salmon fishing in these three EEZ areas could involve a substantial period of time, and prove costly to the traditional net fisheries operating there.

In developing a long-term solution, the Council may consider a permanent closure of these areas based on factors such as weighing the costs of federal management with the fact that the portion of the total salmon fisheries that occur in EEZ is relatively small and Alaska salmon could be fully harvested in state waters with commercial and/or sport harvest closed in the EEZ. Or, the Council may close these areas until it developed a salmon management structure that complied with applicable federal law.

The Council weighed the risk of potential for unregulated fishing against the risk associated with strengthening the role of federal management in the West Area. The Council chose not to include the traditional net areas in the revised FMP because the State’s ability to manage directed salmon fisheries seamlessly across the traditional fishing range and to manage salmon stocks as a unit would be diminished.

2.5.3 Amending the MSA

In the absence of an FMP, the State’s inability to act against unregistered vessels in EEZ waters could be addressed by a change to the MSA. MSA § 306(a)(3)(C) allows the State to regulate a fishing vessel that is not registered with the State and that is operating in a fishery in the EEZ off Alaska, if no FMP was in place on August 1, 1996, for the fishery in which the vessel is operating. In addition, the Secretary and the Council must find that Alaska has a legitimate interest in the conservation and management of the

fishery.[27] The FMP was in place on August 1, 1996. Modification to §306(a)(3)(C) by removing the phrase "on August 1, 1996" could provide the State with the authority to regulate non-State registered vessels commercially fishing for salmon in the EEZ, which would, in turn, reduce the concern regarding unregulated fishing in EEZ waters not under an FMP. While it is clear that the intent of Congress is to provide Alaska with the authority to regulate non-State registered vessels in the absence of an FMP and that the Secretary and Council recognize the State's legitimate interest in the fishery, the relevance of the August 1, 1996, date to this authority is not clear.

2.6 Alternatives Considered but Eliminated from Detailed Study

None of the alternatives in this analysis consider removing the FMP's primary management function – delegating salmon fishery management to the State – and having the Council and NMFS actively manage salmon fishing in the EEZ. The Council considered federal management of the salmon fisheries, but determined that it was not a viable alternative because the Council and NMFS do not have the expertise or infrastructure to manage Alaska salmon fisheries, and expanded federal management is not necessary for the conservation and management of salmon. The Council recognized that salmon are best managed as a unit throughout their range and parsing out a portion of a fishery because it occurred in federal waters and applying a separate management structure on that piece of the fishery would not be the optimal way to manage salmon. The Council also recognized the State's long-standing expertise and infrastructure for salmon management and the fact that the State has been managing the salmon fisheries in Alaska since statehood. This maintains the Council's policy for salmon management established with the original FMP in 1979. Therefore, the Council eliminated an alternative to remove delegation from the State and apply active federal management of the EEZ salmon fisheries. As such, the Council has not considered specific federal management measures for those salmon fisheries that occur in the EEZ, in the absence of State management (e.g., a catch share plan, harvest strategies, time/area closures, observer coverage, recordkeeping and reporting.).

None of the alternatives in the analysis consider managing any three traditional net areas differently from the others. The Council considered whether to manage the three areas separately but found that there is no distinction between these areas relative to the National Standards and the criteria for determining where federal conservation and management are required.

None of the alternatives in the analysis consider removing the East Area, or the commercial troll fishery and sport fishery that occur in the EEZ, from the FMP. The Council recognized that the East Area is substantively different from the West Area and that FMP serves an important role in the East Area as the nexus for the Pacific Salmon Treaty and the Endangered Species Act.

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[27] This management issue is not limited to Alaska salmon—the MSA §306(a)(3)(C) "August 1, 1996" date poses problems for any species that was part of an FMP on August 1, 1996, but has subsequently been removed from the FMP.

3 Options for Updating the Salmon FMP

Section 303(a) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires a fishery management plan to be consistent with a number of provisions, including ten national standards, which guide fishery management. The National Standard (NS) Guidelines provide guidance on how the MSA provisions should be addressed and implemented within an FMP, and should be closely considered when developing options for meeting the MSA requirements or determining which requirements are satisfied in the current *Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska* (FMP).[28] Additionally, federal regulations contain regulatory provisions that implement the FMP and are included in chapter 6.[29]

The North Pacific Fishery Management Council's (Council's) December 2010 motion provided the following direction:

> **Component: FMP updates**
>
> Develop options to update the Salmon FMP to meet the MSA required provisions in section 303(a) for an FMP, using existing state salmon management to the extent possible.

In April 2011, the Council reviewed a discussion paper that provided a description of the provisions in the existing FMP, and considered whether some action (update, revise, or remove) is required (NPFMC 2010b). The discussion paper reviewed the FMP and annotated each FMP provisions that directly address an MSA requirement and whether the provision should be updated or revised.

Table 3-1 provides a review of the FMP provisions and associated MSA requirements or federal regulations. In general, the FMP has provisions to address most of the MSA requirements, but the text should be updated. A number of provisions should be extensively revised to reflect current management, but most likely would not require a change in the nature of the provision. For example, some sections should be modified to include the Pacific Salmon Treaty or the North Pacific Anadromous Stocks Act of 1992.

The discussion paper also preliminarily identified MSA requirements that are not addressed in the 1990 FMP or subsequent amendments. The discussion paper highlighted that the FMP does not contain annual catch limits (ACLs) and accountability measures (AMs), methods to report bycatch and measures to minimize bycatch and the mortality of unavoidable bycatch, or a Fishery Impact Statement. Additionally, if an existing FMP provision should be revised, the discussion paper identified preliminary options for Council consideration that use existing State salmon management to the extent possible. The provisions that the Council may want to remove or replace with a new provision are sport fishery management,

[28] 50 CFR part 600, Subpart D.
[29] 50 CFR part 679.

management objectives, the salmon plan team, federal salmon limited entry permits, and the process for review and appeal.

In April 2011, the Council recommended further direction on each FMP component. Each of these specific items is discussed in the following sections. In October 2011, the Council initially reviewed the draft EA and working draft FMP, and confirmed its preliminary preferred alternative.

3.1 Management Policy and Objectives

The FMP's FMU should reflect the Council's management objectives and the management objectives influence the FMU. Within the scope of the requirements of the MSA and the Pacific Salmon Treaty, the management policy and objectives guide the development of the Council's management recommendations to the Secretary of Commerce (Secretary) and guide State management of the salmon fishery in the East Area. The Council recognizes that these objectives cannot be accomplished by any FMP for the EEZ alone. To that end, the Council considers this plan to represent its contribution to a comprehensive management regime for the salmon fishery that will be achieved in concert with actions taken by the Pacific Salmon Commission and the State.

The Council reviewed the management objectives to determine whether to modify existing objectives or add new objectives. The Council considered whether to continue management of the three net fisheries in the West Area and develop objectives for continuing that management. Similarly, the Council considered objectives for prohibiting fishing in the West Area. Also, to address NS9 and MSA § 303(a)(11), the Council added an objective to reflect that management measures should minimize bycatch to the extent practicable and minimize the mortality of unavoidable bycatch in the directed salmon fisheries.

The Council's April 2011 motion provided the following direction for the management objectives.

- Prevent directed fishing of salmon in the EEZ outside of the traditional fishing areas.
- Manage stocks harvested in directed fisheries as a unit throughout their range; manage interrelated stocks as a unit or in close coordination.
- Retain objectives for the directed commercial fisheries under the FMP in the East Area for future discussion (evaluate them against current state management objectives and the Pacific Salmon Treaty).
- Include a management objective to minimize bycatch and minimize mortality of unavoidable bycatch in the directed salmon fisheries, but defer bycatch management in the directed salmon fisheries to the State of Alaska.

Draft management policy and objectives were developed based on this direction, the National Standards, and the Council related management policy and objectives for other FMP. The Council considered additional objectives, such as (1) a habitat objective to protect EFH, (2) a cultural objective or one that specifically identifies the importance of salmon to Alaska natives, (3) a marine mammal/seabird/ESA-

listed species objective, or (4) an ecosystem objective that encompasses habitat, seabirds, marine mammals, and ESA-listed species. The Council recommended the following management policy and objectives at final action.

The Council and NMFS, in cooperation with the State, are committed to the long-term management of the salmon fishery off Alaska. The goal is to promote stable management and maintain the health of the salmon fishery resource and environment.

The MSA is the primary domestic legislation governing management of the nation's marine fisheries. The MSA requires FMPs to be consistent with a number of provisions, including ten national standards, with which all FMPs must conform and which guide fishery management. In summary, these national standards state a fishery management plan shall: (1) prevent overfishing while achieving, on a continuing basis, the optimum yield from each U.S. fishery; (2) base conservation and management measures on the best scientific information available; (3) manage the harvest of a fish stock (or interrelated stocks) throughout its range as a unit or in close coordination; (4) not discriminate between residents of different States and allocate fishing privileges in a manner that is fair and equitable, reasonably calculated to promote conservation, and prevents an individual, corporation or other entity from acquiring an excessive share of such privileges; (5) consider efficiency in the use of fishery resources, except that economic allocation cannot be the sole purpose; (6) take into account and allow for variations in catches; (7) minimize costs and avoid unnecessary duplication; (8) take into account the importance of fishery resources to fishing communities by providing for their sustained participation, and minimizing adverse economic impacts to the extent practicable; (9) minimize bycatch and bycatch mortality to the extent practicable; and (10) promote the safety of human life at sea to the extent practicable (16 U.S.C. 1851(a)(1)-(10)).

The Pacific Salmon Treaty requires each party to manage its fisheries in accordance with the principles and goals of the Treaty and the decisions of the Pacific Salmon Commission, for the international conservation and harvest sharing of Pacific salmon. Article III, Principles of the Treaty, requires each party to: (1) conduct its fisheries and salmon enhancement programs to prevent overfishing, provide for optimum production, and allow each party to receive benefits equivalent to the production of salmon originating in its waters; (2) cooperate with the other party in management, research, and enhancement; and (3) take into account the desirability of reducing interceptions, of avoiding undue disruption of existing fisheries, and annual variations in abundance of the stocks.

The Treaty's abundance based salmon management program for Chinook salmon establishes annual harvest regimes that are responsive to changes in production, account for fishery-induced mortalities, and are designed to meet MSY or other biologically-based escapement objectives.

Within the scope of the requirements of the MSA and the Pacific Salmon Treaty, the Council has developed a management policy and objectives to guide its development of management recommendations to the Secretary and to guide State management of the salmon fishery in the East Area.

The Council recognizes that these objectives cannot be accomplished by any FMP for the EEZ alone. To that end, the Council considers this plan to represent its contribution to a comprehensive management regime for the salmon fishery that will be achieved in concert with actions taken by the Pacific Salmon Commission and the State.

Management Policy

The Council's salmon management policy is to facilitate State of Alaska salmon management in accordance with the MSA, Pacific Salmon Treaty, and applicable federal law. This FMP represents the Council's contribution to a comprehensive management regime for the salmon fishery that will be achieved in concert with actions taken by the Pacific Salmon Commission and the State. This policy ensures the application of judicious and responsible fisheries management practices, based on sound scientific research and analysis, proactively rather than reactively, to ensure the sustainability of fishery resources and associated ecosystems for the benefit of future, as well as current generations.

Under this policy, all management measures will be based on the best scientific information available. This management policy recognizes the need to balance many competing uses of marine resources and different social and economic objectives for sustainable fishery management, including protection of the long-term health of the resource and the optimization of yield. This policy uses and improves upon the Council's and State's existing open and transparent process of public involvement in decision-making.

The Council has identified the following six management objectives to guide salmon management under the FMP. The Council, NMFS, and the State of Alaska will consider the management policy and the following management objectives in developing amendments to this FMP and associated management measures. Because adaptive management requires regular and periodic review, the management objectives identified in this section will be reviewed periodically by the Council. The Council, NMFS, and the State of Alaska will also review, modify, eliminate, or consider new management measures, as appropriate, to best carry out the management objectives for the FMP.

Objective 1 – Prevent overfishing and achieve optimum yield

Manage the commercial and sport salmon fisheries in the East Areas in concert with the Pacific Salmon Commission, and in accordance with the conservation and harvest sharing goals of the Pacific Salmon Treaty, to prevent overfishing and obtain the number and distribution of spawning fish capable of producing the optimum yield on a sustained basis (wild and hatchery). Prevent overfishing and achieve optimum yield in the West Area by prohibiting the commercial harvest of salmon. Prohibiting commercial harvest enables the State to manage salmon fisheries to achieve escapement goals and maximize economic and social benefits from the fishery.

Objective 2 – Manage salmon as a unit throughout their range

Manage salmon fisheries in the EEZ in a manner that enables the State to manage salmon stocks seamlessly throughout their range. In the East Area, this objective is achieved by delegating management

of the sport and commercial troll fishery to the State, to manage consistent with State and federal laws, including the Pacific Salmon Treaty. In the West Area, this objective is achieved by prohibiting commercial fishing for salmon in the West Area so that the State can manage Alaska salmon stocks as a unit.

Objective 3 – Minimize Bycatch and Bycatch Mortality

To the extent practicable, manage salmon fisheries to minimize bycatch and minimize the mortality of unavoidable bycatch. Decrease, where possible, the incidental mortalities of salmon hooked and released, consistent with allocation decisions and the objective of providing the greatest overall benefit to the people of the United States.

Objective 4 - Maximize economic and social benefits to the Nation over time.

Economic benefits are broadly defined to include, but are not limited to: profits, income, employment, benefits to consumers, and less tangible or less quantifiable benefits such as the economic stability of coastal communities, recreational value, non-consumptive use value, and non-use value. To ensure that economic and social benefits derived from fisheries covered by this FMP are maximized over time, the following will be examined in the selection of management measures:

- Control of fishing effort and salmon catches.
- Fair and equitable allocation of harvestable surpluses of salmon.
- Economic impacts on coastal communities and other identifiable dependent groups (e.g., subsistence users).

This examination will be accomplished by considering, to the extent that data allow, the impact of management measures on the size of the catch during the current and future seasons and their associated prices, harvesting costs, processing costs, employment, the distribution of benefits among members of the harvesting, processing and consumer communities, management costs, and other factors affecting the ability to maximize the economic and social benefits as defined in this section. Other benefits are tied to economic stability and impacts of commercial fishing, as well as, unguided and charter recreational fishing associated with coastal communities, subsistence fishing supporting traditional social and cultural 'communities,' and passive-use 'communities'.

Objective 5 – Protect wild stocks and fully utilize hatchery production

Manage salmon fisheries to ensure sustainability of naturally spawning stocks, while providing access to hatchery production.

Objective 6 –Safety

Promote the safety of human life at sea in the development of fisheries management measures. Upon request, and from time to time as appropriate, the Council, NMFS, or the State may provide for temporary

adjustments, after consultation with the U.S. Coast Guard and fishery participants, for vessels that are otherwise excluded because of weather or ocean conditions causing safety concerns while ensuring no adverse effect on conservation in other fisheries or discrimination among fishery participants.

3.2 Status Determination Criteria

To achieve NS1 – prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery – the MSA requires each FMP to (1) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished and contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery and (2) establish mechanisms for specifying ACLs to prevent overfishing and include AMs to prevent ACLs from being exceeded and to correct overages of the ACL if they do occur.[30] The NS 1 Guidelines provide guidance on how to meet these MSA requirements and describe fishery management approaches to meet the objectives of NS 1.

3.2.1 Status Determination criteria for the East Area

The FMP specifies status determination criteria for the Southeast Alaska troll fishery. No options were developed to modify this FMP provision. Amendment 6 to the FMP (2002) implemented overfishing definitions that translate the overfishing policies of the State and the Pacific Salmon Treaty into the framework of the NS1 Guidelines, to enable NMFS to determine whether or not salmon stocks targeted by FMP fisheries are overfished or overfishing is occurring. The FMP overfishing definitions separate the salmon stocks caught in the Southeast Alaska EEZ into three tiers. Tier 1 stocks are Chinook salmon stocks covered by the Pacific Salmon Treaty.[31] Tier 2 and tier 3 are for salmon stocks managed by the Alaska Board of Fisheries (Board) and Alaska Department of Fish and Game (ADF&G). Coho salmon are Tier 2 stocks. Tier 3 stocks are managed as mixed-species complexes that include coho, pink, chum, and sockeye salmon stocks, with coho salmon stocks as indicator stocks. The overfishing definitions for Tiers 2 and 3 are based on the State's maximum sustainable yield (MSY) escapement goal policies. These existing policies and status determination criteria prevent overfishing and provide for rebuilding of overfished stocks in the manner and timeframe required by the MSA. In creating these overfishing definitions, NMFS determined that State salmon management, which is based on salmon biology and the best scientific and fishery information available, achieves the intent of NS1 (NMFS 2001).

The FMP establishes an MSY control rule, a maximum fishing mortality threshold, and a minimum stock size threshold for each tier. Each year, ADF&G prepares a report on the status of the salmon stocks relative to these status determination criteria. According to these reports, overfishing is not occurring and

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[30] MSA §303(a)(15) "Establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability."

[31] Chapter 3 of Annex IV of the Pacific Salmon Treaty, as amended May 21, 2008 (also referred to as the U.S./Canada bilateral agreement for the Southeast Alaska all-gear Chinook catch).

spawning biomass is well above the minimum stock size threshold (MSST); therefore, these salmon stocks are not overfished. More information on the status of salmon stocks relative to the FMP status determination criteria is in section 5.1.

If a stock or stock complex is declared overfished or if overfishing is occurring, the Council will request that the State conduct a formal assessment of the primary factors leading to the decline in abundance and report to the Council the management measures the State will implement to prevent overfishing and rebuild the fishery. The Council and NMFS will assess these rebuilding measures for compliance with the MSA, including the national standard guidelines. If the Council and NMFS deem the State's proposed rebuilding measures sufficient to comply with MSA requirements, the State rebuilding program may be adopted without an FMP amendment to assure timely implementation.

A minor change is needed in the Tier 3 status determination criteria to reflect revisions to revisions to the NS1 Guidelines regarding overfishing of one or more stocks in a complex. When Amendment 6 was approved, the NS guidelines contained a provision at 50 CFR 600.310(d)(6) that allowed overfishing if the resulting rate or level of fishing mortality will not cause any species or evolutionarily significant unit thereof to require protection under the ESA. Under the revised guidelines, this provision was moved to 50 CFR 600.310(m) and revised to allow overfishing if the resulting rate of fishing mortality will not cause any stock or stock complex to fall below its MSST more than 50 percent of the time in the long term, although it is recognized that persistent overfishing is expected to cause the affected stock to fall below its B_{MSY} more than 50 percent of the time in the long term.

3.2.2 Status Determination Criteria for the West Area

Amendment 6 did not specify status determination criteria for the three traditional net fishing areas in the West Area because, at that time, it was thought that these fisheries were exempt from the FMP requirements. Under Alternative 2, the FMP would apply to these three areas and status determination criteria would need to be created for the salmon stocks caught in the fisheries in these three areas. Two options are available to address status determination criteria—(1) create reference points per the NS1 Guidelines or (2) use the flexibility in application of NS1 Guidelines to use an alternative approach for satisfying the NS1 requirements. The preferred approach would be to use an alternative approach for satisfying the NS1 requirements, as detailed in section 3.3.2.

The alternative approach is appropriate because creating reference points per the NS1 Guidelines would be problematic for these salmon stocks in these fisheries. The standard approaches to specification of reference points set forth in the NS1 Guidelines are incompatible with the existing escapement-based management structure and associated in-season monitoring and management measures. At the time Amendment 6 was developed, the alternative approach provision was not available as a means to comply with requirements to establish status determination criteria. As described in section 3.2.1, NMFS worked with the State to craft overfishing level definitions in the East Area, rooted in the State's existing MSY escapement goal policies. The action was taken to comply with federal requirements, but it is redundant

with requirements already in place under the State's Escapement Goal Policy (5 AAC 39.223), Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222), and the Pacific Salmon Treaty.

The State salmon stock assessment and management program is dependent on biological reference points for salmon populations that are estimated based on long-term, stock specific assessment of recruits from parent escapement or from long-term assessment of escapement. Estimating biological reference points for salmon populations requires direct assessment of the spawning stock. NS1 Guidelines and status determination criteria are catch and exploitation rate based, using information available pre-season. Reference points as defined in NS1 Guidelines do not directly correspond to the biological reference points underlying the state's escapement-based management program. Escapement goals are fixed and escapement levels are monitored in-season. The allowable catch to maintain escapements within the escapement goal range or above the threshold is variable and not known pre-season.

The State provided supplemental material to demonstrate to the Council that the salmon stock assessment and fishery management system, as embodied in the *Escapement Goal Policy and Policy for the Management of Sustainable Salmon Fisheries*, is consistent with NS1. This material is summarized in Section 3.1.5.

Under Alternative 3, the FMP would prohibit commercial fishing in the West Area. Salmon that spend part of their lifecycle in the West Area are subject to commercial salmon fisheries after they reach maturity and travel back to their natal rivers and streams. Prohibiting commercial fishing in the West Area enables the State to manage the Alaska salmon fisheries in waters adjacent to the West Area. Likewise, any non-Alaska salmon that spend part of their life in the West Area would return to their natal regions and be subject to management and directed fisheries there. In Alaska, these directed commercial fisheries are managed by the State of Alaska and are not subject to this FMP. Likewise, fisheries for salmon in areas outside of Alaska are not subject to this FMP. In Alaska, NS1 is achieved by the State's scientifically-based approach for controlling catch to achieve the biomass level necessary to produce MSY by ensuring that overfishing does not occur in the fishery. In the Pacific Northwest, NS1 is achieved under the *Pacific Coast Salmon Plan*. To ensure overfishing does not occur as a result of incidental catch of salmon by other fisheries in the West Area that not regulated under this FMP, this FMP relies on management measures adopted under federal fishery management plans, together with the State's management program in waters adjacent to the West Area.

3.3 Annual Catch Limits and Accountability Measures

MSA § 303(a)(15) requires that each FMP establish a mechanisms for specifying ACLs to prevent overfishing and include AMs to prevent ACLs from being exceeded and to correct overages of the ACL if they do occur. The NS1 Guidelines provide guidance on how to meet this requirement and describe fishery management approaches to meet the objectives of NS1.

3.3.1 Exception for stocks subject to an International Agreement

In recognition that applying ACL/AMs requirements to stocks covered by an international fishery agreement may unfairly impact the U.S. component of these fisheries, the MSA provides an exception for those stocks.[32] The NS1 Guidelines generally require that FMPs establish ACL/AMs for all stocks and stock complexes in the fishery, but recognize the statutory exception from the ACL requirement for stocks or stock complexes that are managed under an international fisheries agreement in which the United States participates. Under MSA § 3(24), an international fishery agreement is "any bilateral or multilateral treaty, convention, or agreement which relates to fishing and to which the United States is a party." Salmon in Alaska are subject to two international agreements — the Pacific Salmon Treaty and the *Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean*.

Pacific Salmon Treaty

The Council's April 2011 motion provided the following direction for addressing the ACL and AM requirement for Chinook salmon harvests under the Pacific Salmon Treaty:

> **Option 1:** Use the NS1 Guidelines exception for stocks managed under an international fishery agreement with regard to ACL/AM requirements for Chinook salmon harvests under the Pacific Salmon Treaty.

The Pacific Salmon Treaty clearly meets the criteria related to international fishery agreements. The Pacific Salmon Treaty is a bilateral treaty between the United States and Canada that established an international management regime to address the conservation and harvest of salmon originating in one country that contribute to fisheries in the other. Terms and provisions of the Pacific Salmon Treaty are negotiated through the Pacific Salmon Commission (Commission). Chinook salmon harvested in Southeast Alaska predominately originate from streams in the Pacific Salmon Treaty area, which stretches from central Oregon, northwest through Canada, to Cape Suckling, Alaska. All Chinook harvested in the Southeast Alaska, other than certain production from Alaska hatchery facilities, are subject to catch limit provisions of the Pacific Salmon Treaty.

The overfishing definition for Chinook salmon is based on a relationship between a pre-season relative abundance index generated by the Commission's Chinook Technical Committee and a harvest control rule specified in the Pacific Salmon Treaty. The Pacific Salmon Treaty also provides for an in-season adjustment to the harvest level based on an assessment of in-season data. In addition, decreases in the allowable catch are triggered by conservation concerns regarding specific stock groups. This abundance-based system reduces the risk of overharvest at low stock abundance while allowing increases in harvest with increases in abundance, as with the management of the other salmon species in the southeast Alaska

[32] MSA §303(note); 50 CFR 600.310(h)(2)(ii).

salmon fishery. The permitted Chinook salmon harvest is allocated to fisheries and stakeholders in accordance with regulations adopted by the Board.[33]

Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean

The harvest of anadromous stocks in international waters of the North Pacific by the U.S., Canada, Japan, the Republic of Korea, and the Russian Federation (collectively "the Parties") is governed by the *Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean* (Convention). Pursuant to Article VIII of the Convention, the North Pacific Anadromous Fish Commission's (Commission) objective is to "promote the conservation of anadromous stocks in the Convention area." Article I of the Convention defines the Convention Area as "waters of the North Pacific Ocean and its adjacent seas, north of 33 degrees North latitude, and beyond the 200-mile zones of the coastal States," and Article III prohibits both the directed fishing for anadromous fish and the retention of anadromous fish caught incidentally during directed fishing activities for non-anadromous fish stocks in the Convention area.

Although the Convention meets the definition of an international fishery agreement under the MSA, the international agreement exception to ACL requirements cannot be invoked for the salmon fisheries subject to the Convention. Congress intended that NOAA Fisheries apply the international exception where there are potential conflicts between the MSA ACL requirements and legislation implementing international fishery agreements (74 FR 3178, January 16, 2009). Congress also intended that NOAA Fisheries apply this exception in situations where foreign fishermen would gain an unfair advantage over U.S. fishermen subject to stricter ACLs beyond the quotas assigned pursuant to an international agreement. The Salmon FMP governs management of salmon fisheries in the EEZ waters off Alaska, and divides the salmon management area into the East Area and West Area. The Salmon FMP delegates regulation of the commercial troll and sport salmon fisheries in the East Area to the State of Alaska and maintains a prohibition on commercial fishing in the West Area, with the exception of the three historical net fishing areas. In contrast, the Convention applies to waters beyond 200 nautical miles and prohibits all parties to the Convention from directed fishing for anadromous fish and retaining incidentally caught anadromous fish in the Convention area. There are no conflicts between the MSA ACL requirements and legislation implementing the Convention. Further, because the Convention prohibits all parties to the Convention from directed fishing for anadromous fish and retaining incidentally caught anadromous fish in the Convention area, foreign fishermen do not have an unfair advantage over U.S. fishermen resulting from the ACL requirements in the MSA.

[33] The Chinook winter troll fishery is managed under the Pacific Salmon Treaty so as not to exceed 45,000 fish. Any Treaty Chinook not harvested in the winter fishery are available for the spring and summer fisheries. *See* ADF&G Report to the NPFMC, June 2010. *See also* 5 AAC 29.080, the Board's winter troll management plan.

3.3.2 State Salmon Management as an Alternative Approach

The Council's April 2011 motion provided the following direction for an alternative approach to satisfy the NS1 requirements of the MSA.

> **Option 2:** Use the State's salmon management program as an alternative approach to satisfy MSA requirements.

The NS1 Guidelines contemplate limited circumstances where the standard approaches to specification of reference points, including ACLs, and management measures detailed in the guidelines may not be appropriate. The NS1 Guidelines specifically cite Pacific salmon as an example of stocks that may require an alternative approach.[34] Under this flexibility within the guidelines, the Council may propose an alternative approach for satisfying the requirements of NS1, other than those set forth in the guidelines. The guidelines require that the Council document its rationale for proposing an alternative approach in an FMP amendment and document its consistency with the MSA.

Under Alternative 2, the alternative approach would apply to the four salmon fisheries that occur in the EEZ; the Southeast Alaska troll fishery, the Prince William Sound drift gillnet fishery, the Cook Inlet drift gillnet fishery, and the Alaska Peninsula drift gillnet and purse seine fisheries. Under Alternative 3 (preferred), the alternative approach would apply to the Southeast Alaska troll fishery because the other fisheries would be removed from the FMP. For the Southeast Alaska troll fishery, under both alternatives, this approach would only apply Tier 2 and 3 salmon stocks caught in the troll fishery because, as discussed above, Chinook salmon (Tier 1) are managed under the Pacific Salmon Treaty (and are exempt from the ACL requirement). Tier 2 and 3 salmon stocks are primarily of Alaska origin. Salmon that originate from the Pacific Northwest are managed under the *Pacific Coast Salmon Plan.* Note that one of the primary functions of the FMP – prohibit commercial fishing in the vast majority of the EEZ – helps to ensure that U.S. stocks return to their natal regions where they are managed to achieve NS1.

Additionally, MSA §302(h)(6) requires each Council to develop annual catch limits for each of its managed fisheries that may not exceed the fishing level recommendations of its SSC or the peer review process established under subsection (g). As part of the alternative approach the Council considered establishing a peer review process in the FMP that utilizes the State's existing salmon expertise and

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[34] 50 CFR 600.310(h)(3), Flexibility in application of NS1 guidelines ("There are limited circumstances that may not fit the standard approaches to specification of reference points and management measures set forth in these guidelines. These include … stocks with unusual life history characteristics (*e.g., Pacific salmon, where the spawning potential for a stock is spread over a multi-year period*). In these circumstances, Councils may propose alternative approaches for satisfying the NS1 requirements of the [MSA] other than those set forth in these guidelines. Councils must document their rationale for any alternative approaches for these limited circumstances in an FMP or FMP amendment, which will be reviewed for consistency with the [MSA]") (emphasis added).

processes for developing escapement goals as fishing level recommendations. The peer review process is discussed in more detail section 3.5.

The primary function of status determination criteria, ACLs, and related requirements is to ensure that a scientifically-based approach is used for controlling catch to maintain stock abundance at the level necessary to produce MSY by ensuring that overfishing does not occur in the fishery. Therefore, an alternative approach that is consistent with the MSA should document how the management measures used to determine stock status and control catch are scientifically-based and how they achieve the biomass level necessary to produce MSY. If the Council and NMFS determine that the State's management represents an alternative approach that satisfies the requirements of the MSA, then implementing reference points, including ACLs, in the manner described within the NS1 Guidelines would be unnecessary.

To that end, Council staff requested ADF&G provide input on how State salmon management could be an alternative approach for meeting the MSA requirements. In a July 31, 2010 letter, Council staff requested that ADF&G provide assistance in evaluating the State's salmon management program by describing in detail how the State's escapement goal- and abundance-based salmon management program could serve as an "alternative approach" and satisfy the requirements of the MSA. ADF&G provided a description of the State's salmon management program in response to the Council's request.[35] The State's response describes how its salmon management program represents a scientifically-based approach to prevent overfishing, while achieving OY.

In addition, in a January 28, 2011 letter, Council staff requested NMFS to (1) consider issuing clarifying rulemaking to remove Alaska salmon from the MSA's ACL requirement and (2) provide clear direction on the applicability to the FMP of an alternative approach for satisfying the ACL and NS1 requirements of the MSA. NMFS responded in a March 15, 2011 letter that clarified rulemaking to remove Alaska salmon from the MSA's ACL requirement was not possible for two related reasons. First, the ACL requirement is applicable to any fishery management plan that is prepared by any Council, and the MSA does not exempt any fishery management plans from the required provisions in section 303(a). Each fishery management plan must comply with these requirements, notwithstanding the degree to which the plan defers management to the State. Second, NMFS cannot create an exemption beyond those set forth in the statute (i.e., for stocks with 1-year life cycle or unless otherwise provided for under an international agreement to which the United States is party).

In this letter, NMFS agreed with the Council's assessment that the standard approaches set forth in the NS1 Guidelines may not be appropriate to apply to the Alaska salmon fisheries, given salmon life history characteristics and the existing escapement goal management. NMFS also agreed with the Council's

[35] Also referenced in the State's response are the State's policies for the Management of Sustainable Salmon Fisheries (5 AAC 39.222) and for Statewide Salmon Escapement Goals (5 AAC 39.223).

assessment that an alternative approach may be appropriate for the FMP. The letter explained that the State's August 31, 2010, letter appears to provide the Council with the rationale to support a proposal to utilize the State's salmon management as an alternative approach.

NMFS also committed to working with Council and State staff in developing the alternative approach and in identifying and resolving the specific issues that need to be addressed in the FMP amendment and analysis. NMFS has identified two issues that should be addressed in the analysis: (1) how scientific uncertainty is addressed in escapement goal management and (2) the process for scientific review of salmon stock assessments, escapement goal ranges, and levels of concern. ADF&G prepared a report detailing how uncertainty is incorporated into escapement goal development and management (Appendix 1). This addresses a major aspect of the NS1 guidelines to incorporate management and scientific uncertainty in ensuring that overfishing is prevented.

Scientific review of salmon stock assessments, escapement goal ranges, and levels of concern is addressed in section 3.5.1. Scientific review ties into how the Council implements the alternative approach for satisfying NS1, and whether the Council adopts a peer review process that utilizes existing State salmon expertise and review processes for the purposes of developing escapement goals as fishing level recommendations and providing scientific information to the Council.[36]

The Council developed and analyzed an FMP amendment that explains how the State's salmon escapement goal management is an appropriate alternative approach for satisfying the NS1 requirements of the MSA. Escapement goals are specified annually, in terms of numbers of fish. The biology of salmon is such that escapement is the point in the species life history best suited to routine assessment and long-term monitoring. The Pacific Fishery Management Council also recommended ACLs specified on the basis of spawning escapement, which is the metric most commonly used for assessing the status of salmon stocks (Pacific Fishery Management Council 2011). The Pacific Council recognized that using spawning escapement, which is more consistent with the FMP conservation objectives, the biology of the species, and the current structure of the salmon management system requires invoking the flexibility provisions of the NS1 Guidelines. Basing ACLs on escapement goals is consistent with the long-standing practice of using spawning escapement to assess the status of salmon stocks. Note that the Pacific Council's recommended approach recognizes that Council's active role in managing salmon and its existing management process, such as its Salmon Technical Team.

The Council proposes an alternative approach because the State's escapement based management system is a more effective management system for preventing overfishing than a system that places rigid numeric

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[36] MSA §302(g)(1)(E) "The Secretary and each Council may establish a peer review process for that Council for scientific information used to advise the Council about the conservation and management of the fishery."
MSA §302(h)(6) [Each Council shall] "develop annual catch limits for each of its managed fisheries that may not exceed the fishing level recommendations of its scientific and statistical committee or the peer review process established under subsection (g)."

limits on the number of fish that may be caught. The fundamental goal of fishery managers who employ catch limits to prevent overfishing is to ensure that the number of fish that survive to breed is sufficient to produce maximum yields over the long term. Given salmon's particular life history attributes, the preferred method to annually ensure that surviving spawners will maximize present and future yields is a system that establishes escapement goals intended to maximize surplus productivity of future runs, estimates run strength in advance, monitors actual run strength and escapement during the fishery, and utilizes in-season management measures, including fishery closures, to ensure that minimum escapement goals are achieved. The Council believes that such an approach provides a more effective mechanism to prevent overfishing than a system that prescribes rigid catch limits before, the season based, on predictions of run strength. Such a catch-based system would rely on pre-season predictions of run strength and of the resulting catch that would allow the stock to meet prescribed escapement goals; however, because it would employ rigid catch limits, such a system would lack the added features of in-season monitoring to confirm actual run strength and the ability to adjust fishing pressure to ensure that escapement goals are met if pre-season predictions of run strength prove inaccurate.

Moreover, an additional advantage of the State's escapement based system is that it does not rely on either the fisherman's or managers' ability to accurately identify the particular stock to which each harvested fish belongs. There are numerous stocks of each species of Pacific salmon managed under this plan, and fish of the same species from different breeding stocks cannot be distinguished visually.

The remainder of this section summarizes information provided by the State to explain how the State's escapement goal management is an alternative approach for satisfying the NS1 requirements on the MSA.

An alternative approach is necessary for Alaska salmon fisheries because developing a catch quota-based management system based on preseason forecasts in order to implement reference points, as prescribed in the NS1 Guidelines, could result in greater risks of overfishing and levels of un-harvested stocks which may prevent the achievement of OY on a continuing basis. According to the State's response, salmon management is based on monitoring in-season abundance for achievement of escapement goals. ADF&G gives the following reasons in support of using the State's salmon management program as an alternative approach for complying with the MSA:

1. Salmon are semelparous, reproducing once during their life cycle;[37]

2. The harvestable surplus of salmon consists of new recruits and the catch is comprised of mature salmon;

3. The productivity of each year class cannot be improved by limiting the catch amount in subsequent years;

[37] A species is considered semelparous if it reproduces a single time in its lifetime; iteroparous if it has multiple reproductive cycles over the course of its lifetime.

4. Foregone catch cannot be recaptured in subsequent years; and

5. Salmon abundance cannot be estimated effectively in advance.

The State concludes that its program of in-season abundance estimates using contemporaneous data, with appropriate monitoring for achievement of escapement goals, is the most effective way to prevent overfishing, while achieving OY on a continuing basis. ADF&G expressly states that its salmon management system has been and is a successful and appropriate system for meeting the requirements of the MSA to prevent overfishing, while achieving on a continuing basis the OY from each salmon fishery for the fishing industry. For these reasons, State salmon management is an alternative approach to the specification of reference points and management measures as set forth in the NS1 Guidelines.

The State has developed spawning escapement goals, harvest guidelines, and other management strategies that reflect and integrate the large number of factors affecting salmon productivity (e.g., annual changes in the number of salmon produced because of fluctuations in the salmon's marine and freshwater environments, annual changes in fishing patterns, management imprecision, annual changes in salmon migration routes, annual differences in relative abundance of various stocks in an area, etc.). Escapement goal ranges, together with real-time escapement enumeration (i.e. visual counts from towers, weir counts, aerial survey counts, sonar counts), and intensive fishery monitoring programs, have been established for most of Alaska's major salmon stocks. In cases where low salmon runs are projected, the State closes the fishery to achieve its escapement goals, thus preventing overfishing.

Scientifically defensible salmon escapement goals are a central tenet of fisheries management in Alaska. The State's salmon management program is based on scientifically defensible escapement goals and in-season management measures to avoid overfishing of salmon stock originating in Alaska. Escapement is defined as the annual estimated size of the spawning salmon stock in a given river, stream, or watershed. Quality of the escapement may be determined not only by numbers of spawners, but also by factors such as sex ratio, age composition, temporal entry into the system, and spatial distribution within salmon spawning habitat (5 AAC 39.222(f)(10)). It is the responsibility of ADF&G to document, establish, and review escapement goals, prepare scientific analyses in support of goals, notify the public when goals are established or modified, and notify the Board of allocative implications associated with escapement goals.

Alaska's salmon fisheries are managed to maintain escapement within levels that provide for MSY, escapements are assessed on an annual basis, all appropriate reference points are couched in terms of escapement level, and status determinations are made, based on the stock's level of escapement. For salmon, MSY is achieved by controlling fishing to maintain the spawning escapement at levels that provide potential to maximize surplus production. Escapement goals are based on direct assessments of MSY escapement levels from stock recruit analysis or a reasonable proxy. Escapement goals are expressed as a range, lower bound, or a threshold. In general escapement goal ranges are specified to produce 90% to 100% of MSY. Escapement goal ranges give managers the flexibility to moderate fishing to protect stocks of weak runs that are commonly exploited in mixed stock fisheries.

Scientifically-based biological reference points for salmon populations are estimated based on long-term, stock specific assessment of recruits from parent escapement or long-term assessment of escapement. The salmon stock assessment programs employed by ADF&G are designed to monitor stock and age-specific catch and escapements. Comprehensive implementation of the ADF&G salmon stock assessment programs, over time, provides stock-recruitment data necessary for developing MSY based escapement goals. Since the catch and escapement monitoring program are conducted in real-time, they provide in-season assessments of run strength necessary for managers to implement ADF&G's escapement based harvest policies.

The key definitions contained in the Policy for the Management of Sustainable Salmon Fisheries with regard to scientifically defensible escapement goals and resulting management actions are: biological escapement goal, optimal escapement goal, sustainable escapement goal, and sustained escapement threshold. Biological escapement goal (BEG) means the escapement that provides the greatest potential for maximum sustained yield. BEG will be the primary management objective for the escapement unless an optimal escapement or in-river run goal has been adopted. BEG will be developed from the best available biological information and should be scientifically defensible on the basis of available biological information. BEG will be determined by ADF&G and will be expressed as a range based on factors such as salmon stock productivity and data uncertainty (5 AAC 39.222(f)(3)).

Sustainable escapement goal (SEG) means a level of escapement, indicated by an index or an escapement estimate, that is known to provide for sustained yield over a five to ten year period, used in situations where a BEG cannot be estimated or managed for; the SEG is the primary management objective for the escapement, unless an optimal escapement or in-river run goal has been adopted by the Board; the SEG will be developed from the best available biological information and should be scientifically defensible on the basis of that information; the SEG will be determined by ADF&G and will take into account data uncertainty and be stated as either a "SEG range" or "lower bound SEG"; ADF&G will seek to maintain escapements within the bounds of the SEG range or above the level of a lower bound SEG (5 AAC 39.222(f)(36)).

Sustained escapement threshold (SET) means a threshold level of escapement, below which the ability of the salmon stock to sustain itself is jeopardized. In practice, SET can be estimated based on lower ranges of traditional escapement levels, for which the salmon stock has consistently demonstrated the ability to sustain itself. The SET is lower than the lower bound of the BEG and also lower than the lower bound of the SEG. The SET is established by ADF&G, in consultation with the Board, for salmon stocks of management or conservation concern (5 AAC 39.222(f)(39)).

Optimal escapement goal (OEG) means a specific management objective for salmon escapement that considers biological and allocation factors and may differ from the SEG or BEG. An OEG will be sustainable and may be expressed as a range with the lower bound above the level of SET (5 AAC 39.222(f)(25)). The Policy for Statewide Salmon Escapement Goals (5 AAC 39.223) allows the Board,

during its regulatory process and in consultation with ADF&G, to review a BEG, SEG, or SET determined by ADF&G, and with the assistance of ADF&G, determine the appropriateness of establishing an OEG. The Board would provide an explanation of the reasons for establishing an OEG and provide, to the extent practicable, and with assistance from ADF&G, an estimate of expected differences in yield of any salmon stock, relative to MSY, resulting from implementation of an OEG. Biological factors must be considered in establishing an OEG; the Board could not establish an OEG without ADF&G finding it consistent with the sustained yield principle.

A management concern results from a continuing or anticipated inability to maintain escapements within the escapement goal range or above the lower bound or threshold. With the determination of a management concern, ADF&G and the Board of Fisheries are required to develop an action plan to address the concern.

In certain fisheries, where it is not cost effective to manage for escapement goal ranges, because the magnitude of the resource is low, the rate of fishing is low, or it is difficult or impossible to enumerate escapement, fishing is limited to weekly fishing periods. These fishing periods are set to provide ample windows of time for salmon to move through the fishery, and reflect the level of fishing that has provided a sustainable level of catch based on the historical performance of the fishery. For these fisheries, fishing periods may be shortened or lengthened depending on qualitative indicators of run strength, such as catch-per-unit-of-effort in directed or test fisheries. The fishing-period strategy is reviewed annually on the basis of postseason evaluations of escapement levels and fishery performance. The fishing-period strategy may result in lower sustained yields than the escapement goal harvest strategy.

The State manages Alaska salmon stocks according to the best scientific information available to achieve sustainable yield. Salmon are targeted throughout their adult life by a variety of fisheries from mixed stock troll fisheries to terminal net fisheries, sport fisheries, subsistence fisheries, and personal use fisheries. Escapement-based management, with real-time monitoring of run strength, inherently accounts for total catch and all sources of natural mortality. The State monitors catch in all of the salmon fisheries and manages salmon holistically by incorporating all the sources of fishing mortality on a particular stock or stock complex in calculating the escapement goal range. As explained above, overfishing is prevented by in-season monitoring and data collection that indicates when an escapement goal is not being met. When the data indicate low run strength due to natural fluctuations in salmon abundance, ADF&G closes the fishery to ensure the escapement goal range is reached. This may result in low catches for the target fisheries, but it prevents overfishing and ensures sustained yield over the long term.

3.4 Optimum Yield

MSA § 303(a)(3) requires that an FMP assess and specify the optimum yield (OY) from the fishery, and include a summary of the information utilized in making such specification. The MSA § 3(33) defines OY as the amount of fish which –

> (A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
> (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and
> (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

In the FMP, OY for each species of salmon harvested under this plan is defined as allowable annual harvest levels. The FMP provides details for OY in the East Area, but not in the West Area. The specification of OY for the West Area depends on the scope of the FMP in the West Area and whether the three net fishing areas are included in the FMU. The existing OY specification does not appear to meet the MSA requirements. The following options are provided for Council consideration for an OY specification that addresses the MSA requirements.

Option 1: East Area Optimum Yield

For the troll fishery in the East Area, several economic, social, and ecological factors are involved in the definition of OY. Of particular importance are the annual variations in the abundance, distribution, migration patterns, and timing of the salmon stocks; provisions of the Pacific Salmon Treaty; decisions of the Pacific Salmon Commission; allocations by the Alaska Board of Fisheries; traditional times, methods, and areas of salmon fishing; and in-season indices of stock strength. Further, because the commercial troll fishery and the recreational fishery take place in the EEZ and State waters, without formal recognition of the boundary between these two areas, the OY should not and cannot be subdivided into separate parts for the EEZ and State waters.

MSY is established for each tier based on the MSY control rules. For Chinook salmon stocks in tier 1, an all-gear MSY is prescribed in terms of catch by the Pacific Salmon Treaty and takes into account the biological productivity of Chinook salmon and ecological factors in setting this limit. The portion of the all-gear catch limit allocated to troll gear represents the OY for that fishery and takes into account the economic and social factors considered by the Board in making allocation decisions.

For stocks in tiers 2 and 3, MSY is defined in terms of escapement. MSY escapement goals account for biological productivity and ecological factors, including the consumption of salmon by a variety of marine predators. The OY for the troll fishery is that fishery's annual catch, which, when combined with the catch from all other salmon fisheries, results in a post-harvest run size equal to the MSY escapement goal for each indicator stock. The portion of the annual catch harvested by the troll fishery reflects the biological, economic, and social factors considered by the Board and ADF&G in determining when to open and close the coho salmon harvest by the troll fishery.

The MSA requires Councils to "review on a continuing basis, and revise as appropriate, the assessments and specifications made ... with respect to the optimum yield." In particular, OY may need to be

respecified in the future, if major changes occur in the estimate of MSY. Likewise, OY may need to be respecified, if major changes occur in the ecological, social, or economic factors governing the relationship between OY and MSY.

Option 2: West Area Optimum Yield (for Alternative 3, excluding three traditional net fishing areas)

Under Alternative 3, since commercial fishing is prohibited in the West Area, the directed harvest OY would be zero. The West Area has been closed to commercial net fishing since 1952 and commercial troll fishing since 1973 and there has not been any yield from this area. This OY recognizes that salmon are fully utilized by state managed fisheries and that the State of Alaska manages fisheries based on the best available information using the State's escapement goal management system. Additionally, management measures adopted under other federal FMPs, together with the State's scientifically-based management program in waters adjacent to the West Area, ensure that overfishing of salmon does not occur as a result of incidental catch of salmon by other EEZ fisheries not regulated under this FMP. This OY also recognizes that non-Alaska salmon are fully utilized and managed by their respective management authority when they return to their natal regions.

Option 3: West Area Optimum Yield (for Alternative 2, an FMP that includes the three traditional net fishing areas)

For salmon stocks harvested in the three traditional net fishing areas, MSY is defined in terms of escapement. MSY escapement goals account for biological productivity and ecological factors, including the consumption of salmon by a variety of marine predators. The OY for the fishery is that fishery's annual catch which, when combined with the catch from all other salmon fisheries, results in a post-harvest run size equal to the MSY escapement goal for each stock or stock complex. The portion of the annual catch harvested by the fishery reflects the biological, economic, and social factors considered by the Board and ADF&G in determining when to open and close salmon fisheries in the three traditional net fishing areas.

For all other stocks in the West Area, the directed harvest OY is zero in the West Area because commercial salmon fishing is prohibited. This recognizes that the State manages salmon when they return to predominantly terminal fisheries, based on the best available information using the State's escapement goal management system. This OY also recognizes that non-Alaska salmon are fully utilized and managed by their respective management authority when they return to their natal regions.

3.5 Salmon Plan Team

The FMP states that the Council will maintain its salmon plan team; however, the salmon plan team has not met since 1990. The Council is considering whether to reconstitute a salmon plan team or remove the salmon plan team from the FMP. The Council's April 2011 motion provided the following direction for the Salmon Plan Team and receiving the status of the stocks and fishery information.

Salmon Plan Team: For fisheries remaining under the FMP, explore review provided under the State of Alaska salmon management program and Pacific Salmon Treaty processes as alternative peer review processes for status of the stocks and fishery information.

Whether there is a salmon plan team is directly related to the preparation of a Stock Assessment and Fishery Evaluation (SAFE) Report and related requirements for reviewing and providing fishery and scientific information to the Council. If the Council decides to remove the salmon plan team, it should specify how it wants to receive information in the future on the salmon fisheries included in the FMP.

Under Alternative 3, the Council chose to establish a peer review process in the FMP that utilizes existing State salmon expertise and review processes for the scientific information used to advise the Council about the conservation and management of the salmon fisheries in the EEZ. This would entail the State annually preparing a stock assessment report, using the best available scientific information, for the salmon caught in the Southeast Alaska troll fishery and provide that to the Council. This ties into implementing the alternative approach for satisfying NS1 and the peer review process that utilizes existing State salmon expertise and review processes for the purposes of developing fishing level recommendations and providing scientific information to the Council.[38] Using the State's process as the peer review process recognizes the limited role of NMFS and the Council in salmon fishery management and the State's existing expertise and infrastructure. The State, as the peer review body, would work together with the Council to implement the provisions of the MSA.

3.5.1 Peer Review Process for ADF&G Escapement Goals

In considering whether NMFS and the Council establish existing State salmon expertise and review processes as the peer review process for the purposes of developing fishing level recommendations and providing scientific information on the salmon fisheries under the FMP, ADF&G provided the following information to explain the peer review process ADF&G uses for escapement goals. The Council used this information to understand the State's peer review process and chose adopt it for purposes of developing salmon escapement goals under the FMP.[39] This would enable the escapement goal recommendations from the State's peer review process to serve as a functional substitute for SSC recommendations on ABC under MSA § 302(h)(6).

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[38] MSA §302(g)(1)(E) "The Secretary and each Council may establish a peer review process for that Council for scientific information used to advise the Council about the conservation and management of the fishery."
MSA §302(h)(6) [Each Council shall] "develop annual catch limits for each of its managed fisheries that may not exceed the fishing level recommendations of its scientific and statistical committee or the peer review process established under subsection (g)."

[39] MSA §302(g)(1)(E).

Initiation of Goal review

The Board convenes a scheduled regulatory meeting every three years for each of the major management regions in Alaska. In conjunction with those meetings, and according to state policy (5 AAC 39.223), ADF&G is required to review all species escapement goals for the region, establish new escapement goals, and determine if updates to existing goals are warranted based on new information. Approximately one year in advance of the board meeting, an inter-divisional escapement goal review team from ADF&G's commercial fisheries and sport fish divisions is assembled, which includes area, regional, and headquarters fishery biologists and fishery scientists. They discuss all species goals in the region, and create work assignments for analyses that will update existing goals or create new ones. A principle decision at this stage is which stocks will require modifications to existing goals based upon new data, a change in assessment method, or significant changes to the fishery for that stock.

Development or revision of goals and internal review

Preliminary analyses for new goals or goal revisions are developed by one or more individuals and brought before the escapement goal review team for further consideration and review. Over a period of approximately six months, based upon input from the review team, draft analyses for each stock under review are provided to the entire team for peer review. Following that, a final draft is created for submission to ADF&G Research and Technical Services, which initiates a formal peer review process involving appropriate department staff, especially those not involved in development of the goal. These reviews are generally provided anonymously and are independent from the work of the goal development team. After revisions are made, goal analyses are published as a separate report or included in a larger publication documenting review of all escapement goals in the region. Though recognized as a largely internal ADF&G process, inclusion of area, regional, and headquarters staff from both fish divisions to review escapement goals fosters a wide variety of inputs from diverse viewpoints. When stakeholders request opportunity to present analyses for specific salmon stock escapement goals, the team is available to review and consider those alternatives.

Statewide and non-ADF&G peer review

Where analyses are particularly complex or controversial, there are two other avenues commonly available for further peer review. The statewide escapement goal review team offers diverse, inter-divisional and inter-regional expertise for review of analytical methods and specific goal development. This provides a mechanism for broad input within ADF&G, and helps assure consistency. The statewide panel may include staff participating in the regional review, but also engages expertise from other state management regions.

The Policy for Statewide Salmon Escapement Goals (5 AAC 39.223(b)(7)) provides for ADF&G discretion in engaging non-ADF&G, independent peer reviews of analyses. Outside experts are occasionally enlisted for independent peer review of goal analyses, particularly where novel methods are

employed or interpretations may be especially complex. The department seeks independent peer review judiciously where significant benefit can be gained from specialized expertise. A number of university level scientists with specific skills and depth have been very helpful to the department in assuring that such analyses are credible and defensible. Independent reviews of analyses in support of escapement goals are typically made available to the public.

During its regulatory meetings, the Board may also receive non-ADF&G peer reviews of ADF&G escapement goal analyses and recommendations from stakeholders and/or their scientific consultants. Stakeholders may also submit independent analyses to the Board during the appropriate regulatory cycle. The Board has the authority to supplant ADF&G escapement goal recommendations with an OEG, which considers biological and allocative factors (5 AAC 39.223(f)(25). The Board would provide an explanation of the reasons for establishing an OEG and provide, to the extent practicable, and with assistance from ADF&G, an estimate of expected differences in yield of any salmon stock, relative to MSY, resulting from implementation of an OEG (5 AAC 39.223(c)(2)). Biological factors must be considered in establishing an OEG; while these goals may differ from the SEG or BEG recommended by ADF&G, the sustainable salmon policy dictates they must also be reviewed by ADF&G and determined to be sustainable. There are currently ten OEGs in Alaska. With two exceptions, the Board determined OEG was made more conservative by raising the lower and/or upper bounds of the escapement goal ranges recommended by ADF&G. For Nushagak River and Redoubt Lake sockeye, OEGs provide a smaller lower bound to the goal range for allocative reasons. In both cases, the goals are clearly sustainable, having been met or exceeded for a decade (Munro and Volk, 2011).

3.6 Bycatch Management

The MSA defines the term "bycatch" as fish which are harvested in a fishery, but which are not sold or kept for personal use, including economic discards and regulatory discards. The FMP does not address MSA § 303(a)(11), which requires that a fishery management plan establish a standardized reporting methodology to assess the amount and type of bycatch, and measures to minimize bycatch to the extent practicable and minimize the mortality of unavoidable bycatch. This requirement addresses NS9. According to the NS9 Guidelines, Councils must: (1) Promote development of a database on bycatch and bycatch mortality in the fishery to the extent practicable; … (2) For each management measure, assess the effects on the amount and type of bycatch and bycatch mortality in the fishery; … (3) Select measures that, to the extent practicable, will minimize bycatch and bycatch mortality; [and] (4) Monitor selected management measures.[40] Additionally, the MSA requires the Council to lower economic discards[41] and to measure total catch in each fishery under its jurisdiction.[42]

[40] 50 CFR 600.350(d).

The Council's April 2011 motion provided the following direction:

> **Bycatch Management:** Include a management objective to minimize bycatch and minimize mortality of unavoidable bycatch in the directed salmon fisheries, but defer bycatch management in the directed salmon fisheries to the State of Alaska. Document existing monitoring and management measures for initial review analysis.

A management objective to address bycatch is included in section 3.1.

The Fishery Impact Statement in Chapter 4 documents the State's measures to minimize bycatch to the extent practicable and minimize the mortality of unavoidable bycatch and the State's standardized reporting methodology to assess the amount and type of non-target catch in the commercial salmon fisheries. Bycatch in the directed commercial salmon fisheries primarily consists of groundfish species and the incidental catch of immature salmon. State and federal management measures seek to minimize bycatch to the extent practicable and minimize the mortality of bycatch.

In both the East and West Areas, a combination of factors work together to keep both the number of fish taken as bycatch and the associated mortality of those fish at a negligible amount. First, ADF&G fish tickets serve as a standardized reporting methodology documenting all retained harvest from both state and EEZ waters. ADF&G regulations require that fish tickets record the type of gear used as well as the number, pounds, delivery condition, and disposition of fish species harvested and retained for both commercial and personal use (5 AAC 39.130(c)). In the East Area, maximum retainable allowances (MRAs) of certain non-salmon species allow for bycatch to be treated as incidental catch so that those species may to be utilized. In addition, non-retention requirements when MRAs are achieved provide incentives to avoid those species. Specified closure areas during those times of the year when bycatch is generally highest serves to significantly reduce the amount of bycatch taken. Finally, the nature of the gear utilized in the troll fishery allows for discarded species to be released with limited mortality. In the West Area, natural water features concentrate salmon and groundfish species are not readily vulnerable to the net gear utilized. Therefore, no additional management measures are necessary at this time to document bycatch interactions within the salmon fisheries.

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[41] MSA § 313(f) BYCATCH REDUCTION. – In implementing section 303(a)(11) and this section, the North Pacific Council shall submit conservation and management measures to lower, on an annual basis for a period of not less that four years, the total amount of economic discards occurring in the fisheries under its jurisdiction.

[42] MSA § 313(h) CATCH MEASUREMENT. – (1) By June 1, 1997 the North Pacific Council shall submit, and the Secretary may approve, consistent with the other provisions of this Act, conservation and management measures to ensure total catch measurement in each fishery under the jurisdiction of such Council. Such measures shall ensure the accurate enumeration, at a minimum, of target species, economic discards, and regulatory discards.

3.7 Federal Salmon Limited Entry Permits

According to the 1979 FMP, the federal salmon permit was established as a compliment to the state salmon limited entry permit, in order to limit capacity in the EEZ (i.e., so that persons who did not receive a state salmon limited entry permit would not simply shift their fishing efforts into federal waters). Additionally, the 1979 FMP explains that there was an interest in ensuring that the half-dozen or so vessels that had fished in the EEZ, but did not land their catch in Alaska, could continue to have access to salmon fishing in the EEZ, even if they were not eligible for a state limited entry permit. In 1979 or 1980, NMFS issued two federal limited entry permits. These permits were not transferrable and upon retirement for any reason, that permit was retired from the fishery.[43] NMFS has no records for these permits and assumes that they have been retired. The problem identified in the 1979 FMP was addressed by this federal permit system.

The Council's April 2011 motion provides the following option.

> **Federal Salmon Limited Entry Permits:** Remove federal permitting provisions.

Under Alternative 3, the Council determined that federal permits are no longer necessary because all current participants have state salmon limited entry permits. As long as the FMP retains the requirement to have a state salmon limited entry permit to fish in the EEZ, pursuant to authority delegated to the state by the FMP, capacity is limited in the EEZ. Therefore, the Council recommended removing the federal limited entry permit from the FMP and federal regulations. Removing this provision from the FMP would also require removing the federal regulations at 50 CFR 679.4 (h) *Salmon permits* (these regulations are included in chapter 6).

3.8 Process for Review and Appeal

This process enables members of the public to request that the Secretary review State salmon management actions. Secretarial review is limited to whether the State statute or regulation is consistent with the FMP, MSA, or other applicable federal law. In 2008, NMFS received the first appeal under the FMP appeals process.

The Council's April 2011 motion provides the following option.

> **Process for Review and Appeal:** More fully describe the process for the public to appeal and request Secretarial review of State regulations and in-season actions.

Delegation of salmon fishery management authority to the State of Alaska requires the Council and NMFS to stay apprised of state management measures governing commercial and sport salmon fishing in

[43] 1979 FMP Sec. 8.3.1.3 (44 FR 33269, June 8, 1979).

the East Area and, if necessary, to review those measures for consistency with the FMP, the Magnuson-Stevens Act, and other applicable federal law. State management measures include measures adopted by the Pacific Salmon Commission and the Alaska Board of Fisheries as well as other state laws, regulations, and inseason actions. FMP chapter 9 describes how the Council and NMFS fulfill this oversight role. FMP section 9.1 describes the ways in which the Council and NMFS monitor state management measures that regulate salmon fishing in the East Area. FMP section 9.2 describes the process by which NMFS will review state management measures governing salmon fisheries in the East Area for consistency with the FMP, the Magnuson-Stevens Act, and other applicable federal law. FMP section 9.3 describes the process by which a member of the public can petition NMFS to review state management measures in the East Area for consistency with the FMP, the Magnuson-Stevens Act, and other applicable federal law. Finally, FMP section 9.4 describes the process NMFS will follow if NMFS determines that state management measures in the East Area are inconsistent with the FMP, the Magnuson-Stevens Act, or other applicable federal laws.

3.9 Fishery Impact Statement

The FMP does not address MSA § 303(a)(9) which requires that an FMP include a fishery impact statement, "which shall assess, specify and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for—" fishery participants and fishing communities and the safety of human life at sea. The NS Guidelines provide direction on the types of information to include in a Fishery Impact Statement. For example, the NS8 Guidelines state that FMPs must examine the social and economic importance of fisheries to communities potentially affected by management measures.[44] The Council's April 2011 motion provided the following direction:

> **Fishery Impact Statement:** Use existing documents to the extent possible to describe the fisheries occurring under the FMP.

While the FMP does not contain a fishery impact statement, the social and economic impacts of salmon management under the FMP on fishery participants, recreational users, and communities has been analyzed in different state and federal documents over the years. In 1997, NMFS and ADF&G prepared an EA for the salmon fisheries in the EEZ and State waters off Alaska that evaluates the deferral of regulation and management to the State (NMFS 1997). The EA concluded that the impacts on the target species by the current salmon fishery in southeast Alaska, due to a fishery policy of optimal sustainable yield, are such that produce optimum production of the stocks and healthy escapement levels. Moreover, management over the past several decades (since Alaska Statehood in 1959) has resulted in healthy stocks for all species of Alaska salmon. In 2003, NMFS prepared a FPEIS that contains an analysis of the

[44] 50 CFR 600.345(c)(1).

impacts, including cumulative impacts, of salmon management under the FMP in the East Area on commercial fishermen, anglers, and communities (NMFS 2003).

The Fishery Impact Statement in Chapter 4 was prepared for the FMP and this would be the Fishery Impact Statement under Alternatives 1 and 2. Under Alternatives 3 and 4, this Fishery Impact Statement would be revised to remove the analysis of the fisheries in the West Area because these fisheries would no longer be under the FMP.

Table 3-1. Review of the FMP provisions, associated MSA requirement or federal regulations, and preliminary options for consideration.

FMP Provision	MSA requirement Sec. 303 (a) REQUIRED PROVISIONS – Any fishery management plan…. shall – (or related MSA provision)	Federal Regulations
2.0 Description of the Fishery Management Unit		
2.1 Areas The FMU consists of all of the EEZ off Alaska and the salmon fisheries that occur there. West Area – EEZ west of cape suckling East Area – EEZ east of cape suckling	***679.1(i) Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska (Salmon FMP).*** (1) Regulations in this part govern fishing for salmon by fishing vessels of the United States in the Salmon Management Area. (2) State of Alaska laws and regulations that are consistent with the Salmon FMP and with the regulations in this part apply to vessels of the United States that are fishing for salmon in the Salmon Management Area.	
2.2.1 Sport Salmon Fishery Sport fishing is allowed in East and West Areas.		
2.2.2 Commercial salmon fisheries in the west area This section prohibits commercial salmon fishing, except for 3 traditional areas. **2.2.3 Commercial troll salmon fishery in the east area** This is the only commercial fishery allowed in the East Area. This section and Appendix D contain information on the troll fishery up to 1988 (permits, landings, season length, values)	**MSA 303(a)(2)** contain a description of the fishery, including, but not limited to; the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, and any recreational interests in the fishery… **MSA 303(a)(13)** include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery, including its economic impact, and, to the extent practicable, quantify trends in landings of the managed resources by the commercial, recreational, and charter fishing sectors.	**679.7 Prohibitions** In addition to the general prohibitions specified in § 600.725 of this chapter, it is unlawful for any person to do any of the following: ***(h) Salmon Fisheries.*** (1) Fish for, take, or retain any salmon in violation of this part. (2) Engage in fishing for salmon in the Salmon Management Area defined at § 679.2 and Figure 23 to this part, except to the extent authorized by § 679.4(h) or applicable State of Alaska regulations.
Entry into the troll fishery is limited by the Alaska Commercial Fisheries Entry Commission and the North Pacific Fishery Management Council.	See discussion under 6.1 Entry into the Commercial Troll Fishery is Limited.	

FMP Provision	MSA requirement Sec. 303 (a) REQUIRED PROVISIONS – Any fishery management plan…. shall – (or related MSA provision)	Federal Regulations
2.3 Salmon Stocks The FMP includes all five species of Pacific salmon in the EEZ: Chinook salmon (king); Coho salmon (silver); Pink salmon (humpy); Sockeye salmon (red); and Chum salmon (dog).		
2.4 Present and probable future conditions of the fisheries. This section contains more information from the 1970s and 1980s, and predicts that salmon runs will increase, number of participants will decrease, and catches will remain the same or increase due to hatchery contributions.	**MSA 303(a)(3)** assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification	
2.5 Indian Treaty Fishing Rights This section discusses the Pacific Northwest treaty tribe situation through 1985, and the Annette Islands Fishery Reserve.	**MSA 303(a)(2)** contain a description of the…nature and extent of foreign fishing and Indian treaty fishing rights, if any.	
3.1 Overfishing Definitions This section establishes a three-tier system for determining whether a stock is overfished or whether overfishing is occurring. Tier 1 stocks are Chinook salmon stocks covered by the Pacific Salmon Treaty. Tier 2 and 3 stocks are salmon stocks managed by the State and the control rules are based on the State's MSY escapement goal policies.	**MSA 303(a)(10)** specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;	
3.2 Optimum Yield (OY) Defined as the allowable annual harvest levels set by the State of Alaska.	**MSA 303(a)(3)** assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification.	

FMP Provision	MSA requirement Sec. 303 (a) REQUIRED PROVISIONS – Any fishery management plan…. shall – (or related MSA provision)	Federal Regulations
3.3 Domestic Annual Harvesting Capacity (DHA) The Council determined that domestic harvesters are able to and expected to harvest the entire OY of salmon each year. **3.4 Domestic Annual Processing Capacity (DAP)** Domestic processors have been able to process the entire commercial troll harvest. **3.5 Joint-Venture Processing (JVP)** No salmon is specified for joint-venture processing. **3.6 Total Allowable Level of Foreign Fishing (TAFL)** No foreign harvesting of salmon is allowed in the EEZ by this plan.	**MSA 303(a)(4)** assess and specify (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the OY specified under paragraph (3), (B) the portion of such OY which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing, and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such OY that will be harvested by fishing vessels of the United States.	
4.0 Objectives for the Domestic Fisheries		
4.1 Introduction The goal is to promote a stable regulatory environment for the seafood industry and maintain the health of the resources and environment. **4.2 Management Objectives** FMP contains six management objectives for the Southeast Alaska salmon fisheries to satisfy seven National Standards and the Pacific Salmon Treaty requirements	**MSA 303(a)(1)** contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are…(C) consistent with the national standards….	
4.3 Vessel Safety Objective This provision directly addresses the 303(a)(6) requirement and National Standard 10.	**MSA 303(a)(6)** consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery.	

FMP Provision	MSA requirement Sec. 303 (a) REQUIRED PROVISIONS – Any fishery management plan…. shall – (or related MSA provision)	Federal Regulations
5.1 Role of the North Pacific Fishery Management Council The Council will amend the FMP and maintain its salmon plan team to oversee the FMP and report to the Council. The Council accepts the harvest levels and allocations set by the Pacific Salmon Commission and the State, as long as those levels are consistent with the Council's goals and objectives and National Standards. The Council defers regulation of the commercial troll and recreational salmon fisheries in the EEZ to the State unless NMFS determines it must issue specific regulations for salmon in the EEZ to ensure, among other things, that salmon stocks are not overharvested. The Council reserves the right to specify management measures applicable to the EEZ that differ from those of the State if it deems that State actions are inconsistent with the FMP or the MSA.	**MSA 303(a)(1)** contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery…and (C) consistent with the national standards…. **MSA 306(a)(3)** A State may regulate a fishing vessel outside the boundaries of the State in the following circumstances: (A)(ii) the State's laws and regulations are consistent with the fishery management plan and applicable Federal fishing regulations for the fishery in which the vessel is operating.	
5.2 Role of the U.S. Department of Commerce, NOAA, and NMFS The FMP authorizes the RA to issue federal limited-entry commercial power-troll permits. NMFS staff will assist the Council in performing analyses and drafting documents, participate in the salmon plan team, and consult with ADF&G on regulations and in-season actions. NOAA OLE will help enforce regulations that implement the FMP, in cooperation with the Coast Guard and the State. NOAA GC will provide legal advice and prosecute violators of federal regulations.		
5.3 Role of the State of Alaska This section outlines the roles of the Board, ADF&G, CFEC, and Public Safety. With regulation of the salmon fisheries in the EEZ being deferred to the State, the State will manage those salmon fisheries to the extent participating vessels are registered under the laws of the State.		**MSA 306(a)(3)** A State may regulate a fishing vessel outside the boundaries of the State in the following circumstances: (A) The fishing vessel is registered under the law of that State.
5.4 Role of the Pacific Salmon Commission This section discusses the Pacific Salmon Treaty, trans-boundary rivers, and Chinook and coho managed under the Treaty.		
5.5 Role of the International North Pacific Fisheries Commission (INPFC) and the Convention for the High Seas Fisheries of the North Pacific Ocean. This section discusses the Convention, which has been repealed.		

FMP Provision	MSA requirement Sec. 303 (a) REQUIRED PROVISIONS – Any fishery management plan…. shall – (or related MSA provision)	Federal Regulations
6.0 Management Measures		
6.1 Entry into the Commercial Troll Fishery is Limited. Entry is primarily limited by the CFEC, but NMFS may issue a nontransferable federal limited entry permit to qualifying applicants.	679.4(h) Salmon permits (1) Operators of commercial fishing vessels using power troll gear. The operator of a fishing vessel using power troll gear may engage in commercial fishing for salmon in the Salmon Management Area if the operator: (i) Held a valid State of Alaska power troll permanent entry permit on May 15, 1979, or is a transferee under paragraph (h)(13) of this section from an operator who held such a permit on that date; (ii) Held a valid State of Alaska power troll interim use permit on May 15, 1979; **or** (iii) Holds a Salmon Fishery permit issued by the Regional Administrator under paragraph (h)(7) of this section.	
6.2 Regulation of the Salmon Fisheries in the EEZ. The Council defers the regulation of the commercial and recreational salmon fisheries in the EEZ off Alaska to the State, however, the Council retains its management authority. State management measures have been designed to attain the FMP's objectives. The State monitors and reports salmon harvests. The Council will rely on periodical verbal reports from its salmon plan team and the annual written SAFE report to keep it appraised of the status of the salmon fisheries.	**MSA 303(a)(5)** specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, charter fishing, and fish processing in the fishery… **MSA 302(g)(E)** The Secretary and each Council may establish a peer review process for that Council for scientific information used to advise the Council about the conservation and management of the fishery.	NS 2 Guidelines (600.315(e)(1)(i)) state, "The Secretary has the responsibility to assure that a SAFE report or similar document is prepared, reviewed annually, and changed as necessary for each FMP. The Secretary or Councils may utilize any combination of talent from Council, state, federal, university, or other sources to acquire and analyze data and produce the SAFE report. "
6.3 Essential Fish Habitat and Habitat Areas of Particular Concern This section, and Appendix E, describe and identify essential fish habitat for salmon and habitat areas of particular concern.	**MSA 303(a)(7)** describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify	
7.0 Enforcement This section discusses enforcement by NOAA OLE, Coast Guard, and State Public Safety.		
8.0 Other Items		

FMP Provision	MSA requirement Sec. 303 (a) REQUIRED PROVISIONS – Any fishery management plan…. shall – (or related MSA provision)	Federal Regulations
8.1 Costs Likely to be incurred in Managing the Fishery. This section discusses the costs to the federal Government of deferred management under the FMP.	**MSA 303(a)(2)** contain a description of the fishery, including, … the cost likely to be incurred in management…	
8.2 Actual and Potential Revenues from the Fishery This section, and Appendix D, contain revenue data for the Southeast Alaska troll fishery (federal and state waters combined) from 1976 through 1985.	**MSA 303(a)(2)** contain a description of the fishery, including, …actual and potential revenues from the fishery….	
9.0 Review and Appeal of State Regulations		
9.1 Annual and Perennial Regulations This section lays out the procedures for any member of the public to appeal to the Secretary any State salmon fishing regulations and Alaska Statute affecting salmon fishing regulations. Secretarial review is limited to whether the State statute or regulation is consistent with the FMP, MSA, and other applicable federal law. If the Secretary decides that the State regulations are inconsistent with the FMP, MSA, or other federal law, the Secretary will supersede that State regulation.	This process implements **MSA 306(a)(3)(B)** …If at any time the Secretary determines that a State law or regulation applicable to a fishing vessel under this circumstance is not consistent with the FMP, the Secretary shall promptly notify the State and the appropriate Council of such determination and provide an opportunity for the State to correct any inconsistencies identified in the notification. If, after notice and opportunity for corrective action, the State does not correct the inconsistencies identified by the Secretary, the authority granted to the State under this subparagraph shall not apply until the Secretary and the appropriate Council find that the State has corrected the inconsistency. ….	
9.2 Review and Appeal of State In-season Management Actions. This section lays out the process for a person to appeal to the Secretary any State in-season management action that is inconsistent with the FMP, MSA, or other federal law.		

4 Fishery Impact Statement

A fishery impact statement is required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA), § 303(a)(9). The fishery impact statement must assess, specify, and analyze any likely effects (including cumulative conservation, economic, and social impacts) of the conservation and management measures on the following:

> (A) participants in the fisheries and fishing communities affected by the plan or amendment;
> (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants; and
> (C) the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery.

Additionally, the fishery impact statement must consider possible measures for mitigating any adverse impacts. This fishery impact statement also addresses the MSA's related requirements for fishery information: (1) a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, actual and potential revenues from the fishery, any recreational interest in the fishery; (2) a specification of the present and probable future condition of the fishery and a summary of the information utilized in making such specification; and (3) a description of the commercial, recreational, and charter fishing sectors which participate in the fishery, including their economic impact, and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors.

The fishery management unit of the current *Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska* (FMP) is comprised of all waters of the EEZ off Alaska and the commercial and sport salmon fisheries that occur there. While the FMP asserts and reserves federal authority and oversight of salmon management in the EEZ, the FMP delegates regulation to the State. The FMP establishes two management areas within its fishery management unit: the East Area and the West Area with the border between these two areas at the longitude of Cape Suckling. This fishery impact statement provides fishery information for the salmon fisheries that occur in the FMP's existing fishery management unit. The fishery information in this chapter was provided by the Alaska Department of Fish and Game (ADF&G) and largely summarized from publically available ADF&G reports.

The proposed action concerns the application of federal management in addition to the existing State management for the salmon fisheries that occur in the EEZ. None of the alternatives or options under consideration would change the State's management of the salmon fisheries. Therefore, the proposed action does not substantially change salmon management under the FMP in a way that is relevant to fishery participants, fishing communities, or safety. However, Alternative 3 (the preferred alternative) and Alternative 4, which would remove specific EEZ waters from the FMP, could impact salmon abundance, if unregulated fishing occurred in EEZ waters. The impacts of the alternatives on salmon stocks are discussed in section 5.1.

4.1 State of Alaska Salmon Management

The State manages subsistence, sport, commercial, and personal use harvests of salmon in waters throughout Alaska. The first priority for management is to meet spawning escapement goals in order to sustain salmon resources for future generations. The highest priority use is for subsistence, under both state and federal law. Salmon surplus above escapement needs and subsistence uses are made available for other uses. Salmon throughout the entire State is a fully allocated resource; multi-use salmon fisheries (commercial, sport, subsistence, and personal use) are competing for a finite resource. Commercial salmon fisheries occurring in EEZ waters are only one component of this multi-use scenario for which competing goals and interests must be managed. While commercial and sport salmon fisheries occur in both state and federal waters, personal use and subsistence salmon fisheries occur entirely in the waters of the State (within three nautical miles). As such, this Fishery Impact Statement provides information on the commercial and sport fisheries subject to the FMP and does not address the fisheries that only occur in State waters.

In the State's Policy for the Management of Mixed Stock Salmon Fisheries (5AAC 39.220), conservation of wild salmon stocks, consistent with sustained yield is given the highest priority. In the absence of a regulatory management plan that allocates or restricts harvest, and when it is necessary to restrict fisheries on stocks where there are known conservation problems, the burden of conservation shall be shared among all fisheries in close proportion to their respective harvest on the stock of concern. Assigning conservation burdens in mixed stock fisheries is accomplished through the application of specific fishery management plans set out in regulation. To this end, management plans are adopted by the State that work to both minimize and maximize allocations of specific salmon stocks, depending upon the conservation need identified. As such, management plans incorporate conservation burden and allocation of harvest opportunity that affects all users of the resource in Alaska. Management plan provisions such as net mesh size restrictions, weekly fishing periods, and size limits work to reduce the incidental catch of non-target salmon species in the salmon fishery so that stocks are able to achieve their established escapement goals.

The State manages salmon through the Alaska Board of Fisheries (Board), ADF&G, and the Alaska Commercial Fisheries Entry Commission (CFEC).

- The Board is responsible for considering and adopting regulations through a public process to conserve and allocate fisheries resources to various user groups; establishing fish reserves and conservation areas, fishing seasons, quotas, bag limits and size restrictions; methods and means; habitat protection; stock enhancement; and developing commercial, subsistence, sport and personal use fisheries.
- ADF&G is responsible for the protection, management, conservation, and restoration of Alaska's fish and game resources.
- CFEC helps to conserve and maintain the economic health of Alaska's commercial fisheries. Its primary duties are limiting the number of participating fishermen; issuing permits and vessel licenses to qualified individuals in both limited and unlimited fisheries; providing due process hearings and appeals; performing critical research; and providing data to governmental agencies, private organizations and the general public.

The priorities of management are to first ensure adequate escapement to sustain future runs; second, provide reasonable opportunity for subsistence fishermen to meet their needs; and third, provide opportunity to commercial, sport, and personal use fishermen, to harvest fish in excess of escapement and subsistence needs. Through its public process, the Board strives to manage for the potential conflicts that arise from the nature of competing interests in such a diverse fishery. The Board has adopted regulations that control the time, area of operation, and efficiency of salmon fisheries to address the unique challenges of managing mixed-stock resources. Fishing effort on mixed Chinook and coho salmon stocks is managed to avoid overharvest of individual salmon stocks. Chinook salmon harvested in Southeast Alaska fisheries are managed under provisions of the Pacific Salmon Treaty, an international agreement with Canada which provides for an abundance-based management regime that takes into account the highly mixed stock nature of the harvest. The majority of coho salmon harvested in Southeast Alaska are produced from streams in the region, and ADF&G maintains several stock assessment projects to track the abundance and escapement of the species on an in-season basis.

ADF&G uses an adaptive management process to achieve these priorities that starts with development of management strategies based on pre-season forecasts, then transitions into evaluation of run strength in season, and adjusting management strategy implementation based on in-season performance of annual salmon runs. Pre-season forecasts and management strategies are developed based on guidelines and directives as outlined in state and federal management plans and regulations, and in cooperation with federal subsistence managers, fishermen, tribal council representatives, and other stakeholders within guidelines.

While forecasts and pre-season management strategies are made each year, these are frequently revised based on in-season run assessments. For example, the structure and implementation of fishing windows may be adjusted in-season by Emergency Order based on run strength and run timing estimates derived from in-season run assessment programs. Management decisions often need to be made before fish have reached the affected areas, districts, or communities. Managers use test fisheries, sonar projects, genetic stock identification and age-sex-length composition, and in-season harvest reports to assess and project salmon run timing and run strength in-season to inform management decisions.

Subsistence

Subsistence fisheries are managed by the State and are not included in the FMP. Subsistence salmon fisheries do not occur in the EEZ.

The State defines subsistence uses of wild resources as noncommercial, customary, and traditional uses for a variety of purposes. Under Alaska's subsistence statute, the Board must identify fish stocks that support subsistence fisheries and, if there is a harvestable surplus of these stocks, determine the amount of the harvestable surplus that is reasonably necessary for subsistence uses, and adopt regulations that provide reasonable opportunities for these subsistence uses to take place. Whenever it is necessary to restrict harvest, subsistence fisheries have a preference over other uses of the stock (AS 16.05.258). Subsistence fisheries management includes coordination with the Federal Subsistence Board and Office of Subsistence Management, which also manages subsistence uses by rural residents on federal lands and applicable waters, under Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA). Yukon River salmon fisheries management includes obligations under an international treaty with

Canada. Salmon fisheries management in southeast Alaska also includes international obligations under the Pacific Salmon Treaty.

Commercial Management

Commercial fishing is defined by the State as the taking of fish with the intent of disposing of them for profit, or by sale, barter, trade, or in commercial channels (AS 16.05.940 (5)). The State manages a large number of commercial salmon fisheries in waters from Southeast Alaska to the Bering Strait. Management of the commercial salmon fisheries is the responsibility of the ADF&G Division of Commercial Fisheries, under the direction of the Board. The fisheries are managed under a limited entry system; participants need to hold a limited entry permit for a fishery in order to fish and the number of permits for each fishery is limited. The state originally issued permits to persons with histories of participation in the various salmon fisheries. Permits can be bought and sold; thus, new persons have entered into the commercial fishery, since the original limitation program was implemented by buying permits on the open market.

Alaska's commercial salmon fisheries are administered through the use of management areas throughout the State. The value of the commercial salmon harvest varies with the size of the runs, market conditions, and with foreign currency exchange rates. Because of the magnitude of commercial fisheries for salmon, State biologists collect extensive information and statistics to support management decisions.

Commercial salmon fisheries are defined by gear type; troll, drift gillnet, purse seine, set gillnet. In any given area, ADF&G manages different commercial fisheries that target mixed salmon stocks. In the East Area, the commercial troll fishery is the only commercial fishery that operates in the EEZ. This fishery is discussed in detail in section 4.2. In the West Area, the only commercial fisheries in the EEZ are the drift gillnet and purse seine fisheries. These fisheries are discussed in section 4.2.2.

Three salmon net fisheries also occur in Southeast Alaska, but exclusively within State waters – the Southeast drift gillnet fishery, the Yakutat set gillnet fishery, and the Southeast purse seine fishery. These net fisheries are managed by the State, with allocation and harvest of Chinook, as well as some sockeye and coho salmon, falling under provisions of the Pacific Salmon Treaty. The Southeast Alaska drift gillnet fishery primarily targets sockeye, pink, and chum salmon during the summer season and coho and chum salmon during the late summer and fall season. The drift gillnet fishery also targets Chinook salmon during the spring season in hatchery terminal areas and in terminal areas of the Taku and Stikine rivers, according to abundance provisions established under the Pacific Salmon Treaty. The Yakutat area set gillnet fishery occurs between Cape Suckling and Cape Fairweather. All five species of salmon are harvested in this area, with coho and sockeye salmon comprising the majority of the catch. There is no directed harvest of Chinook salmon in the Yakutat set gillnet fishery. The purse seine fishery occurs in several areas of Southeast Alaska and primarily targets pink, chum, and sockeye salmon. The net fisheries are managed through weekly fishing periods. While some initial opening dates are established in regulation, decisions on what areas will be open, and on the duration of openings each week are generally based on observations and other data on fish abundance and spawning escapement. More information on these fisheries can be found in ADF&G Fishery Management Plans (see Davidson et al. 2010a, Davidson et al. 2010b, and Woods and Zeiser 2010).

Personal Use Fisheries

Personal use fisheries are managed by the State and are not included in the Salmon FMP. Personal use salmon fisheries do not occur in the EEZ.

The State defines personal use fishing as the taking, fishing for, or possession of finfish, shellfish, or other fishery resources, by Alaska residents for personal use and not for sale or barter, with gill or dip net, seine, fish wheel, longline, or other means defined by the Board (AS 16.05.940(25)). Personal use fisheries are different from subsistence fisheries, because they either do not meet the criteria identifying customary and traditional fisheries or because they occur within nonsubsistence areas. Personal use fisheries provide opportunities for harvesting fish with gear other than rod and reel in nonsubsistence areas. The Joint Board has identified Ketchikan, Juneau, Anchorage-Matsu-Kenai, Fairbanks, and Valdez as nonsubsistence areas (5 AAC 99.015). Persons may participate in personal use or sport harvests for subsistence purposes within nonsubsistence use areas, but subsistence use does not have a preference in those areas. Generally, fish may be taken for personal use purposes only under authority of a permit issued by ADF&G. Personal use fishing, outside of Southeast Alaska, is primarily managed by ADF&G Division of Sport Fish, but some other regional or area fisheries for various species of fish are managed by the Division of Commercial Fisheries. Further information on state management of personal use fisheries can be found on the ADF&G website.[45]

Sport Fisheries

The ADF&G Division of Sport Fish also manages the state's sport fisheries. Alaska statute defines sport fishing as the taking of or attempting to take for personal use, and not for sale or barter, any fresh water, marine, or anadromous fish, by hook and line held in the hand, or by hook and line with the line attached to a pole or rod which is held in the hand or closely attended, or by other means defined by the Board (AS 16.05.940(30)). By law, the division's mission is to protect and improve the state's recreational fisheries resources.

Per Alaska statute (5 AAC 75.075(c)), the ADF&G Division of Sport Fish is also responsible for overseeing the annual licensing of sport fish businesses and guides. A 'sport fishing guide' means a person who is licensed to provide sport fishing guide services to persons who are engaged in sport fishing (AS 16.40.299). 'Sport fishing guide services' means assistance, for compensation or with the intent to receive compensation, to a sport fisherman to take or to attempt to take fish by accompanying or physically directing the sport fisherman in sport fishing activities during any part of a sport fishing trip. Salmon is one of the primary species targeted in the states' recreational fisheries.

The sport fisheries that occur in the EEZ waters are discussed in more detail in section 4.4.

[45] www.adfg.alaska.gov/index.cfm?adfg=fishingPersonalUse.main

4.2 East Area Commercial Troll Fishery

Within the East Area, the commercial troll fishery is the only commercial fishery allowed in the EEZ. Net fishing is prohibited in the EEZ. Troll gear works by dragging baited hooks or artificial lures through the water.

From Alaska Statehood in 1959 until 1979, this fishery was conducted and managed with little recognition of the boundary separating federal and State waters, although at one time the State banned hand trolling seaward of the surf line. Upon implementation of the federal Salmon FMP in 1979, accounting of salmon harvests became delineated between the EEZ and State waters; however, the commercial troll fishery continues to be managed and prosecuted as a single unit.

The commercial troll fishery in Southeast Alaska and Yakutat (Region 1) occurs in State waters and in the federal EEZ east of the longitude of Cape Suckling and north of Dixon entrance. All other waters of Alaska and the EEZ are closed to commercial trolling. The commercial troll fishery harvests primarily Chinook and coho salmon; though chum, sockeye, and pink salmon are also harvested occasionally. The troll fleet also incidentally harvests Pacific halibut under federal Individual Fishing Quota (IFQ) regulations, and lingcod and rockfish under state regulations (refer to section below for a discussion on incidental harvest and bycatch management in the directed salmon fisheries).

The commercial troll fleet is comprised of hand and power troll gear types. State regulations limit vessels using hand troll gear to two lines on two hand-operated gurdies or four fishing rods. Specific exceptions to these gear limits may be found in state regulations at 5 AAC 29.120. While the majority of the troll fleet sells their fresh catch directly to processing plants onshore or to tender vessels affiliated with those facilities, the fleet does include catcher-processor vessels that harvest and freeze their catch at sea.

Chinook Salmon Troll Fisheries

The commercial troll salmon fishery is divided into two seasons: a winter season and a general summer season, which is divided into a spring fishery and a summer fishery. The harvest of Treaty Chinook salmon (i.e., those other than Chinook salmon produced at Alaska hatcheries) by commercial salmon trollers is limited to a specific number of fish, which varies annually according to an abundance estimate established under the Pacific Salmon Treaty (see Salmon Allocations and Harvests section below). Accounting of Treaty Chinook salmon harvested by the commercial troll fleet begins with the start of the winter season and ends with the close of the general summer season.

The winter troll season is defined as October 11 through April 30, and is managed not to exceed a guideline harvest level (GHL) of 45,000 Chinook salmon (with a guideline range of 43,000 to 47,000 fish). Treaty Chinook salmon caught in the winter troll fishery count towards the annual Southeast Alaska troll fishery allocation (under provisions established by the Board) and the Southeast Alaska all-gear Treaty quota (under provisions of the Pacific Salmon Treaty). Any Treaty Chinook salmon not harvested during the winter fishery will be available for harvest during the spring and summer fisheries. By regulation, the open area during the winter fishery is restricted to those areas lying east of the “surf line” south of Cape Spencer, and the waters of Yakutat Bay. All outer coastal areas, including the EEZ, are closed during the winter troll fishery. More information on the winter troll fishery can be found in

ADF&G Fishery Management Plans (see Skannes and Hagerman 2010). Because the winter troll fishery does not occur in the EEZ, the fishery is outside the scope of the Salmon FMP.

The spring troll fishery begins after the winter fishery closes, and may start prior to May 1 if the winter fishery closes early when the harvest cap of 45,000 Chinook salmon is reached. The spring troll and terminal area troll fisheries are designed to target Alaska hatchery-produced Chinook salmon (though Chinook salmon from across the Treaty area are also harvested) and occur primarily in inside waters near hatchery release sites or along the migration routes of early returning hatchery fish. Because the spring troll fishery does not occur in the EEZ, the fishery is outside the scope of the FMP.

The summer troll fishery opens July 1 and targets the remainder, which is the majority (see Appendix 2, Table 3), of the annual Treaty Chinook salmon quota in two open periods during the July 1 to September 30 timeframe. During the general summer season, most waters of the Southeast Alaska/Yakutat area are open to commercial trolling, including outer coastal waters in the EEZ, except for those waters described in 5 AAC 29.150. Those closed waters in effect during the summer fishery, are exempted during the defined spring fishery; however, waters within 3,000 feet of Annette Island (Annette Island Reserve) are closed.

The primary objectives for management of the summer Chinook salmon fishery are as follows:

- Management of Chinook salmon harvest under the conservation and harvest sharing provisions of the Pacific Salmon Treaty.
- Maximize the harvest of Alaska hatchery-produced Chinook salmon.
- Achieve harvest allocations among user groups as mandated by the Board.
- Minimize the incidental mortality of Chinook salmon to the extent practicable.

A harvest control limit is set for management of Chinook salmon during the summer fishery. ADF&G manages the summer fishery by targeting harvest of 70 percent of the annual summer Chinook salmon quota, in an initial opening beginning July 1. The remainder of the Chinook salmon quota is harvested in August. Due to the time lag between when fish are harvested and when the harvest information is received through receipt of fish landing tickets, ADF&G conducts a fisheries performance data program (FPD) to estimate the catch per unit effort (catch per boat day (CPBD)), in-season, during the summer fishery. Confidential interviews are conducted with trollers to obtain detailed CPBD data. Aerial vessel surveys are conducted to obtain an immediate estimate of fishing effort. Total harvest "to date" is estimated by multiplying vessel counts observed during weekly overflights with the CPBD data obtained from the interviews. Daily tallies from processors are also an important tool in tracking harvest.

Following the first Chinook opening, the waters of high Chinook salmon abundance will be closed, unless ADF&G determines that less than 30 percent of the Chinook salmon harvest goal for the initial opening was taken in that opening (5 AAC 29.100(c)(2)(A)). In addition, during the second Chinook salmon opening, if ADF&G determines after 10 days that the annual troll Chinook salmon harvest ceiling might not be reached by September 20, with those waters closed, ADF&G shall reopen the waters of high Chinook salmon abundance by emergency order. Following the closure of the initial summer Chinook salmon period, all Chinook salmon must be offloaded prior to trolling for other species. Further

information on the spring and summer troll fisheries can be found in ADF&G Fishery Management Plans (see Lynch and Skannes 2010a and 2010b).

Chinook salmon caught in troll fisheries must be equal to or greater than 28 inches in total length and the heads of all adipose-fin clipped salmon must remain attached until the fish is sold, in order to facilitate recoveries of coded wire tags.[46] If the ADF&G Commissioner determines that Chinook salmon in a terminal harvest area are predominately Alaska hatchery produced, the Commissioner may, by emergency order, allow the retention of Chinook salmon greater than 26 inches in total length (5 AAC 29.140(d)). Chum, sockeye, and pink salmon of any size may be retained at any time during open fishing periods.

Coho Salmon Troll Fishery

Coho salmon management is based on aggregate abundance. Coho salmon fisheries in southern Southeast Alaska are also managed in cooperation with Canada, under guidelines of the Pacific Salmon Treaty. There are no harvest ceilings for Southeast Alaska coho salmon fisheries under the Treaty; however, areas near the U.S./Canada border will close to trolling if the harvest by Alaska trollers fishing in the border area falls below specified thresholds. The primary objectives for management of the coho salmon fishery are as follows:

- Provide adequate escapement of coho salmon, by area, to ensure sustainable populations.
- Provide maximum opportunities for harvest consistent with conservation objectives.
- Manage the coho salmon fisheries to achieve allocations consistent with Board regulations.
- Manage coho salmon on the U.S./Canada border to comply with provisions of the Pacific Salmon Treaty Agreement.

The regulatory period for coho salmon retention in the troll fishery is June 15 through September 20, with a potential extension (by emergency order) through September 30 in years of high coho salmon abundance. Troll harvests of coho salmon generally peak between mid-July and early September. The coho salmon fishery may also be closed, by emergency order, for conservation of coho salmon stocks as follows:

- For up to seven days beginning on or after July 25, if the total projected commercial harvest of wild coho salmon is less than 1.1 million fish; or
- For up to ten days, if ADF&G makes an assessment and determines that:
    - the number of coho salmon reaching inside waters might be inadequate to provide for spawning requirements under normal or restricted inside fisheries for coho salmon and other species; the primary abundance indicators for the assessment consist of relative harvest levels by all fisheries and, in particular, catch per unit effort in inside drift gillnet

[46] A proportion of Chinook salmon produced in hatcheries (approximately 5% to 20% depending upon release size) have adipose fins that are clipped as a way to externally identify them as having an internal coded wire tag. The heads from fish that have missing adipose fins are sent to the Juneau Mark, Tag and Age Laboratory (MTA) for processing of genetic and biological life history data. At the MTA, coded-wire tags (CWTs) are removed from the heads and decoded. CWTs provide information on migration routes, run-timing, exploitation rates, and the contribution to commercial and recreational fisheries of Chinook salmon from specific river systems.

and sport fisheries as compared to average 1971 through 1980 levels and escapement projections for streams where escapement goals have been established; or

- the proportional share of coho salmon harvest by the troll fishery is larger than that of inside gillnet and sport fishing fisheries when compared to average (1971 through 1980) levels; primary inside fisheries indicators for the assessment are overall coho salmon harvests and catch per unit effort in the District 1, 6, 11, and 15 drift gillnet fisheries and by anglers sport fishing from boats in the salt water sport fishery that return to any port connected to the Juneau road system.

Following any closure, waters for coho salmon trolling may be reopened by emergency order; however, if ADF&G determines that the strength of the coho salmon run in the inshore and terminal salmon fishing waters is less than required to provide a spawning escapement that will maintain the runs on a sustained-yield basis, ADF&G may take additional actions on coho salmon fishing seasons, periods, and areas.

Similar to Chinook salmon, ADF&G's primary tool for in-season assessment of coho salmon catch rates is a program of dockside interviews with vessel skippers. Catches by the net fisheries are obtained from fish tickets, and an assessment of run strength using troll catch per unit effort data occurs in mid to late July.

Chum Salmon Troll Fishery

Historically, chum salmon were harvested incidentally in the general summer troll fishery. Effort directed at targeting chum salmon from Alaska hatcheries has increased in recent years. Target effort is primarily found in terminal or near terminal waters close to hatchery facilities. Chum salmon troll fisheries in terminal areas may be conducted during periods of closures for Chinook or coho salmon. In such fisheries, a person may not have Chinook salmon or coho salmon (respectively) on board a salmon troll vessel while fishing for chum salmon.

4.2.1 Salmon Allocations and Harvests in the East Area

Effort in the Troll Fishery

Limited entry for the power troll fishery was adopted in 1974 by the CFEC and the first permits were issued in 1975. The number of permits fished has fluctuated, with a peak of 919 in 1979 and a low of 637 in 2003. After the power troll fleet came under limited entry, the hand troll fleet, which was not yet limited, increased dramatically. The number of hand troll permits fished more than doubled from 1,100 permits in 1975 to a peak of 2,644 permits in 1978. Limited entry for the hand troll fishery was initiated in 1980 and the first permits were issued in 1982. Of the 2,161 permits issued that year, 1,107 (many of which had been issued as not-transferable) had been vacated, due to non-renewal through 2009. The number of hand troll permits fished declined steadily from 1979 through 2002 when hand troll participation reached a low of 254 permits. From 2003 through 2008, the number of hand troll permits fished increased to 376, but has since declined to 332. During the 2010 spring and summer troll fisheries, both hand and power troll effort decreased when compared to 2009; this was not the case during the 2010 winter troll fishery, when both hand and power troll effort increased significantly compared to 2009.

Fluctuations in effort in both the power and hand troll fisheries relates strongly to salmon prices and abundance.

Chinook Salmon Allocation

The United States and Canada ratified the Pacific Salmon Treaty in 1985. This treaty provides a framework for the management of salmon fisheries, in part, by establishing fishing regimes that set upper limits on intercepting fisheries. Such regimes are expected to be amended periodically upon recommendation from the Pacific Salmon Commission as new information becomes available to better accomplish the Treaty's conservation, production, and allocation objectives.

The original regimes established in 1985 expired by the end of 1992. Between 1993 and 1998, salmon fisheries subject to the Treaty were managed pursuant to short term agreements that governed only some of the fisheries. Where short term agreements could not be reached, the fisheries were managed independently by the respective domestic management agencies, in approximate conformity with the most recently applicable bilateral agreement.

In 1999, new fishery agreements under the Pacific Salmon Treaty were adopted by the United States and Canada, including an agreement for Chinook salmon. The new abundance-based Chinook salmon agreement replaced the previous fixed ceiling-based regime. A major component of this Agreement is the management regime set forth for Chinook salmon, which established a basic aggregate abundance-based management approach for three major ocean Chinook salmon fisheries in southeast Alaska and Canada, coupled with an individual stock-based management approach for all other Treaty-area fisheries in Canada and the Pacific Northwest. The all-gear Chinook salmon fishery is managed to achieve a harvest target; the Treaty agreement specifies a harvest based on a relationship between a preseason Abundance Index, generated by the Pacific Salmon Commission's Chinook Technical Committee and a target harvest rate specified in the agreement. The harvest ceiling is abundance-based, with increased quotas when abundance is high and decreased quotas when abundance is low. In addition to the catch ceiling of Treaty fish, provisions of the Treaty provide for an additional harvest of Chinook salmon that have been produced in Alaskan hatcheries (add-on). The all-gear add-on is equal to the total number of Alaskan hatchery Chinook caught, minus the pre-Treaty production of Chinook salmon of around 5,000 fish, and a risk adjustment factor of around 1,000 fish. The hatchery add-on is calculated in season, through port sampling programs.

The fishing regimes established under the 1999 agreement applied for ten years, expiring at the end of 2008. In May 2008, the Pacific Salmon Commission recommended a new bilateral agreement which was approved by the U.S and Canadian governments in December 2008. As with the 1999 Agreement, the new agreement established fishing regimes that will be in force for a ten year period (2009 through 2018). These new fishing regimes are contained in chapters 1, 2, 3, 5, and 6 of Annex IV to the Pacific Salmon Treaty.

ADF&G manages the sport and commercial fisheries for Chinook salmon, in accordance with the annual harvest ceiling established by the Pacific Salmon Commission under the Pacific Salmon Treaty and allocation guidelines established by the Board. The allocation of the annual Chinook salmon harvest ceiling for each fishery is as follows:

- Troll fishery: 80 percent, after the net fishery allocations are subtracted from the annual harvest ceiling
- Sport fishery: 20 percent, after the net fishery allocations are subtracted from the annual harvest ceiling
- Purse seine fishery: 4.3 percent of the annual harvest ceiling
- Drift gillnet fishery: 2.9 percent of the annual harvest ceiling
- Set gillnet fishery: 1,000 Chinook salmon

For the purposes of calculating the Chinook salmon harvest, the annual harvest period begins with the opening of the winter troll season. For the purpose of calculating the annual harvest performance for the Chinook salmon fisheries, the harvest in the sport and commercial net and troll fisheries is applied to the cumulative harvest, which includes the Alaska hatchery contribution.

Chinook Salmon Harvest

In 2010, all-gear Chinook salmon harvests totaled 265,000 fish out of a total salmon (all species, all gear) harvest of 37 million fish harvested in federal and state waters east of the longitude of Cape Suckling (Table 4-1). Refer to Appendix 2, Tables 1 through 3, when reading about recent Chinook salmon harvests in the Southeast Alaska troll fishery. During the 2010 winter troll fishery, 42,536 Chinook salmon were harvested, which represents 22 percent of the total troll Chinook salmon harvest for 2010. The winter harvest increased by 41 percent compared to the 2009 season. During the 2010 spring fishery, 28,614 Chinook salmon were harvested, which was 3,967 fish fewer than the 2009 spring harvest. The 2010 spring harvest was the lowest since 2000, but was the 11th highest on record.

In 2010, the preseason abundance index of 1.35 for Southeast Alaska was established through the technical committee process of the Pacific Salmon Commission, which translated to an all-gear quota of 221,823 treaty Chinook salmon. Under the Board commercial fisheries allocation plan, the purse seine fleet was allocated 9,538 (4.3 percent) Chinook salmon; the drift gillnet fleet was allocated 6,433 (2.9 percent) Chinook salmon; and the set gillnet fleet was allocated 1,000 Chinook salmon. The remainder of the 204,852 fish was then divided between the troll and sport fisheries in an 80/20 split, which translated to 163,882 Chinook salmon to the troll fishery and 40,970 Chinook salmon to the sport fishery.

Coho Salmon Allocation

Coho salmon are managed to ensure escapement goals and to achieve board allocation guidelines. Coho salmon in fisheries near Dixon Entrance are managed in cooperation with Canada, according to provisions of the Treaty agreement. The historical harvest allocation of coho salmon in the Southeastern Alaska and Yakutat commercial salmon fisheries is 61 percent troll, 19 percent purse seine, 13 percent drift gillnet, and seven percent set gillnet. While these percentages may vary from season to season, given fluctuations in salmon abundance and the distribution and limitations of fisheries management, ADF&G manages the fishery to maintain these allocation guidelines over the long-term. To do so, ADF&G may not disrupt any of the traditional commercial fisheries upon which this historical allocation is founded; however, ADF&G may make in-season adjustments to attempt to achieve these historical harvest allocation guidelines.

A region-wide troll closure for up to 10 days may be required during the coho salmon season to address allocations between outer coastal fisheries and inside water fisheries if ADF&G determines that the proportional share of coho salmon harvest by the troll fishery is larger than that of inside gillnet and recreational fisheries compared to 1971 through 1980 levels. Primary inside fishery indicators for this assessment are overall coho salmon harvests, escapement projections for streams where escapement goals have been established, CPUE in the Tree Point, Prince of Wales, Taku/Snettisham, and Lynn Canal drift gillnet fisheries, and harvest in the Juneau marine sport fishery. Additional in-season management actions may be required for conservation.

Coho Salmon Harvest

All gear harvests of coho salmon averaged 2 million fish during the 1940s. A decline in average harvest occurred during the next three decades, with a low decade average of 1 million fish in the 1970s. The average all-gear commercial coho salmon harvest increased to 1.9 million fish in the 1980s and to 3.2 million fish in the 1990s with a record of 5.5 million fish harvested in 1994. In 2010, the all-gear coho salmon harvest totaled 2.6 million fish (Table 4-1). Refer to Appendix 2, Tables 1 and 2 when reading about recent coho salmon harvests in the Southeast Alaska troll fishery.

Coho salmon retention in the troll fishery opens by regulation on June 15, during the spring troll fisheries. The majority of the troll coho salmon harvest occurred after July 1 during the general summer season. In 2010, the initial late-July coho salmon run strength assessment appeared to be average to below average based on power troll catch/boat/day. The second run strength assessment in early August indicated that the coho salmon run strength was average and did not have any conservation concerns at that time. A four-day closure of the troll fishery was implemented in mid-August, in order to provide for adequate escapement and transition to inside waters. On September 13, ADF&G issued a news release announcing that 2010 was not considered to be a high coho salmon abundance year and that the fishery would close by regulation on September 20. An extension of the troll season was not warranted due to the below-average region wide power troll catch rates seen after the August closure and the below-average cumulative troll coho salmon harvest. The final 2010 troll coho salmon harvest of 1,342,212 fish was the 19th highest in the 50 years since Alaska statehood.

Chinook and Coho Salmon Troll Fishery EEZ Harvests

In 2010, approximately 11 percent of the Chinook (28,831 fish) and 4 percent of the coho salmon (98,946 fish) harvested by the commercial salmon fisheries in Southeast Alaska were reported taken outside of State waters in the EEZ (Table 4-1). In addition, 102 sockeye, 1,081 pink, and 466 chum salmon were reported taken in the EEZ. When all salmon species are combined, less than one percent of the troll harvest was reported to have been taken outside State waters.

The reported number of Chinook salmon harvested from the troll fishery in the EEZ off Alaska has decreased considerably since the FMP first went into effect in 1979. From 1977 through 1985, the troll fishery in the EEZ accounted for about 18% of the troll harvest of Chinook salmon, 10% of the coho, 7% of the sockeye, 6% of the pink, and 8% of the chum in numbers of fish. The peak Chinook harvest from the EEZ occurred in 1980, with 134,666 taken or about 45% of the total troll Chinook harvest. Since the Pacific Salmon Treaty went into effect in 1985, the average (1985 through 1989) percentages of the total

troll harvest made in the EEZ dropped: 10.6% of the Chinook, 5.0% of the coho, 2.6% of the sockeye, 1.4% of the pinks, and 3.8% of the chum. The reasons for the decrease have been the shorter summer troll fishing period for Chinook with a resulting increased percentage of the harvest from the coastal and inside waters of the State as those areas are open longer.

Table 4-1 Southeast Alaska salmon harvest associated with commercial fisheries, EEZ waters only and total, 1991-2010 (numbers of fish).

	Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Chum salmon			Salmon total		
Year	EEZ	Total	EEZ as % of Total	EEZ	Total	EEZ as % of Total	EEZ	Total	EEZ as % of Total	EEZ	Total	EEZ as % of Total	EEZ	Total	EEZ as % of Total	EEZ	Total	EEZ as % of Total
1991	16,615	339,127	4.9%	287	2,063,585	0.0%	56,004	3,194,517	1.8%	3,602	61,926,339	0.0%	609	3,336,042	0.0%	77,117	70,859,610	0.1%
1992	3,266	226,990	1.4%	3,868	2,666,382	0.1%	402,550	3,694,214	10.9%	31,794	34,963,251	0.1%	8,979	4,936,434	0.2%	450,457	46,487,271	1.0%
1993	13,589	297,032	4.6%	692	3,190,945	0.0%	212,439	3,663,518	5.8%	4,921	57,299,350	0.0%	5,347	7,879,758	0.1%	236,988	72,330,603	0.3%
1994	10,286	221,125	4.7%	1,586	2,392,365	0.1%	254,993	5,715,550	4.5%	2,691	57,269,259	0.0%	1,376	10,402,759	0.0%	270,932	76,001,058	0.4%
1995	10,484	214,835	4.9%	1,252	1,795,330	0.1%	295,621	3,343,075	8.8%	6,244	47,965,505	0.0%	5,869	11,225,674	0.1%	319,470	64,544,419	0.5%
1996	11,986	220,437	5.4%	319	2,799,841	0.0%	134,452	3,153,471	4.3%	1,370	64,629,713	0.0%	2,041	16,043,236	0.0%	150,168	86,846,698	0.2%
1997	18,172	298,712	6.1%	3,368	2,456,751	0.1%	101,901	1,966,193	5.2%	1,335	28,679,834	0.0%	1,479	11,764,076	0.0%	126,255	45,165,566	0.3%
1998	18,262	237,495	7.7%	237	1,375,318	0.0%	161,218	2,985,384	5.4%	2,347	42,535,402	0.0%	887	15,695,279	0.0%	182,951	62,828,878	0.3%
1999	16,567	200,581	8.3%	98	1,160,729	0.0%	81,852	3,625,347	2.3%	396	77,848,284	0.0%	203	14,930,931	0.0%	99,116	97,765,872	0.1%
2000	14,264	226,913	6.3%	143	1,229,390	0.0%	60,226	1,954,546	3.1%	972	20,313,426	0.0%	1,480	15,910,909	0.0%	77,085	39,635,184	0.2%
2001	11,061	251,049	4.4%	170	2,035,230	0.0%	53,639	3,297,633	1.6%	1,024	67,055,991	0.0%	497	8,754,392	0.0%	66,391	81,394,295	0.1%
2002	52,024	388,658	13.4%	114	806,447	0.0%	56,412	3,237,674	1.7%	1,286	45,331,007	0.0%	654	7,455,007	0.0%	110,490	57,218,793	0.2%
2003	58,588	411,028	14.3%	192	1,525,356	0.0%	38,870	2,495,053	1.6%	1,340	52,515,632	0.0%	602	11,115,085	0.0%	99,592	68,062,154	0.1%
2004	49,372	482,251	10.2%	287	2,037,745	0.0%	144,193	3,080,644	4.7%	822	45,333,012	0.0%	1,585	11,371,625	0.0%	196,259	62,305,277	0.3%
2005	13,499	447,536	3.0%	504	1,607,835	0.0%	85,413	2,998,830	2.8%	333	59,182,242	0.0%	47	6,427,530	0.0%	99,796	70,663,973	0.1%
2006	35,792	364,109	9.8%	606	1,333,496	0.0%	78,566	2,087,807	3.8%	721	11,695,411	0.0%	221	13,555,280	0.0%	115,906	29,036,103	0.4%
2007	32,014	355,369	9.0%	312	1,904,802	0.0%	82,952	2,058,431	4.0%	681	44,884,739	0.0%	1,243	9,417,807	0.0%	117,202	58,621,148	0.2%
2008	20,176	246,149	8.2%	32	436,279	0.0%	69,355	2,380,628	2.9%	358	15,974,343	0.0%	301	9,053,046	0.0%	90,222	28,090,445	0.3%
2009	23,615	271,451	8.7%	135	925,749	0.0%	69,912	2,635,471	2.7%	784	38,101,430	0.0%	748	9,660,364	0.0%	95,194	51,594,465	0.2%
2010	28,831	265,186	10.9%	102	717,563	0.0%	98,946	2,577,683	3.8%	1,081	24,208,300	0.0%	466	9,474,546	0.0%	129,426	37,243,278	0.3%
Total	458,463	5,966,033	7.7%	14,304	34,461,138	0.0%	2,539,514	60,145,669	4.2%	64,102	897,712,470	0.0%	34,634	208,409,780	0.0%	3,111,017	1,206,695,090	0.3%

Note: Total Southeast harvest is associated with the following CFEC permit types: Southeast salmon purse seine (S01A), Southeast salmon drift gillnet (S03A), Yakutat set gillnet (S04D), Statewide salmon hand troll (S05B), statewide salmon power troll (S15B), Southeast salmon special harvest area (S77A) a hatchery permit, and Southeast Metlakatla reservation permit (S99A), an experimental or special permit. All salmon associated with commercial activity are included, regardless of disposition, and including test fishing and hatchery cost recovery.

EEZ harvest in Southeast Alaska reflects harvest from statistical areas 15000, 15200, 15400, 15600, 15700, 18900, 18930, 18940, and 18950. EEZ harvest is by vessels fishing with statewide salmon hand troll (S05B) and statewide salmon power troll (S15B) permits. There are no harvests in these statistical areas attributed to other permit types.

4.2.2 Groundfish Bycatch Management Measures

The Southeast Alaska troll fishery incidentally harvests State managed groundfish species; including lingcod, black rockfish, dark rockfish, blue rockfish, and demersal shelf rockfish (DSR) (Table 4-2 and Table 4-3). The seven species of rockfish in the DSR assemblage are yelloweye, quillback, canary, rosethorn, copper, china, and tiger rockfish. Bycatch allowances for federal waters are the same as in state waters only for the state managed groundfish species. For federally managed groundfish species, trollers are restricted to a federal retainable percentage found at http://www.alaskafisheries.noaa.gov/rr/tables/tabl10.pdf. To this end, vessels trolling for salmon in EEZ waters of the Gulf of Alaska that retain groundfish as bycatch must have a Federal Fisheries Permit endorsed for troll gear. This requirement identifies the number of troll vessels that can fish in the EEZ and retain groundfish.

In the East Area, all groundfish incidentally taken by hand and power troll gear being operated to take salmon (consistent with applicable laws and regulations) can be legally taken and possessed with the following restrictions:

- The bycatch allowance for DSR is limited to 10 percent of the round weight of all salmon on board the vessel. All DSR in excess of 10 percent must be weighed and reported as bycatch overage on an ADF&G fish ticket. DSR bycatch overages may be kept for a person's own use, but fish retained for that purpose must be reported on fish tickets.
- Lingcod may be taken as bycatch in the commercial salmon troll fishery only from May 16 through November 30.
- Lingcod must measure at least 27 inches from the tip of the snout to the tip of the tail, or 20.5 inches from the front of the dorsal fin to the tip of the tail.

Lingcod harvest allocations for the troll fishery are set by Lingcod Management Area, and area closures will occur as allocations are taken. In-season closures will be announced by news release and marine radio broadcast.

Halibut incidentally taken during an open commercial halibut season by power and hand troll gear being operated for salmon consistent with applicable state laws and regulations are legally taken and possessed. Commercial halibut may be legally retained only by IFQ permit holders during the open season for halibut. Trollers making an IFQ halibut landing of 500 pounds or less of IFQ weight are exempted from the three hour Prior Notice of Landing requirement, if landed concurrently with a legal landing of salmon. Halibut taken incidentally during the troll fishery shall be reported on an ADF&G fish ticket using the CFEC salmon permit.

Trollers are allowed to longline for groundfish and troll for salmon on the same trip, as long as fish are not onboard the vessel in an area closed to commercial fishing or closed to retention of that species and the fisherman has both a commercial salmon permit and the appropriate commercial longline permit.

A vessel may not participate in a directed fishery for groundfish with dinglebar troll or mechanical jig gear if they have commercial salmon on board. A vessel fishing for groundfish with dinglebar troll gear must display the letter "D" and a vessel fishing for groundfish with mechanical jigging machines must

display the letter “M” at all times when fishing with or transporting fish taken with dinglebar troll gear or mechanical jigging machines. A person may not operate a vessel that is displaying one of these letters when the vessel is being used to fish for salmon.

The State reports the amount and type of groundfish harvested incidentally in the Southeast Alaska troll fishery in the SE region groundfish report, prepared for the Board on a 3-year cycle (Brylinsky et al. 2008). All harvest information on groundfish harvested incidentally in the commercial troll fishery comes from catch reported on fish tickets, as required by regulation (5 AAC 39.130(c)(10). Table 4-2 and Table 4-3 show that lingcod and black rockfish, both state managed species, make up the primary groundfish harvested incidentally in the commercial troll fishery. Reported harvest of groundfish from EEZ waters, shown in Table 4-3, is small when compared to bycatch totals from all of Southeast Alaska, shown in Table 4-2. Bycatch in the East Area occurs during the months of July, August, and September when the summer troll season is open. Unreported harvest and discard-at-sea mortality is not estimated, but is thought to be low, given the nature of troll gear and the times and locations fished.

A significant management measure taken by the State, which affects both the bycatch of groundfish and the incidental catch of non-target salmon species, is the closure of Chinook salmon high abundance waters after the first summer period, ending June 30 (Figure 4-1). The purpose of this regulation (5 AAC 29.025) is to slow the Chinook salmon harvest rate during the Chinook salmon retention fishery and to reduce the number of Chinook salmon incidentally hooked and released during a non-retention fishery. While a portion of the closed waters is in State waters, a large portion (the Fairweather Grounds) is within waters of the EEZ. In addition, lingcod and other groundfish may not be taken in the waters off Cape Edgecumbe (Edgecumbe Pinnacles Marine Reserve) enclosed by a box defined as 56° 55.50’ N. lat., 56° 57.00’ N. lat., 135° 54.00’ W. long., and 135° 57.00’ W. long. (5AAC 28.150(c)) These waters are entirely in the EEZ.

Table 4-2 All groundfish species (round pounds) reported on salmon troll fish tickets for all Southeast Alaska, 2005-2010.

SPECIES	2005	2006	2007	2008	2009	2010
Arrowtooth flounder				49		
Black rockfish	15,598	14,832	15,998	18,510	8,362	7,774
Blue rockfish	961			7	150	
Bocaccio rockfish	85	104	85	8	45	116
Bullhead sculpin	20					
Canary rockfish	496	548	287	525	255	699
China rockfish	1			2	3	4
Copper rockfish	13		13	5	15	11
Dusky rockfish	1,669	1,230	745	1,292		2,215 2,743
General flounder				18		
General shark	29					
Greenstripe rockfish		923	23		210	
Lingcod greenling	25,400	34,937	41,231	31,862	29,709	19,246
Pacific cod	32			9		54
Pacific ocean perch		1,397	11	3		18
Quillback rockfish	260	156	324	247	401	440
Redbanded rockfish	3	99	10			22
Redstripe rockfish	14	31	33	30	23	57
rockfish, dark				16		5
Rosethorn rockfish	52	16		15		15
Rougheye rockfish	17	4	25			27
Sablefish				20		
Salmon shark				111		
Shortraker rockfish	5	14	48			10
Silvergray rockfish	1,761	1,420	1,553	1,974	1,529	3,027
Thornyhead rockfish	3	39				
Tiger rockfish				17		3
Widow rockfish	8			48		
Yelloweye rockfish	1,837	1,314	1,587	888	1,075	1,887
Yellowmouth rockfish						15
Yellowtail rockfish	2,679	2,029	1,930	2,641	2,077	3,073
Total	**50,943**	**59,093**	**63,904**	**58,299**	**46,069**	**39,260**

Table 4-3 All groundfish species (round pounds) reported on salmon troll fish tickets for EEZ waters only, 2005-2010.

SPECIES	2005	2006	2007	2008	2009	2010
Black rockfish	2,049	2,690	1,144	2,217	550	167
Bocaccio rockfish			26			48
Canary rockfish	8		13	11		
Dusky rockfish	5	581	59			
General shark	29					
Lingcod greenling	2,701	8,322	10,569	6,241	8,047	7,308
Quillback rockfish		6	3	89	7	42
Redstripe rockfish			11			
rockfish, dusky				10	696	684
Rougheye rockfish			6			
Salmon shark				111		
Silvergray rockfish	108	63	36	50	84	20
Widow rockfish				39		
Yelloweye rockfish	54	208	413	64	282	191
Yellowtail rockfish	40	22	65	38	5	
Total	**4,994**	**11,892**	**12,345**	**8,869**	**9,670**	**8,460**

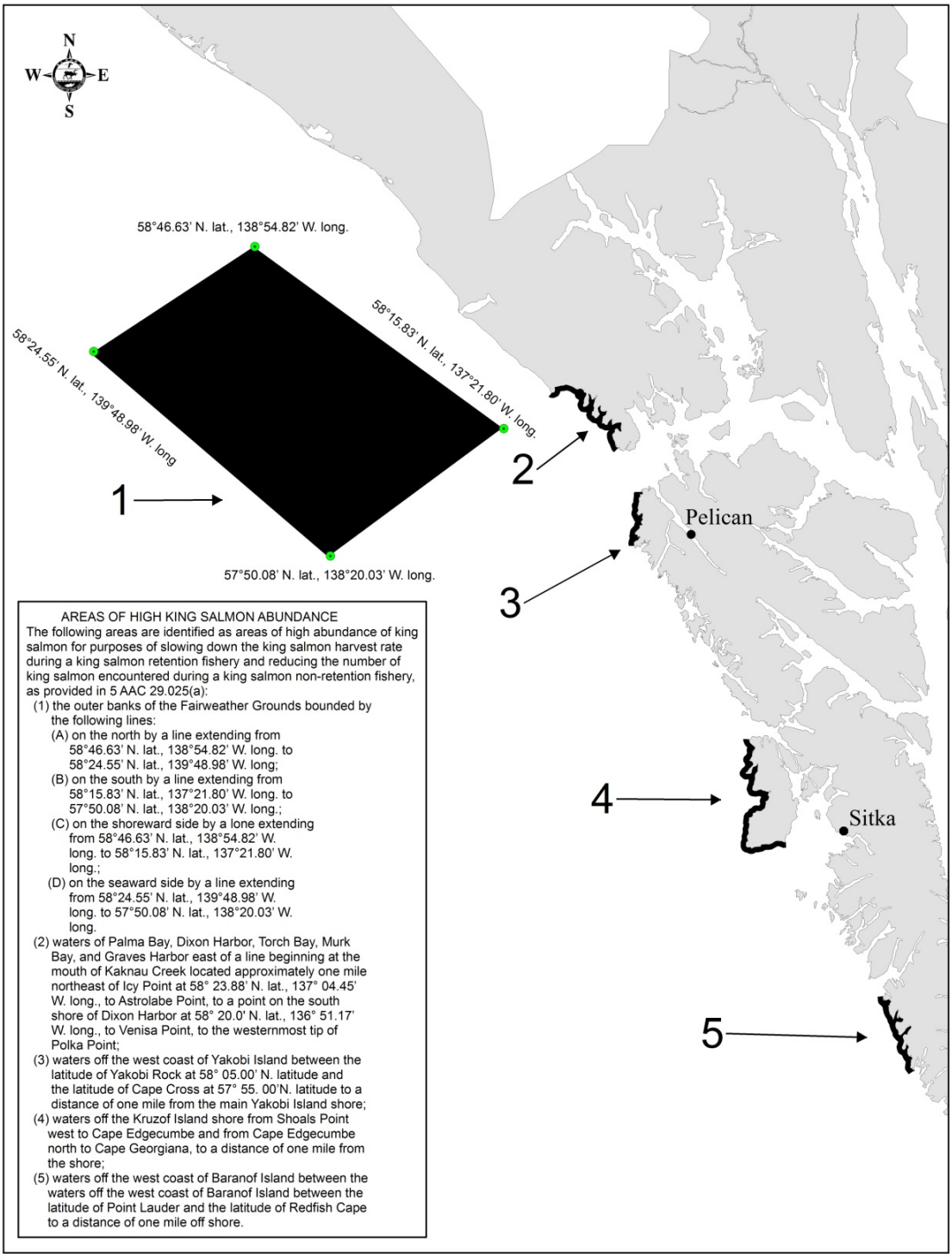

Figure 4-1 ADF&G's map of areas of high Chinook salmon abundance

4.2.3 Salmon Incidental Catch Management Measures

A Southeast Alaska troll vessel observer program was conducted during the general summer troll fishery during the years 1985 through 1988. A Southeast Alaska troll vessel observer and logbook program was reinstituted during the general summer troll fishery, during the years 1998 through 2006. The primary purpose of these programs was to estimate the sex and maturity composition of the Chinook and coho salmon catches, and the number of legal sized and sublegal sized Chinook salmon that were released. The coho salmon sex ratios and maturity data were used to evaluate methods for estimating run timing. In addition, during the second program, the observers collected coded-wire-tag and genetic samples from Chinook for a pilot program to determine stock origin. Estimates of total Chinook releases for the years 1985 through 1988 and 1998 through 2006 were made by directly expanding the observer and logbook data to the entire Southeast Alaska troll fishery. Although the Southeast Alaska troll vessel observer and logbook program has been discontinued, the Southeast Alaska troll Fishery Performance Data program continues to provide sample data on fishing location and effort that are expanded to estimate the total effort in the fishery. Estimates of Chinook releases for the periods 1989 through 1997 and 2007 to the present are based on the observed relationships between total effort in the Southeast Alaska troll fishery and the total number of Chinook releases during the years when observer and logbook programs were in operation.

4.3 West Area Commercial Net Fisheries

The West Area under the Salmon FMP comprises the area of the EEZ off Alaska, west of Cape Suckling. The FMP prohibits commercial salmon fishing in the West Area, except in three traditional net areas (Cook Inlet, Prince William Sound, and the South Alaska Peninsula). In contrast to the East Area, the FMP does not explicitly delegate management and regulation of these fisheries to the State.

The State-Federal boundary has not been relevant to active salmon management in the three traditional net fisheries in the West Area. Fisheries in these areas are managed by district and subdistricts, which are comprised of salmon statistical areas that span both State and federal waters. Historical analysis of only the federal waters portion of the fisheries is not possible. Collection of catch data in these net fisheries has, to date, included no provision for spatial segregation within the salmon statistical areas and the larger units by which the fisheries are managed. As a result, harvest and participation data in tables throughout this section, for districts that include EEZ waters and the gear groups that participate in those waters, represent the maximum level of activity that may have occurred in the EEZ. In each area, the available data overestimate EEZ waters activity.

The harvest and participation data presented in this section are taken from ADF&G fish ticket data and participation and earnings data compiled by the CFEC. To show the relative contribution of salmon harvests in the EEZ compared to total harvests within management districts, the harvest and participation data for the gear group(s) in the district(s) where the fishing area extends into EEZ waters are compared to harvest and participation data for all salmon taken by directed salmon fisheries in the full management area. The districts that include EEZ waters are the Central Upper Cook Inlet district, the Bering River and Copper River districts in Prince William Sound, and the Southwestern and Unimak Districts in the Alaska Peninsula management area. In the Upper Cook Inlet and in Prince William Sound, only drift gillnet permit holders may harvest salmon in the EEZ, whereas in the Alaska Peninsula management area drift

gillnet and purse seine permit holders may fish for salmon in the EEZ. Two tables for each management area are included. Table 4-4, Table 4-5, and Table 4-6 show total annual salmon removals associated with commercial fishing in districts that include EEZ waters and with the gear group(s) that participate in EEZ waters of those districts compared to removals associated with the entire management area and all gear groups. Table 4-10, Table 4-11, Table 4-12, and Table 4-13 show participation, harvests, and estimated gross earnings associated with salmon retained for commercial sale from districts that include EEZ waters and taken by gear group(s) that participate in EEZ waters of those districts. For comparison, these tables also include estimated earnings for the respective gear types in the entire management area, and estimated gross earnings for all gear types in the management area.

Drift gillnet is the primary gear used in the EEZ in the West Area. Drift gillnet gear works by entangling the fish as they attempt to swim through the net. The drift gillnet fleet utilizes a mix of stern and bow pickers; driftnet vessels deploy and retrieve a gillnet from either the stern or bow of the vessel. The net is usually 150 fathoms long, although sometimes shorter than this. Primarily stern picking is used although there are bow pickers in the fleet. The net stays attached to the vessel and is suspended from floats as it soaks. The duration of sets can vary from 20 minutes to four or more hours, depending on fishing conditions and other variables, with between four and 20 sets per day.

Additionally, purse seine gear is used in EEZ waters in the South Alaska Peninsula. Purse seines work by encircling schools of fish with nets that are drawn up to create giant “purses” that hold the school until the fish can be brought aboard.

4.3.1 Upper Cook Inlet (Central District)

The Upper Cook Inlet (UCI) commercial fisheries management area consists of that portion of Cook Inlet north of the latitude of the Anchor Point Light, and is divided into the Central and Northern districts. The Central District is approximately 75 miles long, averages 32 miles in width, and is divided into six subdistricts. The Northern District is 50 miles long, averages 20 miles in width, and is divided into two subdistricts. The UCI traditional EEZ net fishing area occurs within the Central district. Currently, set gillnets are the only gear permitted in the Northern District; both set and drift gillnets are permitted in the Central District. While both set and drift gillnets are permitted in Central District, it is only the drift gillnet fleet that commercially operates in the EEZ. In the UCI area, managers estimate that in recent years approximately 50% to 60% of the drift gillnet fleet’s salmon harvest comes from waters of the EEZ. The drift gillnet fleet primarily harvests sockeye, but also catches coho and chum and, to a lesser degree, pink and Chinook salmon (Table 4-4). Tidal rips and underwater features in UCI help to concentrate sockeye salmon, and provide for fishing opportunity for the drift gillnet fleet. These types of water features are not often found inside three nautical miles.

Salmon fisheries in Upper Cook Inlet are complex, mixed stock, mixed species, with many divergent users. Run-timing and migration routes utilized by all salmon species overlap to such a degree that the commercial fishery is largely mixed-stock and mixed-species in nature. Following the “Mixed Stock Salmon Fisheries Policy”, the State has discouraged the development or expansion of mixed stock fisheries, when the fish that comprise those stocks can be harvested after they have separated into more discrete stocks. It is difficult to manage mixed stock fisheries, mixed species, salmon fisheries for MSY

on all stocks and all salmon species in circumstances where the composition, abundance and productivity of the salmon stocks and species in those fisheries varies substantially from salmon stock to salmon stock.

The State has exceeded the upper end of escapement goals for some stocks in recent years. In part, the reason for this has been the State has tried to manage salmon fisheries in Upper Cook Inlet for maximum harvest of the large most productive salmon stocks, while protecting less abundant salmon stocks and species. Currently, there are a number of salmon stocks in Upper Cook Inlet that are considered a stock of concern.

In terms of economic value, sockeye are the most important component of the catch, followed by coho, Chinook, chum, and pink salmon. Over the last 10 years (2000 through 2009), the proportion of the total annual harvest of coho, pink, and chum salmon taken by drift gillnets has increased, when compared to historical averages, while the average annual drift gillnet harvest (proportion of the total harvest) of sockeye salmon has decreased. However, in 2010 and 2011, this trend reversed with the proportion of the drift gillnet harvest of sockeye salmon exceeding both the historical and most recent 10-year average proportion of the total annual harvest. For Chinook salmon, the average annual harvest has remained fairly stable between commercial gear types.

Management of the sockeye salmon fishery integrates information received from a variety of programs, including: offshore test fishing; escapement enumeration by sonar, weir, remote camera, and mark-recapture studies; comparative analyses of historical commercial harvest and effort levels; genetic stock identification; and age composition studies. Analyses of the age composition of sockeye salmon escapement into the principal watersheds of UCI provides information necessary for in-season estimates of the stock contribution in various commercial fisheries by comparing age and size data in the escapement with that in the commercial harvest.

Major sockeye salmon fisheries in the Central District occur in the Big River, Western Subdistrict, Upper Subdistrict, and Kalgin Island Subdistrict areas. The Big River fishery is a small set gillnet fishery in the northwest corner of the Central District that opens on June 1. Permit holders are limited to a single 35-fathom set gillnet and the minimum distance between nets is 1,800 feet, which is three times the normal separation of gear. While targeting sockeye salmon, this fishery is limited to a harvest of no more than 1,000 Chinook salmon per year. The Western Subdistrict fishery opens on the first Monday or Thursday on or after June 16. The regular fishing schedule consists of two 12-hour weekly fishing periods throughout the season, unless modified by an emergency order. Fishing in the Kasilof Section of the Upper Subdistrict opens between June 20 and June 25, depending upon escapement levels in the Kasilof River; the Kenai and East Forelands Sections of the Upper Subdistrict open on or after July 8. For management of the set gillnet fisheries in the Upper Subdistrict, there are two principal restrictions: 1) a limit on the number of additional hours that may be fished each week beyond the two regular 12-hour fishing periods and 2) implementation of closed fishing times (windows) each week. By regulation, a week is defined as a period of time beginning at 12:01 a.m. Sunday and ending at 12:00 midnight the following Saturday. Weekly limitations vary according to the time of year and the size of the sockeye salmon run returning to the Kenai River. For the drift gillnet fishery throughout the Central District, the regular fishing season begins with the first regular period on or after June 19.

In 2008, Susitna River sockeye salmon were found to be a stock of yield concern and the Board implemented commercial fishing restrictions to the Northern District set gillnet fishery and the Central District drift gillnet fishery for conservation of Susitna River sockeye salmon stocks. In 2011, after reviewing the most recent data available, the Board took action to reduce harvest levels on Susitna River sockeye salmon even further. Conservation of Susitna River sockeye salmon requires ADF&G to restrict the drift gillnet fishing fleet for the first regular period from July 9-15 to the Expanded Kenai and Expanded Kasilof Sections (the corridor) and during the second regular period from July 9-15, the drift gillnet fleet is restricted to Area 1 and the Kenai and Kasilof Sections. From July 16-31, the restrictions to the drift gillnet fleet are dependent upon the size of the sockeye salmon run to the Kenai River. For runs less than 2.3 million sockeye salmon, fishing during one regular 12-hour fishing period will be restricted to the Expanded corridor; at run strengths of 2.3-4.6 million sockeye salmon, fishing during one regular 12-hour fishing period per week will be restricted to either or both the Expanded Kenai and Expanded Kasilof Sections of the Upper Subdistrict, or Drift Gillnet Area 1; for sockeye salmon runs greater than 4.6 million fish, there are no mandatory restrictions.

The State does not fully utilize pink and chum salmon in Upper Cook Inlet, in part, due to the conservation of coho salmon and to provide for recreational fisheries. Coho salmon are important to recreational fishermen in Cook Inlet. It would be difficult to harvest additional pink and chum salmon without harvesting additional coho salmon that have been allocated to sport fisheries by the Board. This is another example of multiple salmon stocks and species being present at the same time and in the same area.

One of the main fisheries in which Chinook salmon are harvested in appreciable numbers is the set gillnet fishery in the Upper Subdistrict of the Central District. Kenai River late-run Chinook salmon (as well as other salmon species) passage is estimated in-season by target strength-based sonar as well as through a test netting project and creel survey. The drift gillnet fleet in the Central District is the primary harvester of pink and chum salmon; however, due to alterations of fishing times for drift gillnetting in order to conserve Susitna River sockeye salmon, there has been a marked reduction of chum and pink salmon harvest.

The 2010 total Cook Inlet commercial salmon harvest was just over 4 million fish, of which almost 50 percent was harvested by drift gillnet gear in the Central District of Upper Cook Inlet. The total Cook Inlet commercial salmon harvest was composed of 9,991 Chinook, 2.9 million sockeye, 208,787 coho, 571,112 pink, and 324,439 chum salmon (Table 4-4). The 2010 total UCI commercial harvest of 3.6 million salmon (all species) was approximately 14 percent less than the 1966-2009 average of 4.2 million fish. Refer to Appendix 2, Tables 4 through 6 when reading about the commercial salmon harvest for UCI net (both drift and set gillnet) fisheries. The 2010 UCI harvest of 9,901 Chinook salmon was approximately 41 percent less than the previous 10-year (2000-2009) average annual harvest of 16,687 fish. For 2010, 71 percent of UCI's Chinook salmon commercial harvest occurred in the Upper Subdistrict set gillnet fishery. For coho salmon, the 2010 commercial harvest of 207,000 fish was 12 percent more than the 2000-2009 average annual harvest of 185,000 fish. For sockeye salmon, the 2010 commercial catch was projected to be approximately 1.8 million fish; the actual harvest of 2.8 million fish was 56 percent more than preseason expectations. Drift gillnet fishermen accounted for 56 percent of the 2010 commercial sockeye salmon harvest while set gillnet fishermen caught 44 percent of the commercial

harvest. The 2010 UCI harvest of approximately 293,000 pink salmon was the fourth lowest even-year harvest since 1992. Approximately 229,000 chum salmon were harvested by UCI commercial fishermen in 2010, the second largest catch in the past 15 years. In the Central District UCI for 2010, drift gillnet gear harvested 2,079,489 salmon (all species) while set gillnet gear harvested 1,400,421 salmon (all species).

Incidental catch

In Upper Cook Inlet, 94 percent of the salmon species harvested are commercially targeted; however, all salmon species are retained, sold, and recorded on ADF&G fish tickets (5 AAC 39.130(c)). In order to reduce the incidental harvest of Chinook salmon, six inch mesh is the largest mesh size allowed in the Cook Inlet drift and set gillnet fisheries.

In Cook Inlet, groundfish taken by drift gillnet gear being operated for salmon are legally taken and possessed (5 AAC 28.330(b)). Groundfish sold, or retained but not sold, are required to be recorded on ADF&G fish tickets (5 AAC 39.130(c)(10)). However, bycatch of non-salmon species in the directed salmon fisheries in Cook Inlet is *de minimus* because drift gillnet vessels utilize water features (i.e., tidal currents and rips) that concentrate salmon, thereby minimizing interactions with groundfish species in the EEZ.

Table 4-4 Central District (Upper Cook Inlet) drift gillnet salmon harvests compared to total Cook Inlet salmon harvests associated with directed commercial fisheries, 1991-2010 (in numbers of fish).

	Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Chum salmon			Salmon total		
Year	Central District drift gillnet	Total Cook Inlet	Pct. of total	Central District drift gillnet	Total Cook Inlet	Pct. of total	Central District drift gillnet	Total Cook Inlet	Pct. of total	Central District drift gillnet	Total Cook Inlet	Pct. of total	Central District drift gillnet	Total Cook Inlet	Pct. of total	Central District drift gillnet	Total Cook Inlet	Pct. of total
1991	249	14,967	1.7%	1,121,171	2,507,887	44.7%	177,002	445,768	39.7%	5,815	843,426	0.7%	216,216	305,202	70.8%	1,520,453	4,117,250	36.9%
1992	618	20,188	3.1%	6,073,147	9,300,882	65.3%	267,751	474,808	56.4%	424,068	1,175,961	36.1%	233,561	297,694	78.5%	6,999,145	11,269,533	62.1%
1993	769	22,647	3.4%	2,561,451	5,003,817	51.2%	122,155	319,599	38.2%	46,510	967,748	4.8%	88,994	139,318	63.9%	2,819,879	6,453,129	43.7%
1994	465	21,195	2.2%	1,902,885	3,706,195	51.3%	310,878	597,943	52.0%	256,481	2,171,602	11.8%	250,272	333,986	74.9%	2,720,981	6,830,921	39.8%
1995	597	21,588	2.8%	1,776,115	3,242,594	54.8%	242,202	462,627	52.4%	64,742	2,982,154	2.2%	469,368	577,425	81.3%	2,553,024	7,286,388	35.0%
1996	392	15,496	2.5%	2,207,252	4,375,582	50.4%	171,965	333,341	51.6%	122,791	695,764	17.6%	141,302	167,168	84.5%	2,643,702	5,587,351	47.3%
1997	632	14,540	4.3%	2,199,933	4,449,536	49.4%	79,094	161,856	48.9%	30,100	2,885,557	1.0%	92,546	110,021	84.1%	2,402,305	7,621,510	31.5%
1998	338	9,198	3.7%	604,852	1,512,583	40.0%	84,301	175,754	48.0%	201,830	2,011,008	10.0%	89,158	101,535	87.8%	980,479	3,810,078	25.7%
1999	582	16,154	3.6%	1,425,750	3,194,605	44.6%	65,429	133,483	49.0%	3,588	1,156,700	0.3%	168,526	184,409	91.4%	1,663,875	4,685,351	35.5%
2000	249	8,542	2.9%	646,050	1,581,086	40.9%	130,855	246,148	53.2%	92,685	1,539,780	6.0%	118,321	204,230	57.9%	988,160	3,579,786	27.6%
2001	511	10,295	5.0%	830,624	2,047,600	40.6%	40,027	121,187	33.0%	29,876	666,002	4.5%	74,562	174,409	42.8%	975,600	3,019,493	32.3%
2002	267	14,278	1.9%	1,180,908	3,101,775	38.1%	120,386	255,717	47.1%	231,676	2,441,407	9.5%	217,112	286,451	75.8%	1,750,349	6,099,628	28.7%
2003	829	19,711	4.2%	1,315,011	4,134,388	31.8%	50,080	113,642	44.1%	25,624	906,563	2.8%	101,593	158,049	64.3%	1,493,137	5,332,353	28.0%
2004	901	28,616	3.1%	2,161,072	5,067,942	42.6%	182,791	320,189	57.1%	204,635	2,876,094	7.1%	127,913	353,468	36.2%	2,677,312	8,646,309	31.0%
2005	1,038	28,819	3.6%	1,731,946	5,483,026	31.6%	123,412	229,586	53.8%	26,695	2,355,670	1.1%	57,115	168,880	33.8%	1,940,206	8,265,981	23.5%
2006	826	18,790	4.4%	376,313	2,428,000	15.5%	93,001	209,259	44.4%	178,277	1,876,646	9.5%	58,333	136,754	42.7%	706,750	4,669,449	15.1%
2007	767	18,160	4.2%	1,717,113	3,693,857	46.5%	106,279	181,539	58.5%	62,178	434,778	14.3%	73,100	79,394	92.1%	1,959,437	4,407,728	44.5%
2008	278	13,626	2.0%	965,815	2,804,722	34.4%	89,326	174,638	51.1%	97,915	675,416	14.5%	46,320	226,446	20.5%	1,199,654	3,894,848	30.8%
2009	868	8,887	9.8%	971,375	2,340,382	41.5%	82,483	154,764	53.3%	140,304	1,204,388	11.6%	77,433	157,178	49.3%	1,272,463	3,865,175	32.9%
2010	400	9,991	4.0%	1,525,932	2,928,130	52.1%	108,287	208,787	51.9%	158,102	571,112	27.7%	212,898	324,439	65.6%	2,005,619	4,042,459	49.6%
Total	11,576	335,688	3.4%	33,294,715	72,904,589	45.7%	2,647,704	5,320,635	49.8%	2,403,892	30,437,776	7.9%	2,914,643	4,486,456	65.0%	41,272,530	113,485,144	36.4%

Note: Central District drift gillnet harvest reflects harvest recorded in Central District ADF&G salmon statistical areas by vessels fishing with Cook Inlet salmon drift gillnet (S03H) permits. This represents the maximum amount of harvest that has been taken from EEZ waters. Total Cook Inlet harvest is associated with the following CFEC permit types: Cook Inlet salmon purse seine (S01H), Cook Inlet salmon drift gillnet (S03H), Cook Inlet salmon set gillnet (S04H), and Cook Inlet salmon special harvest area (S77H), a hatchery permit. All salmon associated with commercial activity are included, regardless of disposition, and including test fishing and hatchery cost recovery. With the exception of commercially sold sport fish derby harvest, no other harvest is excluded based on the disposition of the salmon.

4.3.2 Prince William Sound (Copper River and Bering River Districts)

The Prince William Sound (PWS) management area encompasses all coastal waters and inland drainages entering the north central Gulf of Alaska between Cape Suckling and Cape Fairfield. In addition to Prince William Sound, the management area includes the Bering River and the Copper River and has a total adjacent land area of approximately 38,000 square miles.

The PWS management area is divided into 11 districts that correspond to the local geography, and to the distribution of the five species of salmon harvested by the commercial fishery. The management objective for all districts is to assure sustained yield through the achievement of spawning escapement goals for the major stocks while allowing for the orderly harvest of all fish surplus to spawning requirements. In addition, ADF&G follows regulatory plans to manage fisheries and allow private non-profit hatcheries to achieve cost recovery and brood stock objectives.

The PWS traditional net fishing area includes waters in the Copper River and Bering River districts. While purse seine, drift gillnet, and set gillnet gear are utilized in the PWS management area, only drift gillnets are permitted to fish in the Copper River and Bering River districts, and this is therefore the only gear type to commercially operate in the EEZ. Only the drift gillnet fishery occurs within the EEZ, which is limited to the outer portions of the Copper River and Bering River districts. According to area managers, it is estimated that no more than 28% of sockeye, 22% of Chinook, 12% of coho, <1% of chum, and <1% of pink salmon harvest in these areas comes from waters of the EEZ. These estimates are based on apportionment of harvest by area; this area method of apportionment may significantly overestimate harvests in waters further from land, where fishing effort is reduced. Fishing vessels do not disperse evenly in Prince William Sound fisheries. Instead, their densities are highest closer to shore where the water is less rough, tide rips are more common, and fishing nets are closer to the bottom thereby making the nets more efficient. In addition, salmon tend to congregate in nearshore waters before heading upstream, resulting in generally higher fish densities and harvest rates in nearshore waters than in waters farther from shore.

The Copper River District commercial fishing season has historically opened in mid-May. Sockeye and coho salmon are the two main species targeted in the EEZ. In general, fishing time has steadily been reduced over the years in response to increased efficiency of the commercial fleet, changing patterns in the fishery, and reallocations authorized by the Board. During the current sockeye salmon season for the Copper River District (mid-May to mid-August) there are two evenly spaced fishing periods per week, with periods generally occurring on Mondays and Thursdays, with duration of periods announced by emergency order. Generally, coho salmon management begins during the second week of August. Precedent is to provide an initial single 24-hour opening per week; as numbers warrant, the duration of this fishing period may be increased to 48 hours or a second fishing period may be added during the week. Management tools, such as in-river sonar, aerial survey observations, and harvest data, provide indices of abundance that are used to regulate Copper River fisheries. ADF&G relies on the escapement index provided by the sonar at Miles Lake to aid in managing commercial harvests and provide for upriver escapement and allocations.

The 2010 total PWS management area commercial salmon harvest was 78 million fish. This harvest was composed of 11,003 Chinook, 338,618 coho, 2 million sockeye, 4.3 million chum, and 71.3 million pink

salmon. In 2010, commercial harvests of salmon by drift gillnet vessels fishing in the Copper River and Bering River districts were only one percent of the total Prince William Sound commercial salmon harvest (Table 4-5). Refer to Appendix 2, Tables 7 and 8 when reading about the commercial salmon harvest for PWS net fisheries. The total 2009 Copper River Chinook salmon run was 42,992 fish with 9,457 (22 percent) commercially harvested. This was below an anticipated harvest of 30,700 Chinook salmon. The 2009 Copper River coho salmon run was an estimated 300,079 fish of which 207,776 (69 percent) were commercially harvested. This amount was 30 percent below a projected harvest of 297,431 coho salmon. The 2009 Copper River sockeye salmon run was 1,721,838 fish with 896,621 (52 percent) commercially harvested. Actual harvest was above the projected harvest of 509,588 sockeye salmon. A total of 486 drift gillnet permits were active in the Copper River District in 2009.

Opening in early June, the Bering River District is managed concurrently with the Copper River District. The Bering River drainage is the largest sockeye salmon spawning system in the district. The 2009 commercial harvest of 4,157 sockeye salmon from the Bering River was below the 1999-2008 average harvest of 18,407 fish. For the third year in a row, the Bering River District coho salmon run was late and above average in abundance. The total 2009 Bering River coho salmon harvest of 45,522 fish was below an anticipated harvest of 48,192 coho salmon. A total of 83 drift gillnet permits were active in the Bering River District in 2009.

Incidental catch

In Prince William Sound, 98 percent of the salmon species harvested are commercially targeted; however, all salmon species are retained, sold, and recorded on ADF&G fish tickets (5 AAC 39.130(c)). In order to reduce the incidental harvest of Chinook salmon, six inch mesh is the largest mesh size allowed in this drift gillnet fishery.

In Prince William Sound, groundfish taken by drift gillnet gear being operated for salmon are legally taken and possessed (5 AAC 28.230(b)). Groundfish sold, or retained but not sold, are required to be recorded on ADF&G fish tickets (5 AAC 39.130(c)(10)). However, bycatch of non-salmon species in the directed salmon fisheries in Prince William Sound is *de minimus*, because drift gillnet vessels utilize water features (i.e., tidal currents and rips) that concentrate salmon, thereby minimizing interactions with groundfish species in the EEZ.

Table 4-5 Copper River and Bering River District (Prince William Sound) salmon harvests compared to total Prince William Sound salmon harvests associated with directed commercial fisheries, 1991-2010 (numbers of fish).

Year	Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Chum salmon			Salmon total		
	Copper /Bering River drift gillnet	Total Prince William Sound	Pct. of total	Copper /Bering River drift gillnet	Total Prince William Sound	Pct. of total	Copper /Bering River drift gillnet	Total Prince William Sound	Pct. of total	Copper /Bering River drift gillnet	Total Prince William Sound	Pct. of total	Copper /Bering River drift gillnet	Total Prince William Sound	Pct. of total	Copper /Bering River drift gillnet	Total Prince William Sound	Pct. of total
1991	34,815	35,354	98.5%	1,225,992	1,734,346	70.7%	496,037	641,853	77.3%	1,250	37,135,557	0.0%	20,415	352,039	5.8%	1,778,509	39,899,149	4.5%
1992	39,831	41,306	96.4%	990,680	1,771,612	55.9%	417,261	619,572	67.3%	1,668	8,637,116	0.0%	5,808	334,376	1.7%	1,455,248	11,403,982	12.8%
1993	29,858	32,005	93.3%	1,432,273	1,851,133	77.4%	397,319	445,612	89.2%	9,661	5,761,097	0.2%	13,025	1,186,365	1.1%	1,882,136	9,276,212	20.3%
1994	47,945	49,326	97.2%	1,181,093	1,515,343	77.9%	936,657	1,058,242	88.5%	12,113	36,890,921	0.0%	19,132	1,058,405	1.8%	2,196,940	40,572,237	5.4%
1995	67,418	68,783	98.0%	1,293,407	1,523,464	84.9%	824,703	967,333	85.3%	19,835	16,065,231	0.1%	56,329	758,545	7.4%	2,261,692	19,383,356	11.7%
1996	57,964	58,657	98.8%	2,394,692	3,000,602	79.8%	287,065	459,319	62.5%	6,372	26,048,812	0.0%	25,564	2,103,559	1.2%	2,771,657	31,670,949	8.8%
1997	52,542	53,757	97.7%	2,965,833	4,184,045	70.9%	18,753	91,339	20.5%	8,485	26,131,953	0.0%	2,465	2,252,255	0.1%	3,048,078	32,713,349	9.3%
1998	70,503	72,346	97.5%	1,351,750	1,717,275	78.7%	120,530	196,213	61.4%	20,838	28,694,697	0.1%	5,026	1,271,950	0.4%	1,568,647	31,952,481	4.9%
1999	63,510	64,557	98.4%	1,698,601	2,036,707	83.4%	142,751	172,112	82.9%	10,410	45,031,400	0.0%	25,485	2,960,822	0.9%	1,940,757	50,265,598	3.9%
2000	32,018	33,153	96.6%	882,699	1,431,540	61.7%	361,273	716,770	50.4%	9,804	38,885,528	0.0%	5,366	5,163,769	0.1%	1,291,160	46,230,760	2.8%
2001	40,554	41,407	97.9%	1,331,154	2,263,274	58.8%	259,353	495,349	52.4%	9,387	35,246,524	0.0%	2,789	3,099,796	0.1%	1,643,237	41,146,350	4.0%
2002	39,552	40,490	97.7%	1,250,271	2,263,328	55.2%	612,932	650,518	94.2%	3,677	18,950,931	0.0%	31,657	6,373,517	0.5%	1,938,089	28,278,784	6.9%
2003	49,000	49,278	99.4%	1,210,578	2,730,160	44.3%	422,970	521,917	81.0%	12,967	51,975,683	0.0%	10,123	3,804,895	0.3%	1,705,638	59,081,933	2.9%
2004	38,825	39,144	99.2%	1,061,768	1,892,525	56.1%	563,456	619,913	90.9%	5,177	23,531,483	0.0%	3,407	2,001,949	0.2%	1,672,633	28,085,014	6.0%
2005	35,770	36,119	99.0%	1,411,090	1,988,771	71.0%	306,614	531,771	57.7%	44,335	59,944,654	0.1%	3,536	2,099,493	0.2%	1,801,345	64,600,808	2.8%
2006	31,309	31,634	99.0%	1,535,291	2,524,501	60.8%	375,145	763,720	49.1%	30,901	21,722,036	0.1%	17,245	2,181,580	0.8%	1,989,891	27,223,471	7.3%
2007	40,276	41,149	97.9%	1,920,508	3,231,202	59.4%	126,827	328,980	38.6%	80,757	63,469,830	0.1%	9,765	3,579,068	0.3%	2,178,133	70,650,229	3.1%
2008	12,042	12,407	97.1%	324,248	1,301,040	24.9%	243,369	550,629	44.2%	1,498	42,353,653	0.0%	1,345	5,076,135	0.0%	582,502	49,293,864	1.2%
2009	10,344	10,760	96.1%	907,195	1,919,185	47.3%	254,035	300,615	84.5%	16,821	19,001,363	0.1%	8,693	3,220,841	0.3%	1,197,088	24,452,764	4.9%
2010	10,551	11,003	95.9%	643,329	2,045,144	31.5%	292,289	338,618	86.3%	21,167	71,309,596	0.0%	15,776	4,323,156	0.4%	983,112	78,027,517	1.3%
Total	804,627	822,635	97.8%	27,012,452	42,925,197	62.9%	7,459,339	10,470,395	71.2%	327,123	676,788,065	0.0%	282,951	53,202,515	0.5%	35,886,492	784,208,807	4.6%

Note: Copper River and Bering River District drift gillnet harvest reflects harvest recorded in Copper River or Bering River District ADF&G statistical areas by vessels fishing with Prince William Sound salmon drift gillnet (S03E) permits. This represents the maximum amount of harvest that has been taken from EEZ waters. Total Prince William Sound harvest is associated with the following permit types: Prince William Sound salmon purse seine (S01E), Prince William Sound salmon drift gillnet (S03E), Prince William Sound salmon set gillnet (S04E), Prince William Sound salmon special harvest area (S77E), a hatchery permit. All salmon associated with commercial activity are included, regardless of disposition, and including test fishing and hatchery cost recovery. With the exception of commercially sold sport fish derby harvest, no other harvest is excluded based on the disposition of the salmon.

4.3.3 South Alaska Peninsula (Unimak and Southwestern Districts)

The South Alaska Peninsula Salmon Management Area includes waters from Kupreanof Point, west to Scotch Cap on Unimak Island. This area is divided into four districts: the Southeastern District, consisting of waters between Kupreanof Point and McGinty Point; the South Central District, consisting of waters between McGinty Point and Arch Point Light; the Southwestern District, consisting of waters between Arch Point Light, False Pass, and Cape Pankof Light; and Unimak District, consisting of waters between Cape Pankof Light and Scotch Cap, including Sanak Island.

Legal gear types in South Peninsula waters include purse seine, drift gillnet, and set gillnet. The Alaska Peninsula traditional net fishing area only includes a portion of the waters in the Southwestern and Unimak districts. Only drift gillnet and purse seine gear are utilized in these EEZ waters. Most purse seine and set gillnet permit holders fish South Alaska Peninsula waters throughout the season, whereas most drift gillnet permit holders fish South Unimak waters during the month of June and North Alaska Peninsula waters from July into September. The North Alaska Peninsula Salmon Management Area falls within the same fishery permit area as the South Alaska Peninsula, but does not include EEZ waters.

It is anecdotally estimated by participants in both the drift gillnet and purse seine fisheries that no more than 25 percent of the total Unimak June fishery salmon harvest is taken from waters of the EEZ, outside of the 3 nm boundary. In practice, both gear groups utilize water features (i.e., tidal rips and capes) that help to naturally concentrate the salmon for harvest. These types of water features are not often found outside of three nautical miles; therefore, fishing within the EEZ generally only takes place when fishing within State waters is poor.

The South Alaska Peninsula June fishery takes place in the Unimak District and the Shumagin Islands area. At the February 2004 Board meeting, the Unimak fishery was expanded to include the entire Southwestern District and the West and East Pavlof Bay sections of the South Central District. The South Alaska Peninsula June fishery takes place June 7 through June 29; fishing periods are 88 hours in duration interspersed by 32-hour closures, except for the final fishing period of 64 hours. The primary target species of the June fishery is sockeye salmon, although all five salmon species are harvested.

The South Alaska Peninsula post-June salmon fishery takes place in all four districts listed above (excluding the Southeastern District Mainland prior to July 26). The post-June fishery takes place from July 1 through the end of the season and the three major components of this fishery are as follows:

- From July 6 through 21: six 24-hour fishing periods, each followed by a closure of at least 48 hours. Additional fishing time could be allowed in terminal fishing areas based on local salmon run strength.
- From July 22 through 31: fishing time is limited to three periods not to exceed 36 hours in duration and interspersed by closures of at least 48 hours outside of the Southeastern District Mainland (prior to July 26).
- From August 1 through 31: fishing periods are based on abundance of local sockeye, coho, pink, and chum salmon stocks. From September 1 through October 31 (changed from an ending date of September 30 as of the 2010 Board meeting), fishing periods are based on abundance of coho salmon stocks, although ADF&G could consider abundance of late pink and chum salmon stocks.

Historically, South Alaska Peninsula salmon production for all species has fluctuated dramatically, primarily in response to Board actions that significantly changed management plans and harvests. Pink and sockeye salmon are currently the most abundant salmon species harvested in the South Alaska Peninsula Management Area. There are approximately 224 salmon streams, with sockeye found in 37, pink salmon in at least 204, chum salmon in 136, and coho salmon in 81. Most salmon escapements are monitored by aerial observations. Pink and chum salmon escapements are estimated using an indexed total escapement method, while sockeye salmon systems are estimated using peak escapements.

Salmon stocks targeted throughout the Alaska Peninsula vary through the season. Salmon harvested in the South Unimak and Shumagin Islands June fisheries include stocks migrating to a wide range of locations, including Bristol Bay and the Arctic-Yukon-Kuskokwim regions. The Southeastern District Mainland is managed primarily on the basis of the Chignik River sockeye salmon run prior to July 26. The remaining fisheries are managed on the basis of local run strength and escapements, such as the sockeye fishery on the North Alaska Peninsula and the South Alaska Peninsula pink and chum fisheries.

The Western Alaska Salmon Stock Identification Project (WASSIP) was created in 2006, by a memorandum of understanding between eleven signatories. WASSIP is a comprehensive program to develop sockeye and chum salmon genetic stock identification baselines, sample commercial and subsistence sockeye and chum salmon fisheries in coastal marine areas of western Alaska from Chignik Bay to Kotzebue Sound, and analyze fishery samples against the baselines to determine stock of origin for sockeye and chum salmon harvests to the finest resolution possible. The WASSIP effort is currently on track to be completed during the summer of 2012. This information will help to develop options for management plans, including those that govern the South Alaska Peninsula fisheries, to conserve specific stocks and address allocation issues. For more information on WASSIP, see the ADF&G website at http://www.adfg.alaska.gov/index.cfm?adfg=wassip.main.

The 2010 total Alaska Peninsula salmon (all species) harvest was 5.7 million fish. This harvest was composed of 10,777 Chinook, 3.5 million sockeye, 226,985 coho, 872,303 pink, and 1 million chum salmon. Drift gillnet and purse seine gear operating in the Unimak and Southwestern Districts of the South Alaska Peninsula accounted for 17.4 percent of the total Alaska Peninsula commercial salmon catch (Table 4-6). For the South Alaska Peninsula, the first commercial salmon landing in 2010 occurred on June 7, and the last landing occurred on September 23. Refer to Appendix 2, Tables 9 through 12 when reading about the commercial salmon harvest for the South Alaska Peninsula net fisheries. The 2010 total South Alaska Peninsula commercial harvest of 3,087,923 salmon was composed of 7,863 Chinook salmon; 1,284,882 sockeye salmon; 164,824 coho salmon; 837,985 pink salmon; and 792,369 chum salmon. By gear type, purse seine permit holders accounted for approximately 70 percent of the total salmon harvest drift gillnet permit holder harvested 13 percent and set gillnet holders harvested 17 percent. The Southeastern District had the largest commercial salmon harvest of all the districts at 62 percent; the Southwestern and Unimak districts harvested 21 percent and 13 percent, respectively.

During the 2010 Unimak and Shumagin Islands June fishery, a total of 1.4 million salmon were harvested, including 3,118 Chinook, 818,865 sockeye, 27 coho, 271,700 chum, and 332,435 pink salmon. During 2010, the post-June fishery (minus the Southeastern District Mainland fishery) also harvested a total of 1.4 million salmon, including 3,838 Chinook, 287,491 sockeye, 161,698 coho, 444,245 chum, and

486,748 pink salmon. In 2010, 225 permit holders fished in the South Alaska Peninsula June fishery and 142 permit holders fished in the post-June fishery.

Incidental catch

In order to reduce the incidental harvest of immature salmon in the South Alaska Peninsula, ADF&G conducts a purse seine test fishery in the Shumagin Islands Section in early July, before the post-June fishery begins, to assess abundance of immature salmon. Test fishery results from the Shumagin Islands are an indicator of the presence of immature salmon in the Southeastern, South Central, Southwestern, and Unimak districts of the South Alaska Peninsula Management Area. If 100 or more immature salmon, per set, are present, the commercial fishery will be closed to purse seine gear in an area to be determined by ADF&G. "Immature salmon, per set, are present" is defined as the number of Chinook, sockeye, coho, and chum salmon that are observed to be gilled in the seine web. Test fishing gear is standardized to purse seine gear, conducting two 20-minute sets at Popof Head, middle Set, and Red Bluff located on Popof Island. The fishery will reopen once the abundance of immature salmon harvested during the test fishery is determined to be below the threshold of 100 immature salmon per seine set. Gillnet gear is permitted to fish in these areas during the presence of immature salmon, because the larger mesh size permits immature salmon to pass through the nets.

In the South Alaska Peninsula salmon net fisheries, no regulation allows groundfish species harvested as bycatch to be legally retained. However, bycatch of non-salmon species in the directed salmon fisheries in the South Alaska Peninsula is *de minimus*, because the waters of the EEZ are relatively deep; therefore, groundfish species are not vulnerable to the drift gillnet and purse seine gear being utilized for directed salmon fishing.

Table 4-6 Unimak and Southwestern District (South Alaska Peninsula) drift gillnet and purse seine salmon harvests compared to total Alaska Peninsula salmon harvests associated with directed commercial fisheries, 1991-2010 (numbers of fish).

	Chinook salmon			Sockeye salmon			Coho salmon			Pink salmon			Chum salmon			Salmon total		
Year	Unimak /SW District drift gillnet & purse seine	Total Alaska Peninsula	% of total	Unimak /SW District drift gillnet & purse seine	Total Alaska Peninsula	% of total	Unimak /SW District drift gillnet & purse seine	Total Alaska Peninsula	Pct. of total	Unimak /SW District drift gillnet & purse seine	Total Alaska Peninsula	Pct. of total	Unimak /SW District drift gillnet & purse seine	Total Alaska Peninsula	% of total	Unimak/SW District drift gillnet & purse seine	Total Alaska Peninsula	% of total
1991	3,302	16,880	19.6	1,252,994	4,697,428	26.7	79,149	530,597	14.9	2,914,133	10,600,845	27.5	885,010	1,765,052	50.1	5,134,588	17,610,802	29.2
1992	2,660	21,077	12.6	2,130,252	7,017,468	30.4	85,337	621,761	13.7	4,719,844	10,266,124	46.0	597,848	1,653,183	36.2	7,535,941	19,579,613	38.5
1993	4,639	37,668	12.3	2,398,310	7,549,197	31.8	36,692	279,632	13.1	2,371,862	9,930,451	23.9	549,055	1,181,367	46.5	5,360,558	18,978,315	28.2
1994	4,427	28,121	15.7	1,001,088	4,874,336	20.5	32,365	493,605	6.6	5,145,309	10,228,805	50.3	1,243,181	2,263,438	54.9	7,426,370	17,888,305	41.5
1995	7,551	24,649	30.6	1,471,048	6,269,111	23.5	38,452	396,325	9.7	4,780,987	16,314,764	29.3	826,222	1,814,361	45.5	7,124,260	24,819,210	28.7
1996	1,231	10,461	11.8	562,148	3,454,260	16.3	36,043	450,687	8.0	411,757	2,261,345	18.2	245,941	862,598	28.5	1,257,120	7,039,351	17.9
1997	2,912	18,164	16.0	1,110,388	4,436,459	25.0	22,659	210,920	10.7	1,185,329	2,372,072	50.0	358,978	725,374	49.5	2,680,266	7,762,989	34.5
1998	1,228	10,847	11.3	1,034,193	3,271,328	31.6	34,345	288,918	11.9	2,022,044	8,082,808	25.0	348,365	790,584	44.1	3,440,175	12,444,485	27.6
1999	2,170	9,960	21.8	1,262,989	4,775,623	26.4	22,095	246,410	9.0	1,477,895	8,460,816	17.5	335,766	890,150	37.7	3,100,915	14,382,959	21.6
2000	2,061	9,350	22.0	887,387	3,976,851	22.3	43,665	340,980	12.8	1,016,900	3,853,291	26.4	516,768	1,160,353	44.5	2,466,781	9,340,825	26.4
2001	136	7,048	1.9	158,659	1,766,266	9.0	34,067	236,416	14.4	1,221,754	4,033,961	30.3	455,724	1,108,276	41.1	1,870,340	7,151,967	26.2
2002	355	10,280	3.5	403,361	2,454,963	16.4	17,999	231,483	7.8	647,003	2,192,277	29.5	416,606	871,405	47.8	1,485,324	5,760,408	25.8
2003	311	7,419	4.2	398,774	2,538,908	15.7	13,913	185,628	7.5	1,133,068	4,281,586	26.5	338,346	678,634	49.9	1,884,412	7,692,175	24.5
2004	626	17,525	3.6	569,595	4,643,719	12.3	18,083	270,097	6.7	1,265,740	6,697,275	18.9	186,010	809,686	23.0	2,040,054	12,438,302	16.4
2005	629	13,868	4.5	397,661	5,456,416	7.3	7,353	216,988	3.4	2,462,875	9,428,733	26.1	219,648	785,009	28.0	3,088,166	15,901,014	19.4
2006	1,289	13,306	9.7	368,693	4,231,436	8.7	7,611	264,063	2.9	733,557	5,320,037	13.8	388,381	1,319,703	29.4	1,499,531	11,148,545	13.5
2007	843	12,933	6.5	767,125	5,860,703	13.1	27,373	220,824	12.4	2,058,080	8,461,412	24.3	277,129	862,143	32.1	3,130,550	15,418,015	20.3
2008	1,312	6,178	21.2	1,065,517	4,255,334	25.0	41,372	352,892	11.7	4,390,429	13,530,667	32.4	380,595	991,868	38.4	5,879,225	19,136,939	30.7
2009	1,321	9,064	14.6	566,848	4,155,644	13.6	44,398	316,566	14.0	2,800,380	9,822,112	28.5	708,324	1,792,971	39.5	4,121,271	16,096,357	25.6
2010	2,028	10,777	18.8	509,238	3,521,357	14.5	49,460	226,985	21.8	232,055	872,303	26.6	198,859	1,058,262	18.8	991,640	5,689,684	17.4
Total	41,031	295,575	13.9	18,316,268	89,206,807	20.5	692,431	6,381,777	10.9	42,991,001	147,011,684	29.2	9,476,756	23,384,417	40.5	71,517,487	266,280,260	26.9

Note: Unimak and Southwestern District drift gillnet and purse seine harvest reflects harvest recorded in Unimak or Southwestern District ADF&G statistical areas by vessels fishing with Alaska Peninsula salmon drift gillnet (S03M) permits or purse seine permits (S01M). This represents the maximum amount of harvest that has been taken from EEZ waters. Total Alaska Peninsula harvest is associated with the following CFEC permit types: Alaska Peninsula salmon purse seine (S01M), Alaska Peninsula salmon drift gillnet (S03M), Alaska Peninsula salmon set gillnet (S04M), Bristol Bay salmon drift gillnet (S03T) in statistical areas 31622, 31720, or 31820, and Bristol Bay salmon set gillnet (S04T) in statistical areas 31622, 31720, or 31820. However, over this time period, no S03T or S04T harvest is found in Ilnik Lagoon (statistical area 31622). All salmon associated with commercial activity are included, regardless of disposition, and including test fishing and hatchery cost recovery. With the exception of commercially sold sport fish derby harvest, no other harvest is excluded based on the disposition of the salmon.

4.4 Sport Salmon Fisheries

The ADF&G Division of Sport Fish manages the state's sport fisheries. Alaska statute defines sport fishing as the taking of or attempting to take for personal use, and not for sale or barter, any fresh water, marine, or anadromous fish by hook and line held in the hand, or by hook and line with the line attached to a pole or rod which is held in the hand or closely attended, or by other means defined by the Board (AS 16.05.940(30)). Further information on state management of sport fisheries can be found on the ADF&G website at: www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main.

Under criteria adopted by the Board, the Commissioner may increase or decrease sport fish bag limits or modify methods of harvest for sport fish by means of emergency orders. An emergency order has the force and effect of law after field announcement by the commissioner or an authorized designee. These changes may not reduce the allocation of harvest among other user groups. An emergency order may not supersede bag and possession limits or methods and means established in regulatory management plans established by the Board.

The ADF&G Commissioner or an authorized designee may decrease sport fish bag and possession limits and restrict methods and means of harvest by emergency order when (A) the total escapement of a species of anadromous fish is projected to be less than the escapement goal or the lower limit of the escapement range for that species listed in management plans that have been adopted by the Board of Fisheries or established by ADF&G; or (B) the sport harvest must be curtailed in any fishery for conservation reasons. ADF&G may issue a "catch-and-release only" emergency order when the estimated hooking mortality is not projected to reduce the population of fish below the number required for spawning escapement or, in the case of resident species, below the level requirement for maintenance of the desired age and size distribution of the population; "catch-and-release" as a tool to address conservation under this section shall be labeled "conservation catch-and-release" to differentiate from catch-and-release regulations adopted by the Board for special management to create diversity in sport fisheries.

The ADF&G Commissioner or an authorized designee may increase sport fish bag and possession limits and liberalize methods and means of harvest by emergency order when (A) the total escapement of a species of anadromous fish is projected to exceed the optimum escapement goal by 25 percent or the upper limit of the escapement range for that species listed in management plans that have been adopted by the Board or established by ADF&G, if the total harvest under the increased bag and possession limit will not reduce the escapement below the optimum escapement goal or the upper limit of the escapement range; or (B) hatchery-produced fish escape through existing fisheries to designated harvest areas in numbers that exceed brood stock needs, any natural spawning requirements, or cost recovery goals of private nonprofit hatcheries. The intent of this subparagraph is to allow harvest when there are no other competing user groups.

The Division of Sport Fish has conducted a mail survey (Statewide Harvest Survey (SWHS)) to estimate sport fishing annual effort (angler-days), harvest (fish kept) since 1977, and total catch (fish kept plus fish released) since 1990. Harvest and catch estimates are available for species commonly targeted by sport anglers. Effort, harvest, and catch estimates are available by region and area, but are not specifically available for the EEZ. In Southeast Alaska, the Division of Sport Fish has conducted a creel survey and port sampling program to estimate effort (angler days), harvest, and catch.

Given the available data for sport fishing activity in the EEZ, harvest estimates can be provided for the time period 2004 through 2010 for Chinook, sockeye, and coho salmon. For the West Area, logbook data, which provides an estimate of effort, harvest, and catch (see Sport Fishing Guide Operations section below), can be used to derive the proportion of the guided harvest that occurred in the EEZ for each species and year. Those proportions can then be applied to the annual SWHS estimates for each species and year. This approach assumes that guided and unguided fisheries have equal proportions of harvest in federal (versus State) waters.

EEZ sport harvest of salmon was calculated by multiplying the percentage of harvest that occurred in federal waters by SWHS estimates. The percentage of harvest from federal waters was calculated using logbook data in the West Area. As such, sport harvest estimates from the EEZ include both guided charter vessels and unguided anglers. The percentage of federal waters harvest was applied only to boat harvest estimates from the SWHS; all shore harvest was assumed to be in state waters.

Estimating the sport harvest of salmon for the East Area was not possible prior to 2010, and is recently only possible due to modifications made to maps used with the Saltwater Charter Vessel Logbook program. Modifications were made prior to the 2010 fishing season, whereby existing logbook maps were edited using GIS to include the NOAA-NMFS groundfish statistical areas adjacent to the ADF&G salmon statistical areas along the outer coast of Southeast Alaska. Therefore, unlike information shown for the West Area from 2004 through 2010, the East Area information is limited to the single year 2010.

4.4.1 Sport Salmon Harvest in the East Area

The sport harvest of Chinook, coho, and sockeye salmon in the EEZ waters of the East Area during 2010 was minimal (Table 4-7, Figure 4-2). Effort for the harvest of these salmon species in the EEZ, which is measured as the number of vessels and trips conducted, was also minimal (Table 4-14).

Most of the Chinook salmon harvest took place off of the west coast of Prince of Wales Island. Likewise, the vast majority of the EEZ harvest for coho salmon took place off of Prince of Wales Island, with an additional estimated 26 fish off Sitka and four fish out of Cross Sound that were landed in Gustavus. All of the saltwater sport harvest of sockeye salmon in the East Area during 2010 occurred off of Sitka.

Ports observed to land the majority of salmon coming from EEZ waters in the East Area were predominately off of Prince of Wales Island (Waterfall Resort and Craig/Klawock) and Sitka. A small number of trips (fewer than five) originated from Elfin Cove and Gustavus, which likely fished outside of Cross Sound.

4.4.2 Sport Salmon Harvest in the West Area

Chinook salmon contributions to the EEZ salmon harvest in the West Area from 2004 through 2010 averaged 4.1% of the total saltwater sport harvest (Table 4-7, Figure 4-2). Most of this harvest, an annual average of approximately 1,100 Chinook salmon, came from outside Cook Inlet. An estimated 984 Chinook salmon are harvested annually from the EEZ waters of Prince William Sound and North Gulf (SWHS statistical Area J).

Coho salmon sport harvest in EEZ waters of the West Area averaged 4.6% for 2004 through 2010 (Table 4-7). An average of nearly 6,200 coho salmon were taken in Cook Inlet annually and the remainder, an average of 4,500 coho salmon, were harvested in Prince William Sound and North Gulf (SWHS statistical area J).

Sport harvest of sockeye salmon in the West Area averaged 10.3 percent from 2004 through 2010 (Table 4-7). The vast majority of this sport harvest was from Cook Inlet with 1,600 sockeye salmon harvested in the EEZ during the 2004 through 2010 time period.

Most salmon harvested in the West Area were predominately offloaded in Homer followed by Seward, Anchor Point, and Deep Creek. The species most often being landed in those ports was coho salmon. Few sockeye were harvested in federal waters, as compared to harvests in State waters; however, when offloaded, it most often occurred in the ports of Homer, Seward, and Anchor Point.

Table 4-7 Comparison of State waters and EEZ saltwater sport fishery harvests of Chinook, coho, and sockeye salmon, 2004 through 2010 (numbers of fish).

		West		East	
Species	**Year**	**State**	**Federal**	**State**	**Federal**
Chinook	2004	34,574	654	-	-
	2005	32,356	1,119	-	-
	2006	34,057	742	-	-
	2007	29,490	1,002	-	-
	2008	23,205	698	-	-
	2009	20,775	663	-	-
	2010	18,362	2,514	53,919	82
Coho	2004	249,285	18,159	-	-
	2005	298,973	12,042	-	-
	2006	200,307	10,459	-	-
	2007	261,670	10,066	-	-
	2008	191,886	7,197	-	-
	2009	180,541	10,430	-	-
	2010	182,367	6,667	153,819	163
Sockeye	2004	15,554	1,220	-	-
	2005	18,811	988	-	-
	2006	12,563	2,540	-	-
	2007	24,052	2,586	-	-
	2008	23,706	572	-	-
	2009	25,223	4,043	-	-
	2010	23,281	652	3,938	4

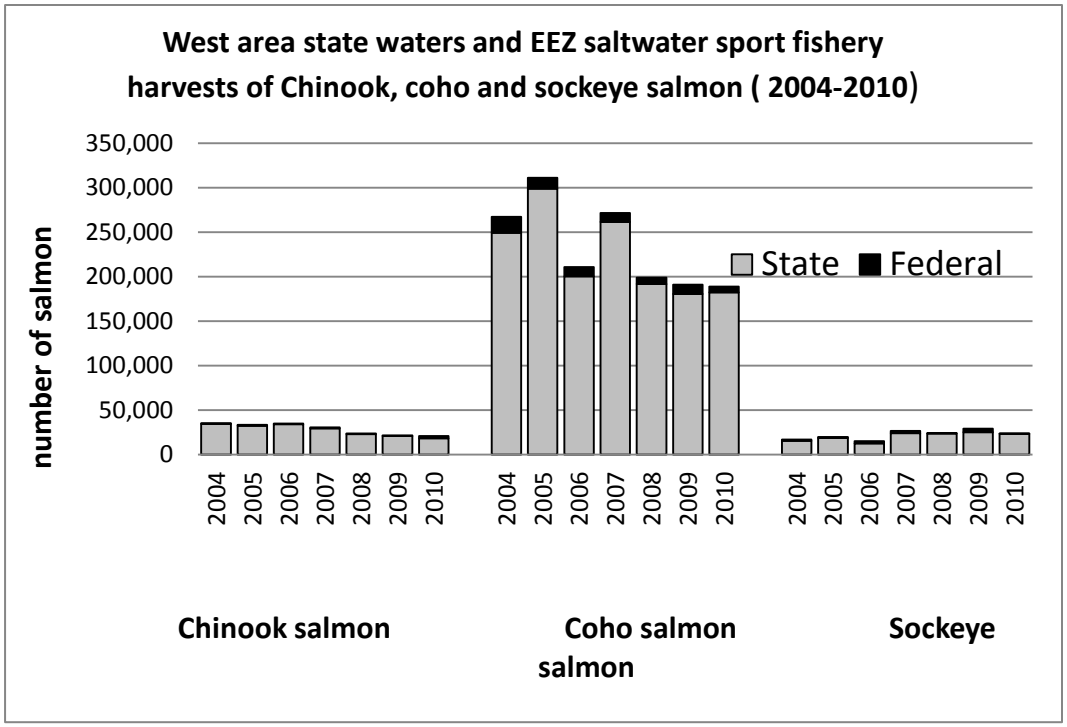

Figure 4-2 Comparison of State waters and EEZ saltwater sport fishery harvests of Chinook, coho and sockeye salmon in 2004 through 2010 (numbers of fish, data from Table 4-7).

4.4.3 Sport Fishing Guide Operations

Per Alaska statute (5 AAC 75.075(c)), the ADF&G, Division of Sport Fish is also responsible for overseeing the annual licensing of sport fish businesses and guides. A 'sport fishing guide' means a person who is licensed to provide sport fishing guide services to persons who are engaged in sport fishing (AS 16.40.299). 'Sport fishing guide services' means providing assistance, for compensation or with the intent to receive compensation, to a sport fisherman to take or to attempt to take fish by accompanying or physically directing the sport fisherman in sport fishing activities during any part of a sport fishing trip. Salmon is one of the primary species targeted in the states' sport fisheries. All saltwater and freshwater sport fishing charter vessels must be registered through ADF&G.

In addition, all freshwater and saltwater sport fishing guide operators are required to maintain an ADF&G-issued logbook of their clients' catch. The Division of Sport Fish conducts a program to issue Saltwater and Freshwater Charter Logbooks, which provides comprehensive effort, harvest, and catch estimates for guided anglers. Logbook data are available specifically for State and federal waters in Southcentral Alaska since 1998, and in Southeast Alaska since 2010.

4.4.4 Sport Fishing and Chartering from a Registered Troll Vessel

A person may sport fish from a registered commercial salmon hand or power troll vessel. A person who sport fishes from a vessel licensed for commercial fishing (other than a charter vessel) in waters closed to commercial salmon fishing shall, immediately upon bringing a salmon aboard, mark the salmon by

removing its dorsal fin. This regulation also applies when a person is sport fishing for a species closed to commercial trolling. Sport fishing from a commercially licensed vessel while commercially caught salmon are in possession is illegal in waters closed to commercial fishing. A troll gurdy may be used as a downrigger in conjunction with a sport fishing rod to sport fish for salmon.

Additionally, a registered troll vessel may also be registered as a charter vessel. A vessel registered both as a commercial troller and as a charter vessel may not be used to troll commercially and charter in the same day.

All regulations pertaining to sport fishing for salmon in the marine waters of Alaska also apply in all waters of the EEZ.

4.5 Economic and Community Impacts of Salmon Fishing

For analytical purposes, it is convenient to divide the EEZ salmon fishery contributions to regional employment and income into direct, indirect, and induced effects.[47] The direct effects are those reflected in jobs and income directly attributable to participation in the fisheries. In this case, these include the direct employment of the crew of the salmon trollers, gillnetters, and seiners and direct income to various participants in the fishing firms (crew shares, vessel shares, or shares for Alaska limited entry permit holders).

The indirect effects are those generated in other businesses, by the purchases or sales of the salmon fishing firms. Indirect effects would accrue to businesses supplying fuel and supplies, fishing gear and fishing gear repairs, ship construction and repairs, insurance, banking, legal, and accounting services, lobbying, and consulting. The goods and services above are "backward" linkages. Jobs and income may also be associated with "forward" linkages, in processing firms, and in firms providing transportation, warehousing, cold storage, brokering, and other distribution services.

Induced effects are those generated when directly or indirectly employed persons spend their income. Employment and income are created when people receiving income from fisheries spend their money on such things as groceries, gas, cars, car repairs, rent, home repairs, home construction, insurance, and so on.

It is customary to think of these regional economic contributions in terms of *multipliers* showing the total indirect and induced employment and income associated with direct employment and income. Multiplier estimates depend in part on the size of the community under consideration, because the smaller the community, the greater the "leakage," as more labor, goods, and services are purchased outside of the community.

Multipliers for fishing activity within Alaska tend to be relatively low, compared to those for other Alaskan industries. Significant portions of the management and labor in fisheries and fish processing, tend to originate outside of the state. Significant portions of productive inputs tend to be purchased

[47] This discussion addresses the employment and income contributions of the salmon fisheries taking place in federal waters off of Alaska. This is not a discussion of the fishery contribution to net economic welfare at the community, state, or national level.

outside of the state (see Seung's analysis of Alaska seafood processing, Seung 2008: 102). Because of this, direct, indirect, and induced effects tend to be divided between Alaska, and the places of origin for these inputs.

Employment

The direct employment contribution of EEZ fishing activity is the employment of persons on the fishing vessels. The Alaska Department of Labor (ADOL) surveys permit holders in Alaska's fisheries and uses the responses to estimate crew factors in Alaska's commercial fisheries.[48] The crew factor for a fishery is equal to the estimated average size of vessel crews in the fishery, excluding the skipper. Using the ADOL crew factor estimates from its 2010 survey, and adjusting them to account for skippers, it is possible to estimate the number of separate job positions available in fisheries in a year.[49] This is done by assuming that each permit fished corresponds to a separate fishing operation, incrementing the ADOL crew factor for the fishery by one, to account for the skipper, and multiplying the number of permits fished by the adjusted crew factor. The number of separate persons active is likely to be larger, due to turnover in positions. The survey does not collect information about the place of residence of crewmembers.

Because of the limited information about the numbers of permit holders operating in West Area net fisheries, it is not possible to estimate the numbers of positions active only in the EEZ. Thus, the West Area positions, reported below, correspond to the numbers of permits fished in the relevant districts from Table 4-10, Table 4-11, and Table 4-12, and overstate the number of positions attributable to salmon fishing in the EEZ.

In the East Area, the estimated average vessel crew size (the ADOL crew factor increased by one) for power trollers was 2.4 persons in 2010.[50] Treating the number of permits fished from 1991 to 2010 as a guide to the distribution of permits normally fished, and multiplying the number of permits fished by the estimated average vessel crew size, the median number of positions active in the EEZ is 362. Proceeding in the same manner, the median number of positions active in the West Area's Central Cook Inlet District would be 1,102; the median in the Copper and Bering River Districts of the Prince William Sound Management Area would be 1,160; and the median in the Southern Alaska Peninsula districts would be 495 (this includes both seine and gillnet operations). As noted, the estimates for the West Area are not EEZ-specific, but also cover any vessels that fished in the districts.[51]

Residency

The share of fishing activity conducted by Alaskan residents differs by fishery. The fisheries that are affected by this action require limited entry permits issued by the State. Alaska tracks permit issuance,

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[48] The ADOL crewsize estimates the Alaska permit holder

[49] The ADOL crew size estimates are used courtesy of the Research and Analysis Division of the Alaska Department of Labor and Workforce Development.

[50] The average hand troll crew size (ADOL crew factor plus one) was 2.3.

[51] Vessel crew sizes (ADOL crew factors plus one) were 2.3 persons in each of the drift gill net fisheries, and 4.9 persons in the Alaska Peninsula seine fishery.

permits fished, and permit production and revenue by state of residence of the permit holder. The percentage of permits fished by Alaska residents varies by permit fishery.[52]

In the East Area, about 85 percent of the power troll permits fished in 2010 were held by Alaskan residents and these permit holders accounted for about 85 percent of the fishery gross revenues. In the hand troll fishery, about 91 percent of the permits fished were held by Alaskan residents, and these accounted for about 93 percent of revenues (CFEC 2011a).

In the West Area, in the Prince William Sound drift gill net fishery, the fishery operating off of the Copper River, about 78 percent of the permit holders in 2010, accounting for about 79 percent of fishery gross revenues, were Alaskan residents. In the Cook Inlet drift gillnet fishery about 72 percent of the permit holders, accounting for about 74 percent of the revenues, were Alaskan residents. In the Alaska Peninsula seine fishery about 76 percent of the permit holders, accounting for about 70 percent of the revenues, were Alaska residents, while in the drift gill net fishery, about 55 percent of the permit holders, accounting for about 49 percent of the gross revenues were Alaska residents (CFEC 2011a).

Alaska residents are found in smaller proportions in the seafood processing sector than in the fishing sector. In Sitka in 2001, with 758 seafood processing workers, about 30 percent were Alaska residents. On the Kenai Peninsula, where there are 1,490 seafood processing workers, about 38 percent are Alaska residents, and in the Aleutians East Borough, with 2,608 workers, about 12 percent are Alaska residents. Alaska workers in these places do tend to receive a disproportionate share of the wages, either because they work more during the year, or because they occupy higher wage jobs. In Sitka, they receive about 53 percent of the wages, on the Kenai, about 48 percent, and in the Aleutians East Borough, about 18 percent (Hadland et al. 2011: 7).[53]

Seung and Waters report that the seafood processing industry's output multiplier is among the lowest for Alaska industries, because much of the income earned in the industry is earned by non-residents, and because a large proportion of intermediate inputs are purchased from out of state. They estimate that about 60 percent of labor earnings in seafood processing leave Alaska, and that about 69 percent of intermediate inputs is imported (Seung and Waters 2006: 347-348).[54]

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[52] This discussion of the residency of permit holders is based on an examination of Basic Information Tables prepared by Alaska's CFEC, and available at its web site at http://www.cfec.state.ak.us/bit/MNUSALM.htm. These tables were downloaded on August 23, 2011. In Alaska, there should be one limited entry permit holder present with each fishing operation. The number of crew present on an operation will normally be larger than this. For the percentages reported here to be indicative of the place of origin for the crew as a whole, it is necessary to assume that permit holders hire crew from their own state of residence.

[53] As a caveat, these numbers, and those reported in the next paragraph, relate to all seafood processing, and not just salmon processing.

[54] These relate to all seafood processing. The numbers specific to the regions under consideration in this analysis, or to salmon processing, are unknown, but may differ from the overall statewide numbers. The largest category of imported intermediate inputs is raw fish caught by catcher vessels owned by nonresidents but landed for processing in Alaska. This includes significant volumes of groundfish and crab, and the proportion of intermediate inputs in these fisheries may differ from that for salmon processing.

Fisheries Taxes

Alaska's fisheries taxes, some of which are shared with communities or enhancement operations local to fisheries, are another source of indirect salmon fishery effect. "Fish" tax receipts shared with a community may be associated with increased community spending on goods and services within the community, smaller community sales tax or property tax assessments, purchases of goods and services outside the community, or some combination of these. Costs recovered for salmon aquaculture may be a source of local employment and income, as well.

The salmon fisheries that occur, in part, in the waters of the EEZ[55] may be subject to different combinations of five separate State fisheries taxes.[56] These are listed in Table 4-8. The taxes and rates applicable to the salmon fisheries in the EEZ are (ADOR; Cottongim, pers. comm.[57]):

- Fisheries Business Tax: The fisheries business tax is generally paid by the first processor of processed fish, or the exporter of unprocessed fish, based on the ex-vessel price of unprocessed fish. The rates vary depending on the type of processor, and on whether or not the species of fish is considered a "developing" species. Salmon species are considered established species. The key applicable rates for the species of salmon considered here are those for shore-based processors and direct marketers (3 percent), floating processors (5 percent), or salmon canneries (4.5 percent). Half the tax revenues are shared with communities where the processing takes place. Revenue sharing is based on fishery harvests one year before; thus payments in 2011 are based on taxes collected in 2011, for fishing that took place in 2010.
- Fishery Resource Landing Tax: This tax is levied on fishery resources processed outside the three-mile limit and first landed in Alaska, or on fish processed subject to section 210(f) of the American Fisheries Act. The tax is levied on the average unprocessed value of the fish. This tax would not be levied on drift gill net vessels or seine vessels, which do not process salmon on-board. It may, however apply to certain troll vessels in the Eastern Area, which freeze their product on board. The tax rate is 3 percent. Fish products would not be subject to both the Fisheries Business Tax and the Fishery Resource Landing Tax. Half the revenues are shared with communities where the landing occurs.
- Seafood Marketing Assessment: Any person processing or exporting more than $50,000 of seafood products in a calendar year is responsible for paying 0.5 percent of the ex-vessel value of the fish to support marketing efforts. This revenue is not shared with communities affected by the fisheries.
- Salmon Enhancement Tax. Salmon fishermen in a region may vote to assess themselves to support salmon enhancement programs in their regions. Assessments may vary from program to program. Assessments are collected by licensed fish buyers from limited entry permit holders when they sell their salmon. Limited entry permit holders who sell to unlicensed buyers or export

[55] These are the troll fisheries off of Southeast Alaska, the drift gillnet fisheries off of the Copper River and in central Cook Inlet, and the drift gill net and seine fisheries on the south side of the Alaska Peninsula.
[56] In addition to the taxes discussed here, municipalities may impose their own taxes, and commercial fishing operations contribute a share of the fuel tax revenues collected by Alaska. These are not discussed
[57] Cottongim, Tim. Revenue Audit Supervisor I, Alaska Department of Revenue Fish Tax Unit, Juneau, Alaska.

their fish from the aquaculture region where they were caught must pay the assessment themselves. These revenues support aquacultural activity in the regions within which they are collected.

Regional Seafood Development Tax: Groups of Alaska fishermen may organize to form regional fisheries development associations for marketing, infrastructure, or other development purposes. Fishermen may vote to assess themselves to fund these activities. Among the groups of salmon fishermen operating at times in the EEZ, only the Prince William Sound drift gill net fishermen have voted to assess themselves for this purpose; these voted to assess 1 percent of their gross revenues.

Table 4-8 summarizes the tax rate information for the fisheries taking place partly in the EEZ. In these fisheries, salmon from the EEZ make a contribution to state tax revenues.

Table 4-8 Summary of State of Alaska fisheries taxes and the incidence on salmon fisheries occurring in the EEZ

	Fisheries Business Tax	Fishery Resource Landing Tax	Seafood Marketing Assessment	Salmon Enhancement Tax	Regional Seafood Development Tax
Eastern Offshore troll fisheries	3.0%, 4.5%, or 5% depending on processor type	3.0% for trollers freezing their product at sea. A vessel would not pay this and the Fisheries Business Tax.	0.5%	3.0%	0.0%
Copper River drift gill net	3.0%, 4.5%, or 5% depending on processor type	0.0%	0.5%	2.0%	1.0%
Central Cook Inlet drift gill net	3.0%, 4.5%, or 5% depending on processor type	0.0%	0.5%	2.0%	0.0%
South Alaska Peninsula seine and drift gill net	3.0%, 4.5%, or 5% depending on processor type	0.0%	0.5%	0.0%	0.0%
Revenue sharing	50% to local communities	50% to local communities	100% to Alaska Seafood marketing Institute (ASMI)	100% returned to regional hatcheries	100% returned to regional development association
Statute	AS 43.75	AS 43.77	AS 16.51	AS 43.76.001	AS 43.76.350
Regulations	15 AAC 75	15 AAC 77	15 AAC 116	15 AAC 76	Not applicable
Sources: ADOR; Cottongim, pers. comm.;					

4.5.1 Impacts of EEZ Harvests in Southeast Alaska

Table 4-9 highlights earnings from salmon commercially harvested in the Southeast Alaska EEZ. In 2010, the estimated gross earnings from salmon (all species) harvested in the EEZ was $2.6 million, which represents approximately 9 percent of the total earnings grossed by the troll fishery (hand and

power combined) in all of Southeast Alaska and approximately 2.5 percent of the earnings grossed by all salmon fisheries (troll and net) in all of Southeast Alaska. Between 1991 and 2010, earnings from salmon commercially harvested in the EEZ represented at the maximum (1992) 16 percent of the total troll fishery earnings and 4.5 percent of the total all-gear earnings throughout Southeast Alaska. On average, from 1991 to 2010, earning from salmon commercially harvested in the EEZ represent 8.4 percent of the total troll fishery earnings and 2.4 percent of the total all-gear earnings throughout Southeast Alaska.

For the time period 2006 through 2010, the majority of commercially retained salmon harvested in the EEZ portion of Southeast Alaska was delivered directly or by tender to Sitka. The average amount of salmon (all species combined) delivered to Sitka over this time period was 370,440 pounds with an average gross ex-vessel value of $1,193,270. The other primary ports taking deliveries of troll caught salmon in Southeast Alaska include Yakutat, Craig, Pelican, and Hoonah. Sitka and Yakutat are home to multiple processing facilities.[58] Additionally, in Southeast Alaska salmon are harvested and processed by freezer vessels. Over the time period 2006 through 2008, an average of 149,182 pounds were attributed to these vessels with an average ex-vessel value of $512,593 (no deliveries from these vessels were made in Southeast Alaska in 2009 or 2010). Some deliveries of salmon harvested in the Southeast Alaska EEZ are delivered to the Washington communities of Seattle, La Connor, and Bellingham, but these represent an extremely small proportion of the landings, when compared to the processing activity that takes place in the communities of Southeast Alaska.

In addition to being the primary port where deliveries of commercially retained salmon are made, Sitka is also the primary community of residence for troll (hand and power combined) permit holders operating in the EEZ. For the time period 2006 through 2010, an average of 33 Sitka troll permit holders were active in the EEZ and had combined annual average estimated gross earnings of $618,886 from EEZ harvests. Other main Alaska communities of residence for troll permit holders operating in the EEZ include Yakutat, Craig, Wrangell, Juneau, and Petersburg. Communities of residence associated with this activity outside of Alaska include Port Angeles, Washington.

[58] Source: NOAA Technical Memorandum NMFS-AFSC-160: Alaska Fisheries Science Center Community Profiles, 2005. http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/CPU.php.

Table 4-9 Comparison of Southeast Alaska salmon (all species) harvest earnings from EEZ waters and area wide, 1991-2010.

Year	Number of Salmon Harvested in EEZ	Pounds of Salmon Harvested in the EEZ	Estimated Gross Earnings from the EEZ	Average Earnings Per Permit	CFEC Permit Count	EEZ Earnings as a Percentage of Troll Gear Earnings (all Southeast Alaska)	EEZ Earnings as a Percentage of Total Southeast Alaska Earnings (all gear)
1991	77,117	652,156	$1,124,758	$7,757	144	4.5%	1.5%
1992	450,457	3,006,900	$4,675,975	$13,554	347	15.9%	4.5%
1993	236,988	1,454,737	$1,992,755	$14,033	142	7.5%	2.1%
1994	270,932	2,142,233	$2,839,030	$16,899	167	7.3%	2.4%
1995	319,424	2,374,798	$2,256,761	$8,358	269	13.7%	2.5%
1996	150,168	1,106,474	$1,155,716	$9,631	120	7.1%	1.6%
1997	126,253	1,065,637	$1,568,293	$10,053	155	8.3%	2.2%
1998	182,344	1,490,423	$1,534,645	$9,652	160	10.3%	2.1%
1999	99,102	710,945	$1,090,426	$11,014	99	5.3%	1.2%
2000	77,045	624,846	$969,672	$8,288	117	6.6%	1.5%
2001	65,567	485,092	$645,309	$7,014	92	3.8%	0.8%
2002	110,310	1,190,119	$1,294,591	$10,611	122	9.9%	3.1%
2003	98,661	1,172,249	$1,461,097	$15,220	96	9.9%	2.9%
2004	196,041	1,706,607	$3,135,001	$18,333	169	10.8%	4.3%
2005	99,729	686,341	$1,188,166	$9,283	128	4.4%	1.6%
2006	115,759	1,008,509	$3,181,645	$20,932	153	9.2%	3.8%
2007	116,981	929,398	$2,854,124	$19,027	149	9.3%	2.9%
2008	89,877	820,820	$2,949,131	$18,905	156	8.1%	2.8%
2009	95,087	719,274	$1,725,313	$11,203	154	7.5%	1.9%
2010	129,263	1,081,694	$2,629,159	$14,212	185	8.9%	2.5%

Note: Only commercially retained harvest is included. Earnings estimates and average earnings estimates per permit are based on CFEC gross earnings data. Total Southeast harvest is associated with the following CFEC permit types: Southeast salmon purse seine (S01A), Southeast salmon drift gillnet (S03A), Yakutat set gillnet (S04D), Statewide salmon hand troll (S05B), statewide salmon power troll (S15B), Southeast salmon special harvest area (S77A) a hatchery permit, and Southeast Metlakatla reservation permit (S99A), an experimental or special permit.

4.5.2 Impacts of EEZ Harvests in Upper Cook Inlet

Table 4-10 highlights earnings from salmon commercially harvested by drift gillnet gear in the Central District of UCI. In 2010, the estimated gross earnings from salmon (all species) harvested by drift gillnet gear were $18.5 million, which represents approximately 54 percent of the total earnings grossed by all commercial fisheries (purse seine, set gillnet, and drift gillnet combined) throughout Cook Inlet. Between 1991 and 2010, earnings from salmon commercially harvested by drift gillnet gear in the Central District represented at the maximum (1992) 66 percent of the total all-gear gross earnings, and at the minimum (2003) 33 percent of the total all-gear gross earnings. On average, from 1991 to 2010, earnings from salmon commercially harvested by drift gillnet gear in the Central District were 45.6 percent of the total Cook Inlet all-gear gross earnings.

In the UCI area, managers estimate that in recent years approximately 50% to 60% of the drift gillnet fleet's sockeye salmon harvest comes from waters of the EEZ. Tidal rips and underwater features in UCI help to concentrate sockeye salmon, and provide for fishing opportunity for the drift gillnet fleet. These types of water features are not often found inside three nautical miles.

For the time period 2006 through 2010, the majority of commercially retained salmon harvested by drift gillnet gear in the Central District of UCI was delivered to Kenai. The average amount of salmon (all species combined) delivered to Kenai (from drift gillnet vessels fishing in the Central District) over this time period was 6,112,575 pounds with an average estimated gross ex-vessel value of $6,243,539. Salmon accounts for the majority of seafood processing in Kenai. Other ports taking deliveries of salmon in Cook Inlet include Nikishka/Nikiski, Homer, Kasilof, and Anchorage.

Homer is the primary community of residence for drift gillnet permit holders operating in Central District of UCI. For the time period 2006 through 2010, an average of 91 Homer drift gillnet permit holders were active in the Central District, with a combined annual average estimated gross earnings of $2,454,671 from harvests in the Central District. Other main Alaska communities of residence for drift gillnet permit holders operating in the Central District include Kenai, Soldotna, and Kasilof. Communities of residence outside of Alaska associated with this activity include Astoria, Oregon and Cathlamet, Washington.

Table 4-10 Central District (Upper Cook Inlet) drift gillnet participation and estimated gross earnings from commercially retained salmon (all species) compared to total Cook Inlet estimated gross earnings across all salmon permit types, 1991-2010.

	Central District drift gillnet commercial salmon harvests						Estimated gross earnings by all permit types in Central District	Total Cook Inlet estimated gross earnings, all permit types	Central District drift gillnet earnings as pct. of total Cook Inlet earnings
Year	Number of salmon	Pounds of salmon	Estimated gross earnings	Avg. estimated earnings per permit	Permit count	Processor facility/platform count			
1991	1,515,860	9,215,538	$8,099,133	$14,012	578	22	$11,224,762	$16,821,543	48.1%
1992	6,994,103	45,313,206	$66,374,208	$114,438	580	32	$76,172,508	$100,586,685	66.0%
1993	2,816,525	16,813,960	$16,535,277	$28,509	580	25	$19,967,692	$31,694,852	52.2%
1994	2,718,026	16,262,457	$18,714,345	$32,890	569	28	$25,063,079	$34,756,117	53.8%
1995	2,548,313	15,484,537	$13,909,931	$24,107	577	26	$17,523,022	$24,829,358	56.0%
1996	2,639,427	16,872,199	$17,727,709	$31,657	560	23	$22,603,241	$33,038,277	53.7%
1997	2,399,075	16,027,273	$17,455,320	$30,516	572	24	$22,488,542	$33,861,060	51.5%
1998	971,289	5,401,864	$4,296,966	$8,138	528	18	$6,049,144	$9,717,632	44.2%
1999	1,648,851	10,395,737	$12,134,809	$24,917	487	17	$21,284,820	$24,040,441	50.5%
2000	966,250	6,219,035	$4,305,023	$8,392	513	18	$7,915,150	$9,788,168	44.0%
2001	967,791	6,115,384	$3,630,061	$7,807	465	22	$7,267,278	$8,516,376	42.6%
2002	1,681,772	10,892,171	$4,793,448	$11,720	409	18	$9,924,797	$12,057,334	39.8%
2003	1,478,125	9,087,169	$5,225,341	$12,501	418	19	$12,711,672	$15,979,498	32.7%
2004	2,661,480	16,594,805	$10,058,016	$22,859	440	23	$20,827,625	$23,642,672	42.5%
2005	1,907,449	12,004,837	$10,611,449	$22,530	471	25	$25,281,352	$31,535,749	33.6%
2006	700,923	3,913,051	$2,904,392	$7,684	378	27	$9,477,696	$15,313,750	19.0%
2007	1,952,745	12,648,718	$12,016,317	$28,885	416	25	$21,592,514	$24,071,974	49.9%
2008	1,194,635	7,440,774	$7,691,442	$18,098	425	26	$17,795,256	$22,643,337	34.0%
2009	1,265,357	7,757,905	$8,202,586	$20,303	404	28	$16,340,545	$18,588,144	44.1%
2010	2,000,185	12,411,950	$18,537,709	$49,302	376	25	$31,908,094	$34,471,224	53.8%

Note: Only commercially retained harvest is included. Earnings estimates and average earnings estimates are based on CFEC gross earnings data. Central District drift gillnet harvest reflects harvest recorded in Central District ADF&G salmon statistical areas by vessels fishing with Cook Inlet salmon drift gillnet (S03H) permits. Total Cook Inlet harvest is associated with the following CFEC permit types: Cook Inlet salmon purse seine (S01H), Cook Inlet salmon drift gillnet (S03H), and Cook Inlet salmon set gillnet (S04H). Cook Inlet salmon special harvest area (S77H permits are not included. Earnings estimates and average earnings estimates per permit are based on CFEC gross earnings data.

4.5.3 Impacts of EEZ Harvests in Prince William Sound

Table 4-11 highlights earnings from salmon commercially harvested by drift gillnet gear in the Copper River and Bering River Districts of Prince William Sound. In 2010, the estimated gross earnings from salmon (all species) harvested by drift gillnet gear was $11.7 million, which represents approximately 9 percent of the total earnings grossed by all commercial fisheries (all gear combined) throughout Prince William Sound. Between 1991 and 2010, earnings from salmon commercially harvested by drift gillnet gear in the Copper and Bering River Districts represented at the maximum (1996) 69 percent of the total all-gear gross earnings. Earnings from drift gillnet gear in these two districts for 2010 represent the minimum of the total all-gear gross earnings throughout this time series, due in large part to the very large pink salmon return to Prince William Sound that year. On average, from 1991 to 2010, gross earnings from salmon commercially harvested by drift gillnet gear in the Copper and Bering River Districts was 46 percent of the total Prince William Sound all-gear gross earnings.

In Prince William Sound, the only fisheries within the EEZ are drift gillnet and are limited to the outer portions of the Copper River and Bering River districts. According to area managers, it is estimated that no more than 28% of sockeye, 22% of Chinook, 12% of coho, <1% of chum, and <1% of pink salmon harvest comes from waters of the EEZ. These estimates are based on apportionment of harvest by area; this area method of apportionment may significantly overestimate harvests in waters further from land where fishing effort is reduced. Fishing vessels do not disperse evenly in Prince William Sound fisheries. Instead, their densities are highest closer to shore where the water is less rough, tide rips are more common, and fishing nets are closer to the bottom thereby making the nets more efficient. In addition, salmon tend to congregate in nearshore waters before heading upstream, resulting in generally higher fish densities and harvest rates in nearshore waters than in waters farther from shore.

In Prince William Sound, Cordova is the primary port taking deliveries of salmon harvested by drift gillnet vessels fishing in the Copper River and Bering River Districts. In Cordova, salmon represents the majority of fish processing activity.[59] For the time period 2006 through 2010, the average amount of salmon (all species combined) delivered to Cordova by drift gillnet vessels fishing in the Copper and Bering River districts was 8,263,532 pounds with an average estimated gross ex-vessel value of $14,616,553.

In addition to being the primary port where deliveries of commercially retained salmon are made, Cordova is also the primary community associated with drift gillnet permit holders operating in the Copper and Bering River Districts. For the time period 2006 through 2010, an average number of 255 drift gillnet permit holders with residence in Cordova were active in the Copper River and Bering River Districts; these permit holders had a combined annual average gross earnings of $9,474,842 from salmon harvests in the Copper and Bering River Districts. Other main Alaska communities of residence for drift gillnet permit holders operating in the Copper and Bering River Districts include Homer, Anchorage, Delta Junction, Seward, and Wasilla. Communities of residence outside of Alaska associated with this activity include Molalla and Woodburn, Oregon and Bellingham, Washington.

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[59] Source: NOAA Technical Memorandum NMFS-AFSC-160: Alaska Fisheries Science Center Community Profiles, 2005. http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/CPU.php.

Table 4-11 Copper River and Bering River District (Prince William Sound) drift gillnet participation and estimated gross earnings from commercially retained salmon (all species) compared to total Prince William Sound estimated gross earnings across all salmon permit types, 1991-2010.

	Copper & Bering River District drift gillnet commercial salmon harvests						Estimated gross earnings by all permit types in Copper & Bering River Districts	Total Prince William Sound gross earnings. all permit types	Copper & Bering District drift gillnet earnings as a pct. total Prince William Sound earnings
Year	Number of salmon	Pounds of salmon	Estimated gross earnings	Avg. estimated earnings per permit	Permit count	Processor facility/platform count			
1991	1,778,509	12,923,658	$15,145,358	$29,581	512	13	$15,145,358	$31,057,780	48.8%
1992	1,455,209	10,778,143	$19,341,570	$36,911	524	16	$19,341,570	$33,624,331	57.5%
1993	1,882,029	12,147,008	$14,175,312	$27,904	508	15	$14,175,312	$21,472,754	66.0%
1994	2,195,195	17,434,145	$17,392,763	$34,647	502	20	$17,392,763	$36,336,665	47.9%
1995	2,259,993	17,420,529	$20,047,166	$39,078	513	17	$20,047,166	$30,811,783	65.1%
1996	2,768,848	19,467,017	$23,983,704	$47,492	505	16	$23,983,704	$34,753,427	69.0%
1997	3,046,081	20,041,255	$20,487,422	$39,704	516	16	$20,487,422	$39,033,229	52.5%
1998	1,565,402	10,779,783	$16,949,209	$32,784	517	21	$16,949,209	$31,684,588	53.5%
1999	1,937,060	12,878,964	$24,549,950	$47,485	517	17	$24,549,950	$44,488,747	55.2%
2000	1,289,317	9,850,272	$12,255,366	$23,613	519	19	$12,255,366	$39,343,459	31.1%
2001	1,634,991	11,379,181	$13,376,795	$26,594	503	18	$13,376,795	$35,346,318	37.8%
2002	1,935,522	14,855,360	$14,003,258	$27,674	506	23	$14,003,258	$27,927,071	50.1%
2003	1,700,438	12,092,088	$14,034,675	$27,847	504	27	$14,034,675	$38,299,719	36.6%
2004	1,671,424	12,236,749	$17,262,938	$34,320	503	32	$17,262,938	$28,812,167	59.9%
2005	1,798,367	11,583,504	$19,674,228	$39,746	495	36	$19,674,228	$44,005,518	44.7%
2006	1,987,275	12,961,922	$21,119,606	$43,278	488	36	$21,119,606	$39,766,280	53.1%
2007	2,174,292	13,992,868	$24,052,776	$48,888	492	34	$24,052,776	$72,229,932	33.3%
2008	579,050	4,582,348	$10,491,684	$21,325	492	26	$10,491,684	$86,585,034	12.1%
2009	1,188,942	8,025,359	$14,949,177	$30,760	486	29	$14,949,177	$44,550,052	33.6%
2010	973,936	6,788,126	$11,751,649	$23,741	495	23	$11,751,649	$134,056,579	8.8%

Note: Only commercially retained salmon harvest is included. Earnings estimates and average earnings estimates are based on CFEC gross earnings data. Copper and Bering District drift gillnet harvest reflects harvest recorded in Copper and Bering District ADF&G salmon statistical areas by vessels fishing with Prince William Sound salmon drift gillnet (S03E) permits. Total Prince William Sound harvest is associated with the following permit types: Prince William Sound salmon purse seine (S01E), Prince William Sound salmon drift gillnet (S03E), Prince William Sound salmon set gillnet (S04E), Prince William Sound salmon special harvest area (S77E), a hatchery permit.

4.5.4 Impacts of EEZ Harvests in the South Alaska Peninsula

Table 4-12 and Table 4-13 highlight earnings from salmon commercially harvested by purse seine and drift gillnet gear in the Unimak and Southwestern Districts of the South Alaska Peninsula. In 2010, the estimated gross earnings from salmon (all species) harvested by purse seine gear in the Unimak and Southwestern Districts was $1.5 million, which represents approximately seven percent of the total gross earnings by all commercial salmon fisheries throughout the entire Alaska Peninsula. In 2010, the estimated gross earnings from salmon (all species) harvested by drift gillnet gear in the Unimak and Southwestern Districts was $1.6 million, which represents approximately seven percent of the total gross earnings by all commercial salmon fisheries throughout the entire Alaska Peninsula. Between 1991 and 2010, earnings from salmon commercially harvested by purse seine gear in the Unimak and Southwestern Districts represented at the maximum (1992) 20 percent of the total all-gear earnings and at the minimum (2006) six percent of the total all-gear earnings. Between 1991 and 2010, earnings from salmon commercially harvested by drift gillnet gear in the Unimak and Southwestern Districts represented at the maximum (1998) 22.6 percent of the total all-gear gross earnings and at the minimum (2005) 36 percent of the total all-gear gross earnings.

It is anecdotally estimated by participants in both the drift gillnet and purse seine fisheries that no more than 25 percent of the total Unimak June fishery salmon harvest is coming from waters of the EEZ outside of the three nautical mile boundary. In practice, both gear groups utilize water features (i.e., tidal rips and capes) that help to naturally concentrate the salmon for harvest. These types of water features are not often found outside of three nautical miles; therefore, fishing within the EEZ generally only takes place when fishing within State waters is poor.

Due to the substantial amount of custom processing activity that takes place in the Alaska Peninsula area, and to issues of confidentiality, it is difficult to precisely discern where a portion of the salmon harvest from purse seine and drift gillnet vessels fishing in the Unimak and Southwestern Districts is processed. However, for the time period 2006 through 2010, the majority of commercially retained salmon harvested by drift gillnet vessels in these two districts was delivered to King Cove. Other ports taking deliveries of salmon in the Alaska Peninsula area include False Pass, Port Moller, Sand Point, and Dillingham.

In addition to being the primary port where deliveries of commercially retained salmon are made, King Cove is also the primary community of residence for purse seine and drift gillnet permit holders operating in the Unimak and Southwestern Districts. For the time period 2006 through 2010, an average of 26 King Cove purse seine and drift gillnet permit holders were active in the Unimak and Southwestern Districts with a combined annual average gross earnings of $2,180,648 from salmon harvests in the Unimak and Southwestern Districts. Other main Alaska communities of residence for purse seine and drift gillnet permit holders operating in the Unimak and Southwestern Districts include Homer, False Pass, Sand Point, and Anchorage. Communities of residence outside of Alaska associated with this activity include Anacortes, Everett, and Seattle, Washington.

Table 4-12 Unimak and Southwestern Districts (South Alaska Peninsula) purse seine participation and estimated gross earnings from commercially retained salmon (all species) compared to total Alaska Peninsula estimated gross earnings across all permit types, 1991-2010.

	Unimak & Southwestern District purse seine salmon harvests						Estimated gross earnings by all permit types in Unimak & Southwestern Districts	Total Alaska Peninsula earnings, all permit types	Unimak & SW District purse seine earnings as pct. of total Alaska Peninsula earnings
Year	Number of salmon	Pounds of salmon	Estimated gross earnings	Avg. estimated earnings per permit	Permit count	Processor facility/platform count			
1991	4,211,352	16,740,652	$5,217,686	$49,223	106	7	$9,150,326	$32,113,937	16.2%
1992	6,416,857	25,497,491	$13,811,117	$121,150	114	8	$22,606,541	$69,517,023	19.9%
1993	4,254,424	18,605,698	$8,004,136	$87,001	92	11	$13,099,155	$41,588,951	19.2%
1994	6,743,035	26,733,234	$6,839,019	$62,743	109	7	$10,287,171	$38,183,493	17.9%
1995	6,034,657	24,812,476	$7,429,760	$86,393	86	5	$13,167,938	$50,300,143	14.8%
1996	*	*	*	*	67	3	*	*	*
1997	*	*	*	*	53	2	*	*	*
1998	2,112,404	8,653,634	$2,103,164	$45,721	46	4	$9,381,243	$28,026,200	7.5%
1999	2,053,479	8,027,331	$3,271,899	$57,402	57	5	$9,510,245	$34,268,128	9.5%
2000	1,522,632	6,663,461	$1,502,274	$22,092	68	4	$6,299,218	$24,356,416	6.2%
2001	*	*	*	*	31	2	*	*	*
2002	1,034,035	5,153,319	$794,059	$36,094	22	4	$1,973,989	$8,578,685	9.3%
2003	*	*	*	*	22	2	*	*	*
2004	*	*	*	*	19	3	*	*	*
2005	*	*	*	*	17	2	*	*	*
2006	1,116,936	5,382,553	$1,262,154	$84,144	15	4	$2,796,661	$20,821,192	6.1%
2007	*	*	*	*	20	2	*	*	*
2008	4,727,433	17,020,908	$5,998,007	$230,693	26	4	$10,340,219	$36,695,744	16.3%
2009	3,534,582	14,303,586	$4,145,752	$159,452	26	4	$6,556,228	$31,683,464	13.1%
2010	585,830	2,742,749	$1,580,708	$49,397	32	5	$3,523,197	$22,412,768	7.1%

*Note: Only commercially retained salmon harvest is included. Earnings estimates and average earnings estimates are based on CFEC gross earnings data. An * denotes confidential data. Unimak and Southwestern District purse seine harvest reflects harvest recorded in Unimak and Southwestern District ADF&G salmon statistical areas by vessels fishing with Alaska Peninsula salmon purse seine (S01M) permits. Total purse seine harvest is associated with CFEC permit type S01M. Total Alaska Peninsula harvest is associated with the following CFEC permit types: Alaska Peninsula salmon purse seine (S01M), Alaska Peninsula salmon drift gillnet (S03M), Alaska Peninsula salmon set gillnet (S04M), Bristol Bay salmon drift gillnet (S03T), and Bristol Bay salmon set gillnet (S04T). However, over this time period, no S03T or S04T harvest is found in Ilnik Lagoon.*

Table 4-13 Unimak and Southwestern Districts (South Alaska Peninsula) drift gillnet participation and estimated gross earnings from commercially retained salmon (all species) compared to total Alaska Peninsula estimated gross earnings across all permit types, 1991-2010.

	Unimak & Southwestern District drift gillnet salmon harvests						Estimated gross earnings by all permit types in Unimak & Southwestern Districts	Total Alaska Peninsula earnings, all permit types	Unimak & SW District drift gillnet earnings as % of total Alaska Peninsula earnings
Year	Number of salmon	Pounds of salmon	Estimated gross earnings	Avg. estimated earnings per permit	Permit count	Processor facility/platform count			
1991	923,236	5,272,134	$3,411,149	$21,727	157	11	$9,150,326	$32,113,937	10.6%
1992	1,119,084	6,273,389	$7,267,218	$51,178	142	15	$22,606,541	$69,517,023	10.5%
1993	1,106,134	6,257,697	$4,480,417	$31,114	144	12	$13,099,155	$41,588,951	10.8%
1994	683,335	3,670,082	$2,600,874	$17,937	145	11	$10,287,171	$38,183,493	6.8%
1995	1,089,603	5,928,111	$4,936,510	$32,692	151	11	$13,167,938	$50,300,143	9.8%
1996	595,442	3,625,896	$2,444,731	$16,631	147	5	$3,554,770	$20,315,724	12.0%
1997	1,106,097	6,168,959	$4,988,546	$35,131	142	9	$7,395,614	$26,306,032	19.0%
1998	1,327,771	7,231,217	$6,333,897	$43,645	145	6	$9,381,243	$28,026,200	22.6%
1999	1,047,436	5,542,132	$5,345,229	$34,936	153	6	$9,510,245	$34,268,128	15.6%
2000	944,149	5,680,456	$4,119,618	$27,648	149	6	$6,299,218	$24,356,416	16.9%
2001	*	*	*	*	99	3	*	*	*
2002	*	*	*	*	86	2	*	*	*
2003	*	*	*	*	84	2	*	*	*
2004	551,730	2,839,003	$1,202,229	$12,655	95	5	$2,654,176	$17,926,031	6.7%
2005	420,117	2,180,099	$921,732	$9,799	94	4	$3,074,270	$25,528,456	3.6%
2006	*	*	*	*	85	3	*	*	*
2007	*	*	*	*	87	2	*	*	*
2008	1,151,792	5,976,960	$3,729,666	$33,792	110	6	$10,340,219	$36,695,744	10.2%
2009	586,689	3,104,006	$1,840,243	$14,331	117	4	$6,556,228	$31,683,464	5.8%
2010	405,810	2,195,079	$1,610,588	$12,921	119	4	$3,523,197	$22,412,768	7.2%

*Note: Only commercially retained salmon harvest is included. Earnings estimates and average earnings estimates are based on CFEC gross earnings data. An * denotes confidential data. Unimak and Southwestern District drift gillnet harvest reflects harvest recorded in Unimak and Southwestern District ADF&G salmon statistical areas by vessels fishing with Alaska Peninsula salmon drift gillnet (S03M) permits. Total purse seine harvest is associated with CFEC permit type S01M. Total Alaska Peninsula harvest is associated with the following CFEC permit types: Alaska Peninsula salmon purse seine (S01M), Alaska Peninsula salmon drift gillnet (S03M), Alaska Peninsula salmon set gillnet (S04M), Bristol Bay salmon drift gillnet (S03T), and Bristol Bay salmon set gillnet (S04T). However, over this time period, no S03T or S04T harvest is found in Ilnik Lagoon.*

4.5.5 Impacts of Sport Fishing in the EEZ

Marine sport fishing is particularly important in Southeast Alaska, where over 80 percent of all angler days are in saltwater. A 2008 report titled "Economic Impacts and Contributions of Sportfishing in Alaska, 2007", coauthored by the ADF&G and Southwick Associates, Inc., estimated more than 85 percent of all trip and package spending in Southeast Alaska was geared towards saltwater fishing trips in 2007. Trip and package spending for saltwater fishing in the Southeast region contributed an estimated $54 million of income, supported 1,897 jobs, and contributed $26 million of tax revenues in 2007. The portion of these impacts attributable specifically to salmon and specifically to EEZ waters of Southeast Alaska is not known. The amount and limited activity by both guided and unguided anglers that can be quantified as operating within the Southeast Alaska EEZ is negligible when compared to the activities conducted in State waters. Although there is some documented effort within federal waters, the precision with which we could estimate the economic impacts to the communities of Sitka, Craig or Klawock where landings likely occur, is poor, relative to what is estimated to accrue from state waters effort.

Similar to the East Area, the documented amount of effort from marine waters within the West Area is minor in comparison to state waters; however it does represent some level of economic impact to communities adjacent to the West Area. The number of vessels harvesting salmon in EEZ waters is approximately one-third of the number of vessels harvesting salmon within state waters over the time series; however, the number of trips made into EEZ waters is much less, at under ten percent over the time series (Table 4-14 and Figure 4-3)

The ports likely benefitting are: Homer, Seward and Anchor Point given the number of trips observed offloading fish in those ports. The marine component of the Economic Impacts and Contributions of Sport Fishing in Alaska, 2007, shows that saltwater anglers contributed over $203.5 million dollars from direct expenditures for trip related and package spending in communities of Southcentral Alaska. This suggests that part of the contributions to communities from those expenditures are associated with fish harvested from federal waters in the West Area and could certainly be upwards of several million dollars annually. However, there is no way to directly measure the monetary contributions for fish harvested in the West Area of the EEZ using the existing information, and to do so would require additional surveys to collect that information.

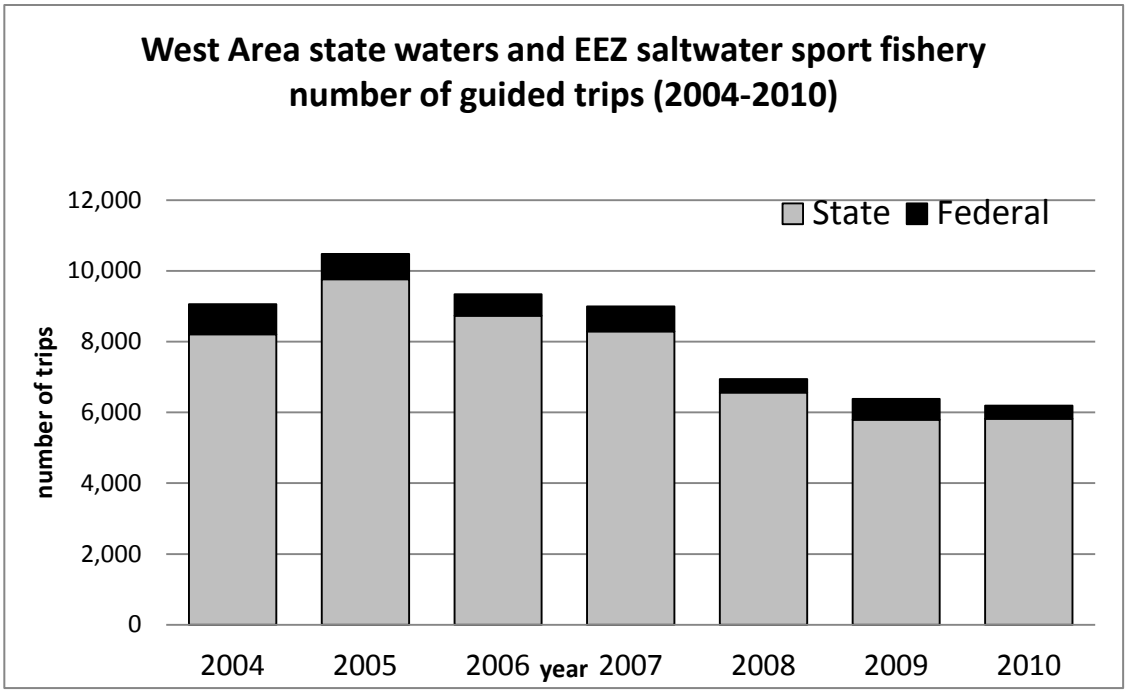

Figure 4-3 Comparison of State waters and EEZ saltwater guided sport fishery salmon trips during 2004-2010. Data source: ADF&G Saltwater Logbooks

Table 4-14 Comparison of State waters and EEZ saltwater sport fishery effort, 2004-2010 (vessels and trips). Data source: ADF&G Saltwater Logbooks.

		West		East	
Species	**Year**	**State**	**Federal**	**State**	**Federal**
Vessels	2004	447	148	-	-
	2005	476	159	-	-
	2006	512	165	-	-
	2007	494	156	-	-
	2008	437	112	-	-
	2009	405	125	-	-
	2010	380	91	609	12
Trips	2004	8,207	849	-	-
	2005	9,759	722	-	-
	2006	8,733	605	-	-
	2007	8,290	703	-	-
	2008	6,558	380	-	-
	2009	5,797	581	-	-
	2010	5,819	370	18,919	25

4.6 Safety

According to the National Institute for Occupational Safety and Health (NIOSH), of the major commercial fisheries[60] in Alaska, salmon fisheries have the lowest annual commercial fishing fatality rate, which accounts for the number of workers and exposure time on the water. From 2000 through 2009, commercial salmon fisheries experienced a rate of 115 fatalities per 100,000 full-time equivalent workers. During 2000 through 2010, 40 fishermen died while fishing for salmon; these deaths included 17 falls overboard, 14 lives lost after a vessel disaster (i.e., vessel sinking, skiff swamping), 5 on board injuries, and 4 fatalities that occurred on shore. These fatalities occurred on vessels using the following gear type: drift gillnet (18 fatalities), set gillnet (10 fatalities), troll gear (5 fatalities), purse seine (2 fatalities), and no fishing gear attributed (4 fatalities). By location, Southwest Alaska had the highest number of fatalities with 18 deaths over the 2000 through 2010 time period; Southcentral and Southeast Alaska had an equal number of fatalities with 11 each.

From the information gathered and reported by NIOSH, it is impossible to delineate whether the fatalities discussed above occurred within State waters in the EEZ. However, it is important to note that the only salmon gear groups operating in the EEZ are the drift gillnet and purse seine (Alaska Peninsula only) salmon fisheries in the West Area, and the troll fisheries in the East Area. As such, the fatality numbers recorded above likely inflate the actual number of deaths that have occurred in the EEZ.

Through its public process, the Board addresses specific fishery safety issues as they arise and works to modify its regulations, as necessary, in order to increase safety and minimize risk of injury or death for all fishery participants. ADF&G promotes safety, whenever possible, in its salmon fisheries through management practices, support in the regulation formation process, and through assistance to enforcement agencies. Examples of safety supported through management practices include: daytime openings, when possible, of salmon fisheries by emergency order allowing fishermen to harvest and deliver fish during daylight hours; and delays in opening weekly fishing periods when severe weather is forecast, and extending fishing time after severe weather thereby encouraging fishermen to seek shelter and still be able to fish when the weather moderates. An example of safety supported through regulation formation includes salmon nets that are limited in length and size, which moderates harvest levels to manageable quantities that fishermen are able to handle more safely. Additionally, ADF&G promotes safety through direct assistance to enforcement agencies. ADF&G provides information on harvest patterns, fishing effort and lists of registered vessels to the Alaska Wildlife Troopers, NMFS, and the United States Coast Guard. This allows these enforcement agencies to focus efforts in areas where the fishing fleets are concentrated, thus providing on-scene presence of enforcement personnel, vessels, and aircraft, which provides expedited reaction times when accidents occur.

[60] The commercial fisheries included in the NIOSH study were: Bering Sea-Aleutian Islands Freezer Trawl, Bering Sea Crab, Alaska Halibut, and Alaska Salmon. More information can be found at: www.cdc.gov/niosh/docs/2011-103/.

5 Environmental Assessment

This environmental assessment (EA) analyzes the impacts of the proposed action to revise the Salmon FMP and the alternative management approaches considered.

The environmental impacts of the *Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska* (FMP) were first analyzed in an Environmental Impact Statement (NPFMC 1978). The EIS analyzed the impacts of alternatives to allow an unrestricted fishery, greatly restrict the fishery, or hold the fishery at its present level. The 1978 FMP maintained the fisheries in the EEZ at their then present level (i.e., no change in fishing with the introduction of the federal FMP). The EIS concluded –

> A primary objective of the action is to prevent overfishing and conserve the resource, the overall impact of the fishery management plan on the environment will generally be beneficial. Monitoring the plan will allow adjustments in applying the management concepts outlines in the plan. These concepts are designed to help minimize fluctuations in fish stock numbers due to catch efforts and to integrate management of ocean salmon with those of other salmon fisheries. This will exert a stabilizing influence in the ecosystem by preventing biological depletion of fish populations.

The environmental impacts of the 1990 version of the FMP were first analyzed in an EA (NPFMC 1990b). The EA concluded –

> The EA shows that implementing the proposed amendment will have no significant impacts of the human environment. The proposed changes are primarily of style and structure of the fishery management plan, rather than with the way the fisheries are actually managed. The parts of the draft amendment that deal with management of the fisheries (e.g. deferring regulatory authority to the State of Alaska, for vessels registered under Alaska law) will, by themselves, have little, if any effect of the human environment.

In 1997, NMFS and the Alaska Department of Fish and Game (ADF&G) prepared an EA for the salmon fisheries in the EEZ and State waters off Alaska that evaluated the deferral of regulation and management to the State (NMFS 1997). The EA concluded that the impacts on the target species by the current salmon fishery in southeast Alaska, due to a fishery policy of optimal sustainable yield, are such that produce optimum production of the stocks and healthy escapement levels. Moreover, management over the past several decades (since Statehood) has resulted in healthy salmon stocks for all species.

In 2003, NMFS prepared the *Final Programmatic Environmental Impact Statement for the Pacific Salmon Fisheries Management off the Coasts of Southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin* (FPEIS, NMFS 2003). The primary federal action considered in the FPEIS for the Southeast Alaska salmon fishery was the annual decision regarding continued deferral of management to the State and the issuance of an incidental take statement through the Endangered Species Act Section 7 consultation process. The FPEIS details the short-term, long-term, and cumulative effects of the federal action on salmon fisheries and harvests, ESA-listed salmon, non-salmon fish species, ESA-listed and unlisted marine mammals, ESA-listed and unlisted seabirds. The FPEIS also evaluates effects

on the human environment, including angler benefits (i.e., net willingness to pay for ocean salmon fishing), net income (profit) to businesses that are directly affected by angler activity, net income to commercial fishers, and social effects on the coastal and riverine communities of commercial and sport fisheries affected by the federal action.

This EA evaluates the need to prepare a Supplemental EIS (SEIS) for the proposed action. An SEIS should be prepared if –

- the agency makes substantial changes in the proposed action that are relevant to environmental concerns, or
- significant new circumstances or information exist relevant to environmental concerns and bearing on the proposed action or its impacts (40 CFR 1502.9(c)(1)).

Not every change requires an SEIS; only those changes that cause effects which are significantly different from those already studied require supplementary consideration.[61] The Supreme Court explained that "an agency need not supplement an EIS every time new information comes to light after the EIS is finalized. To require otherwise would render agency decision-making intractable."[62] On the other hand, if a subsequent related federal action occurs, and new information indicates that that subsequent action will affect the quality of the human environment in a significant manner or to a significant extent not already considered, an SEIS must be prepared.[63]

The second part of the inquiry to determine whether an SEIS is required involves a two-step process. First, the analysis identifies new information or circumstances. Second, the analysis analyzes whether these are significant to the analysis of the proposed action and relevant to environmental concerns and bearing on the proposed action or its impacts. The following sections provide a comprehensive review of recent information on the interactions of the FMP salmon fisheries with environmental components.

An environmental assessment has not been conducted specifically for the salmon fisheries in the EEZ waters of the three traditional net fishing areas. The best available information on the status of the salmon stocks in these areas, and interactions between these salmon fisheries and ESA-listed Pacific salmon, marine mammals, and seabirds is provided in the following sections. This EA analyzes the impacts of the alternatives on these resource components.

The proposed action concerns the application of federal management in addition to the existing State management for the salmon fisheries that occur in the EEZ. None of the alternatives or options under consideration would change the State's management of the salmon fisheries relative to status quo. Therefore, the proposed action does not substantially change salmon management under the FMP in a way that is relevant to the prosecution of the fisheries. However, Alternatives 3 and 4, which would remove specific EEZ waters from the FMP, could impact salmon abundance and other resources, such as marine mammals, if unregulated fishing occurred in EEZ waters. In addition, removal of these waters

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[61] See *Davis v. Latschar*, 202 F.3d 359, 369 (D.C. Cir. 2000).
[62] See Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 373 (1989).
[63] See *Marsh*, 490 U.S. at 374.

from FMP coverage would also eliminate the requirement for NMFS to conduct ESA § 7 consultations on salmon fishing activities in the EEZ waters. These potential impacts are discussed in this chapter.

5.1 Alaska Salmon Stocks

Salmon fisheries are complex, mixed stock, mixed species, with many divergent users. It is difficult to manage mixed stock fisheries, mixed species, salmon fisheries for MSY on all stocks and all salmon species in circumstances where the composition, abundance and productivity of the salmon stocks and species in those fisheries varies substantially from salmon stock to salmon stock.

Table 5-1 through Table 5-8 provide an overview of salmon stocks in Southeast Alaska, Upper Cook Inlet, Prince William Sound, and the Alaska Peninsula for which escapement goals exist, a numerical description of the goal, type of goal, year the current goal was first implemented, and recent years' escapement data for each stock. In addition, summary statistics documenting performance in achieving goals is presented.

Escapements from 2002 through 2010 were compared against escapement goals in place at the time of enumeration to assess outcomes in achieving goals. Escapements for a particular stock were classified as "below" if escapement for a given year was less than the lower bound of the escapement goal. If escapement fell within the escapement goal range or was greater than a lower-bound goal, escapements were classified as "met". Where escapements exceeded the upper bound of an escapement goal range, they were classified as "above". Escapement goals are exceeded because, in part, the State has tried to manage salmon fisheries maximum harvest of the large most productive salmon stocks, while protecting less abundant salmon stocks and species. Where escapement goals or enumeration methods changed between 2002 and 2010 for a stock, outcomes were assessed by comparing escapement estimates with the goal and methods in place at the time of the fishery.

The majority of escapement goals in Upper Cook Inlet, Prince William Sound, and the Alaska Peninsula are sustainable escapement goal (SEGs), including lower-bound SEGs. Escapement goals for sockeye, Chinook, and chum salmon comprise 75 percent of all escapement goals statewide, with the majority of goals for each species being SEGs. The reverse is true for Southeast Alaska, where the majority of escapement goals are biological escapement goals (BEGs). Optimal escapement goals (OEGs), management targets, and goals based upon international agreements collectively represent a small proportion of escapement goals in Alaska. There are many reasons why escapement goal types differ between regions including fishery structure, stock assessment capacity, and technical approaches.

Between 2002 and 2006, it was typical to observe greater than 80 percent success in achieving or exceeding escapement goals for Southeast Alaska, Upper Cook Inlet, Prince William Sound, and the Alaska Peninsula. In recent years, the proportion of escapements falling below the lower bound of goals has increased in each of these regions. Statewide, the percentage of escapement goals within the goal range (or above the lower bound if a lower-bound SEG) has been between 35 percent and 58 percent since 2002.

The State does not have the necessary resources to monitor all the salmon runs in Upper Cook Inlet, Prince William Sound, or the Alaska Peninsula. Therefore, the State does not have the information

necessary to set escapement goals for many of the salmon runs. However, the State (in conjunction with users) has identified the most important species and runs, and has tried to monitor those salmon runs. Even though the State doesn't monitor some of the smaller stocks of sockeye, Chinook, and pink, chum, and coho stocks; the State does have other information (catch and test fish indices) to indirectly monitor the abundance on some of these species. In the absence of specific stock information, the State has managed these stocks conservatively following the precautionary principle and based on the information it collects from indicator stocks (stocks that can be assessed) and the performance of salmon fisheries.

5.1.1 Salmon Stocks of Concern and Actions to Address Concerns

There are currently 289 established and monitored salmon stock escapement goals in Alaska, which provide benchmarks for assessing stock performance (Munro and Volk, 2011). Where escapements are chronically below established goal ranges or thresholds, a stock of concern designation may be recommended to the Board by ADF&G at one of three levels of increasing concern; yield, management, and conservation. Stocks of concern and the conditions which may trigger their adoption by the Board are narrowly defined in the Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222). Three categories of concern exist:

- yield concern – stocks that fail to produce expected yields;
- management concern – stocks that fail to meet established escapement goals; or
- conservation concern – stocks in danger of not being able to rebuild.

Stocks are designated as concerns if the stock fails to meet the escapement goal over a period of 4 to 5 years despite appropriate management taken to address the concern.

When stocks of concern are identified, ADF&G staff members work with the board and public to develop action plans, management plans, and research plans to help achieve stock re-building goals. Action plans for management may involve time and area restrictions for commercial fisheries judged to have significant impacts on the stock of concern as well as sport fish restrictions including bag limit changes, use of bait, or closures of the fisheries. Subsistence fishing restrictions may also be considered in action plans.

Action plans responding to stocks of concern designations vary widely. If warranted, commercial fisheries are generally restricted by time, area and gear according to our best understanding of impacts on the stocks of concern. Stocks of concern in the management areas that include FMP waters are as follows:

- Chuitna, Theodore, and Lewis rivers – Chinook stocks of management concern, designation adopted 2010/11
- Alexander Creek – Chinook stock of management concern, designation adopted 2010/11
- Willow and Goose creeks – Chinook stocks of yield concern, designation adopted 2010/11
- McDonald Lake – sockeye stock of management concern, designation adopted 2008/09
- Susitna (Yentna) River – sockeye stock of yield concern, designation adopted 2008/09

Action plans have been adopted for each stock of concern. As an example, for Westside Cook Inlet Chinook salmon from Theodore, Chuitna, and Lewis Rivers, the board adopted action plan called for closures of the Westside set gillnet Chinook salmon fishery in specific areas until June 25, which will likely reduce commercial harvest on these stocks of management concern. The action plan for Susitna sockeye salmon requires the Northern District set gillnet fishery to fish with no more than one net per permit from July 20 through August 6 to reduce harvest on these stocks. Similarly, in Southeast Alaska, time restrictions to purse seine and drift gillnet fisheries in districts 1,2,5,6, and 7 were implemented during a four-week time span when historical coded wire tag and genetics data suggest that MacDonald Lake sockeye are most abundant in these fisheries. Recent escapements suggest that these measures have been effective in conserving MacDonald Lake sockeye, despite the loss of substantial catches of commingled healthy stocks of chum, pink, and sockeye to the fleet. Restrictions to sport fisheries are generally a part of action plans addressing Chinook salmon. A recent action plan calls for sport fish closures on Chinook stocks of management concern in the Theodore, Chuitna and Lewis Rivers. Fishing time restrictions and reductions in bag and possession limits were also instituted to conserve Goose and Willow Creek stocks of yield concern. Fishing for any fish species is closed within a one-half mile radius of the mouth of Alexander Creek from May 1 – July 13.

In addition to measures affecting commercial and sport fishery management, stock of concern action plans also identify key research objectives designed to provide information necessary to make informed decisions. For MacDonald Lake sockeye, in addition to on-going efforts to monitor adult escapements and juvenile abundance in the lake, new initiatives to estimate proportions of supplemented hatchery fish in escapements and harvests have been instituted as part of the comprehensive stock assessment program. For Westside Cook Inlet Chinook stocks of management concern in the Lewis, Chuitna and Theodore Rivers, the department will continue to build appropriate genetic baselines in Cook Inlet which will assist in specifically identifying these stocks in mixed fisheries. Should sufficient discriminatory power exist, sampling of marine Chinook salmon harvests may be instituted. The improved baseline and marine sampling is also part of the Goose and Willow Creek action plan. Aerial survey programs will continue monitoring escapements for these stocks, and installation of weirs for the next three years on the Theodore and Lewis Rivers will help to improve assessment of escapements and provide a platform for collection of reliable age, sex and size information. Continued monitoring of salmon escapements against established stock goals allows ADF&G, the Board and the public to gauge success of these actions and modify action plans accordingly.

5.1.2 Over-escapement

Over-escapement means that the number of spawning salmon exceeds the upper bound of the escapement goal range established for any particular system. Over-escapement is a common occurrence in areas with salmon fisheries in the EEZ, as shown in Table 5-2, Table 5-4, Table 5-6, and Table 5-8. Over-escapement usually results from (1) a lack of fishing effort, (2) unexpectedly large salmon runs, or (3) management or economic constraints on the fishery. Management constraints result, in part, from State management of salmon fisheries for maximum harvest of the largest, most productive salmon stocks, while protecting less abundant salmon stocks and species. Mixed stock salmon fisheries with multiple species are complex and exploited by divergent users. It is not possible to manage mixed salmon fisheries

for MSY on all stocks and species in circumstances where the composition, abundance, and productivity of stocks and species in those fisheries varies substantially.

ADF&G prepared a comprehensive review of the biological and fishery-related aspects of over-escapement in Alaska sockeye salmon stocks (Clark et al. 2007). This report is incorporated by reference and the following provides a brief summary.

The topic of over-escapement in Pacific salmon stocks is controversial and complex, especially in regards to the management of Alaskan sockeye salmon. The controversy has many facets, but three major issues are (1) the definition of over-escapement, (2) the effects of over-escapement on the stock, and (3) the effects of over-escapement on the fishery. The report attempts to clarify these major issues from ADF&G's perspective and based on experience and the best available scientific information.

Understanding how over-escapement affects short- and long-term yields is dependent on knowledge of salmon production, carrying capacity, and the amount of fishing effort. The general theory is that salmon stock size is limited by habitat carrying capacity and that too many salmon returning can cause lower future production due to overcrowding and competition.

Over-escapement occurred at least once in the recent 15-year period for 37 of the 40 sockeye salmon stocks examined in the ADF&G study. The short-term cost of over-escapement is the harvest foregone as a consequence of escapement exceeding the escapement goal. Foregone harvest (expressed as average percent of the run over the recent 15 year period) due to over-escapement occurred for 37 of the 40 stocks examined. In general, the foregone harvest was small (< 5% of the run). For seven stocks the average foregone harvest averaged greater than 20 percent and for 18 stocks averaged greater than 10 percent of the run. The stock which exhibited largest foregone harvests were not heavily exploited, had limited fishing power, and were unable to fully exploit large runs when they occurred.

For most stocks, the long-term biological consequences of over-escapement were a decrease in yields relative to MSY and an increase in the variability of yield. This is consistent with the compensatory nature of salmon production and the limits of the habitat carrying capacity. In general, over-escapement and the associated decreased yield are not long-lasting for highly exploited stocks because future yields will increase as a consequence of lower future escapements and diminished competition.

For some stocks, there was little evidence for decreased yields with over-escapement. The observed exploitation rates for these stocks were higher and at times exceeded the MSY exploitation rate. For these stocks, yields tended to increase with increasing escapement even when over-escapement occurred.

The report recommended several areas of additional research to improve our understanding of the biological consequences of over-escapement. These include improving the methods for (1) determining carrying capacity of sockeye salmon watersheds, (2) defining threshold juvenile salmon densities that cause delayed density-dependent responses in rearing lake ecosystems, and (3) defining threshold population densities needed to evoke an ecological response.

Additionally, ADF&G has on-going work to provide data to better understand system carrying capacity for sockeye smolts. Examples include a program for limnological sampling in a number of Kodiak lake systems which provides information on zooplankton communities and nutrient levels. In the Central

Region, a lot of similar data has been collected related to nutrient enrichment projects. For some of these systems, there are also fry and/or smolt estimates, with age composition data, that allow some important inferences regarding density dependent effects among juveniles in the lake. As the Clark et al. (2007) report points out, there are limnological methods for estimating maximum smolt capacity, but efforts to validate those methods against independent estimates of carrying capacity are scant.

Another thing to consider is that over-escapement is pretty much defined by the escapement goals developed for those systems. On-going improvements in ADF&G's genetic stock identification capabilities help to identify stock-specific harvest better, which improves brood tables, the underpinning of stock recruit relationships used to develop escapement goals. So, while there are currently no specific efforts aimed at unraveling the complex biological and economic effects of over-escapement, on-going work in the study of sockeye rearing lake limnology and its relationship to population density contributes to our understanding of the issue and provides valuable data to the modeling efforts suggested in the Clark et al. (2007) report. Biometric and genetic work aimed at improving brood tables and escapement goals help to better define what over-escapement is.

Table 5-1 Southeast Alaska Chinook, chum, coho, pink, and sockeye salmon escapement goals and escapements, 2001 to 2009.

	2010 Goal Range			Year	Escapement								
System	Lower	Upper	Type	Implemented	2002	2003	2004	2005	2006	2007	2008	2009	2010
CHINOOK SALMON[a]													
Blossom River	250	500	BEG	1997	224	203	333	445	339	135	257	123	180
Keta River	250	500	BEG	1997	411	322	376	497	747	311	363	172	475
Unuk River	1,800	3,800	BEG	2009	6,988	5,546	3,963	4,742	5,645	5,668	3,104	3,157	4,290[b]
Chickamin River	450	900	BEG	1997	1,013	964	798	924	1,330	893	1,086	611	1,023
Andrew Creek	650	1,500	BEG	1998	1,708	1,160	2,991	1,979	2,124	1,736	981	628	1,205
Stikine River	14,000	28,000	BEG	2000	50,875	46,824	48,900	40,501	24,405	14,560	18,352	11,086	15,180[b]
King Salmon River	120	240	BEG	1997	155	119	135	143	150	181	120	109	158
Taku River	19,000	36,000	BEG	2009	55,044	36,435	75,032	38,725	42,296	14,854	27,383	20,762	29,307[b]
Chilkat River	1,750	3,500	BEG	2003	4,051	5,657	3,422	3,366	3,039	1,445	2,905	4,429	1,852[b]
Klukshu (Alsek) River	1,100	2,300	BEG	1998	2,109	1,645	2,451	1,034	568	676	466	1,466	2,159[a]
Situk River	450	1,050	BEG	2003	1,000	2,163	698	595	695	677	413	900	167[c]
CHUM SALMON													
Southern Southeast Summer	68,000		lower-bound SEG	2009	55,000	66,000	74,000	66,000	76,000	132,000	13,000	41,000	47,000
Northern Southeast Inside Summer	149,000		lower-bound SEG	2009	397,000	210,000	242,000	185,000	282,000	149,000	99,000	107,000	77,000
Northern Southeast Outside Summer	19,000		lower-bound SEG	2009	19,000	30,000	86,000	77,000	57,000	34,000	46,000	15,000	24,000
Cholmondeley Sound Fall	30,000	48,000	SEG	2009	39,000	75,000	60,000	15,000	54,000	18,000	49,500	39,000	76,000
Port Camden Fall	2,000	7,000	SEG	2009	450	676	3,300	2,110	2,420	505	1,400	1,711	5,400
Security Bay Fall	5,000	15,000	SEG	2009	6,000	8,700	13,100	2,750	15,000	5,400	11,700	5,100	6,500
Excursion River Fall	4,000	18,000	SEG	2009	4,680	6,300	5,200	1,100	2,203	6,000	8,000	1,400	6,100
Chilkat River Fall	75,000	170,000	SEG	2009	206,000	166,000	310,000	202,000	704,000	331,000	451,000	337,000	91,000
COHO SALMON													
Hugh Smith Lake	500	1,600	BEG	2009	3,291	1,510	840	1,732	891	1,224	1,741	2,281	2,878
Taku River[d]	35,000		MT	1995	219,360	183,038	129,327	135,558	121,778	74,326	95,360[b]	104,321[b]	103,992[b]
Auke Creek	200	500	BEG	1994	1,176	585	416	450	581	352	600	360	417
Montana Creek	400	1,200	SEG	2006	2,448	808	364	351	1,110	324	405	698	630
Peterson Creek	100	250	SEG	2006	195	203	284	139	439	226	660	123	467
Ketchikan Survey Index	4,250	8,500	BEG	2006	12,223	11,859	9,904	14,840	6,912	4,488	16,680	8,226	4,657
Sitka Survey Index	400	800	BEG	2006	1,868	1,101	1,124	1,668	2,647	1,066	1,117	1,156	1,273
Ford Arm Lake	1,300	2,100	BEG	1994	7,109	6,789	3,539	4,257	4,737	2,567	5,173	2,181	1,610
Berners River	4,000	9,200	BEG	1994	27,700	10,110	14,450	5,220	5,470	3,915	6,870	4,230	7,520
Chilkat River	30,000	70,000	BEG	2006	205,429	134,340	67,465	38,589	80,683	25,493	57,376	47,548	87,381
Lost River	2,200		lower-bound SEG	2009	8,093	6,394	5,047	1,241	3,500	2,542	NA	3,581	2,393

System	2010 Goal Range		Type	Year Implemented	Escapement								
	Lower	Upper			2002	2003	2004	2005	2006	2007	2008	2009	2010
Situk River	3,300	9,800	BEG	1994	40,000	6,009	10,284	2,514	8,533	5,763	NA	5,814	11,195
Tsiu/Tsivat Rivers	10,000	29,000	BEG	1994	31,000	35,850	NA	16,600	14,500	14,000	25,200	28,000	11,000
PINK SALMON													
Southern Southeast	3,000,000	8,000,000	BEG	2009	8,850,000	9,780,000	8,260,000	9,400,000	4,330,000	10,590,000	6,290,000	7,200,000	5,900,000
Northern Southeast Inside	2,500,000	6,000,000	BEG	2009	5,470,000	6,680,000	5,210,000	6,680,000	3,960,000	4,740,000	1,470,000	3,650,000	3,200,000
Northern Southeast Outside	750,000	2,500,000	BEG	2009	2,300,000	3,510,000	2,190,000	3,840,000	1,960,000	2,310,000	1,730,000	1,820,000	2,000,000
Situk River (even-year)	42,000	105,000	BEG	1995	98,790		144,938		114,779		1,232[e]		89,301[e]
Situk River (odd-year)	54,000	200,000	BEG	1995		374,533		281,135		229,033		62,787	
SOCKEYE SALMON													
Hugh Smith Lake	8,000	18,000	OEG[c]	2003	5,880	19,568	19,734	23,872	42,112	33,743	3,588	9,483	15,646
	8,000	18,000	BEG	2003									
McDonald Lake	55,000	120,000	SEG	2009	42,102	110,633	28,759	61,043	31,357	29,086	20,700	51,000	72,500
Mainstem Stikine River	20,000	40,000	SEG	1987	26,001	57,972	36,748	34,788	27,603	20,865	16,802	24,575	25,164
Tahltan Lake	18,000	30,000	BEG	1993	17,340	53,533	62,952	43,046	53,455	20,874	10,416	30,323	22,702[g]
Speel Lake	4,000	13,000	BEG	2003	5,016	7,014	7,813	7,549	4,165	3,099	1,763	3,689	5,640
Taku River	71,000	80,000	SEG	1986	103,507	160,366	106,688	120,053	146,151	87,764[b]	70,442[b]	71,200[b]	87,899[b]
Redoubt Lake	7,000	25,000	OEG	2003	23,943	69,893	77,263	65,653	103,953	66,938	10,146	12,851	17,119
	10,000	25,000	BEG	2003									
Chilkat Lake	70,000	150,000	BEG	2009	128,000	113,000	119,000	84,000	73,000	68,000	71,735	150,033	61,906
Chilkoot Lake	38,000	86,000	SEG	2009	58,361	74,459	75,569	51,178	96,203	72,561	32,957	33,545	71,657
East Alsek-Doame River	13,000	26,000	BEG	2003	14,200	36,400	33,300	50,000	29,000	40,100	8,000	12,000	19,500
Klukshu River	7,500	15,000	BEG	2000	23,587	32,120	13,721	3,167	12,890	8,479	2,741	5,509	18,546
Lost River	1,000		lower-bound SEG	2009	1,818	3,057	1,123	1,476	1,018	180	200	NA	1,525

Source: Munro, A. and E. Volk. 2011. Summary of Pacific salmon escapement goals in Alaska with a review of escapements from 2001 to 2009. Alaska Department of Fish and Game, Fishery Manuscript Series No. 11-06, Anchorage.

Note: NA = data not available.

a Goals are for large (>660 mm MEF or fish age 1.3 and older) Chinook salmon, except Alsek River goal, which is germane to fish age 1.2 and older and can include fish <660 mm MEF.

b Preliminary data.

c Incomplete weir count due to in-season problems with weir (e.g.breach of weir).

d For the Taku River coho salmon, the management intent of the U.S. is to ensure a minimum above border run (i.e. in river run) of 38,000 fish as detailed in the Pacific Salmon Treaty. The management threshold for escapement is the inriver run minus the allowed Canadian inriver harvest of 3,000 at runs of less than 50,000.

e Situk River weir was pulled well before peak of pink salmon run so adequate assessment was not possible.

f Hugh Smith Lake OEG includes wild and hatchery fish.

g Escapement count includes fish collected for broodstock.

Table 5-2 **Summary of Southeast Alaska salmon escapements compared against escapement goals for the years 2002 to 2010.**

		2002	2003	2004	2005	2006	2007	2008	2009	2010
Stocks with Escapement Data		35	38	37	38	41	41	38	48	48
Below Lower Goal										
	Number	5	2	2	5	3	11	16	15	5
	Percent	14%	5%	5%	13%	7%	27%	42%	31%	10%
Goal Met										
	Number	13	12	20	20	21	20	15	26	33
	Percent	37%	32%	54%	53%	51%	49%	39%	54%	69%
Above Upper Goal										
	Number	17	24	15	13	17	10	7	7	10
	Percent	49%	63%	41%	34%	41%	24%	18%	15%	21%

Source: Munro, A. and E. Volk. 2011. Summary of Pacific salmon escapement goals in Alaska with a review of escapements from 2001 to 2009. Alaska Department of Fish and Game, Fishery Manuscript Series No. 11-06, Anchorage.

Table 5-3 Upper Cook Inlet Chinook, chum, coho, pink, and sockeye salmon escapement goals and escapements, 2002 to 2010.

	2010 Goal Range			Year	Escapement								
System	Lower	Upper	Type	Implemented	2002	2003	2004	2005	2006	2007	2008	2009	2010
CHINOOK SALMON													
Alexander Creek	2,100	6,000	SEG	2002	1,936	2,012	2,215	2,140	885	480	150	275	177
Campbell Creek	50	700	SEG	2008	744	745	964	1,097	1,052	588	439	554	290
Chuitna River	1,200	2,900	SEG	2002	1,394	2,339	2,938	1,307	1,911	1,180	586	1,040	735
Chulitna River	1,800	5,100	SEG	2002	9,002	NS	2,162	2,838	2,862	5,166	2,514	2,093	1,052
Clear (Chunilna) Creek	950	3,400	SEG	2002	3,496	NS	3,417	1,924	1,520	3,310	1,795	1,205	903
Crooked Creek	650	1,700	SEG	2002	958	2,554	2,196	1,903	1,516	964	881	617	1,088
Deshka River	13,000	28,000	BEG	2002	28,535	39,257	57,934	37,725	31,150	18,714	7,533	11,960	18,594
Goose Creek	250	650	SEG	2002	565	175	417	468	306	105	117	65	76
Kenai River - Early Run	5,300	9,000	OEG	2005	6,185	10,097	11,855	16,387	18,428	12,504	11,732	9,771	7,500[a]
	4,000	9,000	BEG	2005									
Kenai River - Late Run	17,800	35,700	BEG	1999	30,464	23,736	40,198	26,046	24,423	32,618	24,144	17,158	20,000[a]
Lake Creek	2,500	7,100	SEG	2002	4,852	8,153	7,598	6,345	5,300	4,081	2,004	1,394	1,617
Lewis River	250	800	SEG	2002	439	878	1,000	441	341	0[b]	120	111	56
Little Susitna River	900	1,800	SEG	2002	1,660	1,114	1,694	2,095	1,855	1,731	1,297	1,028	589
Little Willow Creek	450	1,800	SEG	2002	1,680	879	2,227	1,784	816	1,103	NC	776	468
Montana Creek	1,100	3,100	SEG	2002	2,357	2,576	2,117	2,600	1,850	1,936	1,357	1,460	755
Peters Creek	1,000	2,600	SEG	2002	2,959	3,998	3,757	1,508	1,114	1,225	NC	1,283	NC
Prairie Creek	3,100	9,200	SEG	2002	7,914	4,095	5,570	3,862	3,570	5,036	3,039	3,500	3,022
Sheep Creek	600	1,200	SEG	2002	854	NS	285	760	580	400	NC	500	NC
Talachulitna River	2,200	5,000	SEG	2002	7,824	9,573	8,352	4,406	6,152	3,871	2,964	2,608	1,499
Theodore River	500	1,700	SEG	2002	934	1,059	491	478	958	486	345	352	202
Willow Creek	1,600	2,800	SEG	2002	2,533	3,855	2,840	2,411	2,193	1,373	1,255	1,133	1,173
CHUM SALMON													
Clearwater Creek	3,800	8,400	SEG	2002	8,864	800	3,900	530	500	5,590	12,960	8,300	13,700
COHO SALMON													
Jim Creek	450	700	SEG	2002	2,473	1,421	4,652	1,464	2,389	725	1,890	1,331	242
Little Susitna River	10,100	17,700	SEG	2002	47,938	10,877	40,199	16,839	NA	17,573	18,485	9,523	9,214
PINK SALMON													
There are no pink salmon stocks with escapement goals in Upper Cook Inlet													
SOCKEYE SALMON													
Crescent River	30,000	70,000	BEG	2005	62,833	122,159	103,201	125,623	92,533	79,406	62,029	NS	86,333
Fish Creek (Knik)	20,000	70,000	SEG	2002	90,483	91,952	22,517	14,215	32,562	27,948	19,339	83,480	126,836
Kasilof River	150,000	300,000	OEG	2002	216,134	347,434	575,721	346,516	366,216	335,943	299,601	295,434	265,513

System	2010 Goal Range			Year	Escapement								
	Lower	Upper	Type	Implemented	2002	2003	2004	2005	2006	2007	2008	2009	2010
	150,000	250,000	BEG	2002									
Kenai River[c]	500,000	1,000,000	OEG	1999	700,707	921,064	1,120,076	1,114,618	1,311,144	595,355	402,264	498,592	732,790
	500,000	800,000	SEG	2005									
Packers Creek	15,000	30,000	SEG	2008	NS	NS	NS	22,000	NS	46,637	25,247	16,473	NS
Russian River - Early Run	14,000	37,000	SEG	2002	85,943	23,650	56,582	52,903	80,524	27,298	30,989	52,178	27,074
Russian River - Late Run	30,000	110,000	SEG	2005	62,115	157,469	110,244	59,473	89,160	53,068	46,638	80,088	38,848
Yentna River[d]	90,000	160,000	SEG	2002	78,591	180,813	71,281	36,921	92,045	79,901	90,180		
Chelatna Lake	20,000	65,000	SEG	2009					18,433	41,290	73,469	17,721	37,784
Judd Lake	25,000	55,000	SEG	2009					40,633	58,134	54,304	44,616	18,361
Larson Lake	15,000	50,000	SEG	2009				9,751	57,411	47,736	35,040	40,933	20,324

Source: Munro, A. and E. Volk. 2011. Summary of Pacific salmon escapement goals in Alaska with a review of escapements from 2001 to 2009. Alaska Department of Fish and Game, Fishery Manuscript Series No. 11-06, Anchorage.

Note: NA = data not available; NC = no count; NS = no survey.

a Preliminary escapement estimates.

b Lewis River diverged into swamp 1/2 mi. below bridge. No water in channel.

c Use the best estimate of sport harvest upstream of sonar.

d Yentna River sockeye salmon escapement goal was replaced by SEGs on Chelatna, Judd and Larson lakes in early 2009.

Table 5-4 **Summary of Upper Cook Inlet salmon escapements compared against escapement goals for the years 2002 to 2010.**

		2002	2003	2004	2005	2006	2007	2008	2009	2010
Stocks with Escapement Data		31	28	31	30	29	30	29	33	31
Below Lower Goal										
	Number	3	3	3	4	3	8	11	14	16
	Percent	10%	11%	10%	13%	10%	27%	38%	42%	52%
Goal Met										
	Number	16	11	10	17	17	17	14	15	12
	Percent	52%	39%	32%	57%	59%	57%	48%	45%	39%
Above Upper Goal										
	Number	12	14	18	9	9	5	4	4	3
	Percent	32%	50%	58%	30%	31%	16%	14%	12%	9%

Source: Munro, A. and E. Volk. 2011. Summary of Pacific salmon escapement goals in Alaska with a review of escapements from 2001 to 2009. Alaska Department of Fish and Game Fishery Manuscript Series No. 11-06, Anchorage.

Table 5-5 Prince William Sound/Copper River Chinook, chum, coho, pink, and sockeye salmon escapement goals and escapements, 2002 to 2010.

	2009 Goal Range			Year	Escapement								
System	Lower	Upper	Type	Implemented	2001	2002	2003	2004	2005	2006	2007	2008	2009
CHINOOK SALMON													
Copper River	24,000		lower-bound SEG	2003	21,502	34,034	30,628	21,528	58,454	34,565	32,487	27,787	17,207[a]
CHUM SALMON[b]													
Eastern District	50,000		lower-bound SEG	2006	94,046	198,921	108,833	113,135	109,403	123,814	74,740	55,219	91,514
Northern District	20,000		lower-bound SEG	2006	30,531	44,272	42,456	30,657	52,039	49,669	38,791	37,358	38,207
Coghill District	8,000		lower-bound SEG	2006	7,430	19,729	9,685	11,979	15,900	14,052	39,660	36,724	51,589
Northwestern District	5,000		lower-bound SEG	2006	16,194	12,736	10,371	12,696	25,860	10,778	28,051	34,290	30,074
Southeastern District	8,000		lower-bound SEG	2006	104,906	116,131	42,344	25,547	26,739	60,464	21,614	16,453	85,138
COHO SALMON													
Copper River Delta	32,000	67,000	SEG	2003	89,815	72,180	99,980	101,082	89,270	53,820	76,892	41,294	41,077
Bering River	13,000	33,000	SEG	2003	34,200	32,475	30,185	44,542	33,192	33,062	28,932	22,141	21,311
PINK SALMON													
All Districts Combined (even year)	1,250,000	2,750,000	SEG	2003	943,177		1,996,223		1,187,595		862,419		1,916,910
All Districts Combined (odd year)[c]	1,250,000	2,750,000	SEG	2003		2,857,289		4,669,168		1,509,133		1,828,801	
SOCKEYE SALMON													
Upper Copper River	300,000	500,000	SEG	2003	572,610	461,050	438,482	541,247	605,874	638,029	496,451	477,905	504,549[d]
Copper River Delta	55,000	130,000	SEG	2003	75,735	73,150	69,385	58,406	98,896	88,285	67,950	69,292	82,835
Bering River	20,000	35,000	SEG	2003	24,715	32,840	25,135	30,890	14,671	21,471	18,396	17,022	4,367
Coghill Lake	20,000	40,000	SEG	2006	28,323	75,427	30,569	30,313	24,157	70,001	29,298	19,293	24,312[e]
Eshamy Lake	13,000	28,000	BEG	2009	40,478	39,845	13,443	23,523	41,823	16,646	18,495	24,025	16,291

Source: Munro, A. and E. Volk. 2011. Summary of Pacific salmon escapement goals in Alaska with a review of escapements from 2002 to 2010. Alaska Department of Fish and Game, Fishery Manuscript Series No. 11-06, Anchorage.

Note: NA = data not available; NC = no count; NS = no survey.

a The 2010 Copper River Chinook salmon spawning escapement estimate is preliminary. The estimate is generated from a mark-recapture project run by the Native Village of Eyak and LGL Consulting. The spawning escapement estimate is generated by subtracting the upper Copper River state and federal subsistence, state personal use, and sport fishery harvest estimates from the mark-recapture estimate of the inriver abundance. The estimates for the federal and state subsistence and the state personal use fishery harvests are generally not available for ~6 months after the fishery is closed. Additionally, the sport fishery harvest estimate is based on the mail-out survey and is generally available ~12 months after the fishery ends.

b No estimates for chum salmon escapements are included for the Unakwik, Eshamy, Southwestern, or Montague districts because there are no escapement goals for those districts.

c The estimates for pink salmon (odd year) do not include Unakwik District escapements, due to absence of an escapement goal and an average escapement estimate of a few thousand fish.

d The 2010 Upper Copper River sockeye salmon spawning escapement estimate is preliminary pending estimates of sport fishery harvests and final mark-recapture estimate of Upper Copper River Chinook salmon.

e The Coghill River weir was removed on 26 July 2010, so this provides a minimum estimate.

Table 5-6 **Summary of Prince William Sound/Copper River salmon escapements compared against escapement goals for the years 2002 to 2010.**

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Stocks with Escapement Data	13	14	14	14	14	14	14	14	14
Below Lower Goal									
Number	4	0	1	1	2	1	3	2	2
Percent	31%	~	7%	7%	14%	7%	21%	14%	14%
Goal Met									
Number	4	9	11	8	8	10	10	12	11
Percent	31%	64%	79%	57%	57%	71%	71%	86%	79%
Above Upper Goal									
Number	5	5	2	5	4	3	1	0	1
Percent	38%	36%	14%	36%	29%	21%	7%	~	7%

Source: Munro, A. and E. Volk. 2011. Summary of Pacific salmon escapement goals in Alaska with a review of escapements from 2001 to 2009. Alaska Department of Fish and Game, Fishery Manuscript Series No. 11-06, Anchorage.

Table 5-7 Alaska Peninsula Chinook, chum, coho, pink and sockeye salmon escapement goals and escapements, 2002 to 2010.

	2010 Goal Range			Year	Escapement								
System	Lower	Upper	Type	Implemented	2002	2003	2004	2005	2006	2007	2008	2009	2010
CHINOOK SALMON													
Nelson River	2,400	4,400	BEG	2004	6,750	5,154	6,959	4,993	2,516	2,492	5,012	2,048	2,769
CHUM SALMON													
Northern District	119,600	239,200	SEG	2007	262,800	214,660	139,350	103,675	382,583	243,334	228,537	154,131	145,310
Northwestern District	100,000	215,000	SEG	2007	417,100	236,000	295,600	192,965	193,460	335,450	241,750	84,460	144,100
Southeastern District[a]	106,400	212,800	SEG	1992	204,150	218,810	367,200	412,500	405,300	201,451	277,450	106,500	62,612
South Central District	89,800	179,600	SEG	1992	129,400	79,000	184,800	235,700	119,600	126,000	140,450	18,600	5,300
Southwestern District	133,400	266,800	SEG	1992	268,000	193,030	180,000	317,910	231,935	398,010	171,250	385,730	142,650
Unimak District	800		lower-bound SEG	2007	1,200	200	400	4,200	7,915	1,200	2,800	1,400	1,050
COHO SALMON													
Nelson River	18,000		lower-bound SEG	2004	38,000	28,000	52,500	24,000	19,000	19,000	24,000	22,000	15,000
Thin Point Lake	3,000		lower-bound SEG	2004	18,000	25,000	9,600	17,500	9,750	9,000	3,200	900	NA[b]
Ilnik River	9,000		lower-bound SEG	2010	45,000	37,000	40,000	NA	27,000	19,000	22,000	NA	19,600
PINK SALMON													
Bechevin Bay Section (odd year)	1,600		lower-bound SEG	2004		800		8,720		16,800		72,000	
Bechevin Bay Section (even year)	31,000		lower-bound SEG	2004	10,700		84,300		116,075		11,900		13,600
South Peninsula Total (odd year)	1,637,800	3,275,700	SEG	2007		5,511,220		6,165,634		2,680,213		3,067,000	
South Peninsula Total (even year)	1,684,600	3,729,300	SEG	2007	3,762,800		8,311,410		2,862,250		3,338,370		742,912
SOCKEYE SALMON													
Cinder River	12,000	48,000	SEG	2007	11,500	88,700	55,050	96,000	52,100	123,000	96,800	102,600	90,900
Ilnik River	40,000	60,000	SEG	1991	43,000	69,000	82,000	154,000	88,000	93,000	44,300	66,000	59,000
Meshik River	25,000	100,000	SEG	2010	47,250	94,000	82,200	96,100	114,010	45,500	61,250	63,500	46,200

	2010 Goal Range			Year	Escapement								
System	Lower	Upper	Type	Implemented	2002	2003	2004	2005	2006	2007	2008	2009	2010
Sandy River	34,000	74,000	SEG	2007	49,000	66,000	32,000	101,000	48,000	44,700	32,200	36,000	37,000
Bear River Early Run	176,000	293,000	SEG	2004	178,480	226,201	354,565	332,248	262,995	206,233	125,526	216,237	226,534
Bear River Late Run	117,000	195,000	SEG	2004	96,520	139,799	80,435	221,752	182,005	224,767	195,474	133,263	142,966
Nelson River	97,000	219,000	BEG	2004	315,689	343,511	480,097	303,000	215,000	180,000	141,600	157,000	108,000
Christianson Lagoon	25,000	50,000	SEG	1980s	42,700	52,200	75,400	54,500	41,505	48,100	114,000	48,100	27,900
Swanson Lagoon	6,000	16,000	SEG	2007	10,000	16,100	24,300	2,400	376	9,200	5,500	1,000	1,700
North Creek	4,400	8,800	SEG	late 1980s	10,100	10,200	15,000	45,000	7,530	16,800	38,000	8,000	18,500
Orzinski Lake	15,000	20,000	SEG	1992	42,849	70,690	75,450	44,797	18,000	10,643	36,839	21,457	18,039
Mortensen Lagoon	3,200	6,400	SEG	late 1980s	5,205	16,804	7,215	21,703	14,688	6,200	5,600	25,000	6,600
Thin Point Lake	14,000	28,000	SEG	late 1980s	51,000	40,000	34,500	21,000	11,510	21,550	18,900	33,500	12,400
McLees Lake[c]	10,000	60,000	SEG	2010	97,780	101,793	40,283	12,097	12,936	21,428	8,661	10,120	32,842

Source: Munro, A. and E. Volk. 2011. Summary of Pacific salmon escapement goals in Alaska with a review of escapements from 2002 to 2010. Alaska Department of Fish and Game, Fishery Manuscript Series No. 11-06, Anchorage.

Note: NA = data not available.

a Southeastern District chum salmon escapement goal includes Shumagin Islands Section and Southeastern District Mainland.

b Poor survey conditions contributed to the zero aerial survey escapement index for Thin Point Lake coho salmon.

c McLees Lake sockeye salmon SEG will be in effect if a weir is in place; there will be no goal if a weir is not operated.

Table 5-8 **Summary of Alaska Peninsula salmon escapements compared against escapement goals for the years 2002 to 2010.**

		2002	2003	2004	2005	2006	2007	2008	2009	2010
Stocks with Escapement Data		25	25	24	24	24	24	24	24	25
Below Lower Goal										
	Number	1	3	3	2	2	1	4	5	7
	Percent	4%	12%	13%	8%	8%	4%	17%	21%	28%
Goal Met										
	Number	10	4	5	6	16	16	11	12	15
	Percent	40%	16%	21%	25%	67%	67%	46%	50%	60%
Above Upper Goal										
	Number	14	18	16	16	6	7	9	7	3
	Percent	56%	72%	67%	67%	25%	29%	38%	29%	12%

Source: Munro, A. and E. Volk. 2011. Summary of Pacific salmon escapement goals in Alaska with a review of escapements from 2002 to 2010. Alaska Department of Fish and Game, Fishery Manuscript Series No. 11-06, Anchorage.

5.1.3 Status of Salmon in the East Area

In the FMP, salmon stocks caught in the East Area are separated into three tiers for the purposes of status determination criteria. A maximum sustainable yield (MSY) control rule, a maximum fishing mortality threshold (MFMT), and a minimum stock size threshold (MSST) are established for each tier. Tier 1 stocks are Chinook salmon stocks covered by the Pacific Salmon Treaty. The overfishing definition is based on a harvest based on a relationship between a pre-season relative abundance index generated by the Pacific Salmon Commission's Chinook Technical Committee and a harvest control rule specified in the Pacific Salmon Treaty. The Pacific Salmon Treaty also provides for an in-season adjustment to the harvest level based on an assessment of in-season data. In addition, decreases in the allowable catch are triggered by conservation concerns regarding specific stock groups. This abundance-based system reduces the risk of overharvest at low stock abundance while allowing increases in harvest with increases in abundance, as with the management of the other salmon species in the southeast Alaska salmon fishery.

Tier 2 and tier 3 are salmon stocks managed by the Board and ADF&G. Tier 2 stocks are coho salmon stocks. Tier 3 stocks are coho, pink, chum, and sockeye salmon stocks managed as mixed-species complexes, with coho salmon stocks as indicator stocks. Management of coho is based on aggregate abundance. Lack of a general coho stock identification technique prevents assessment of run strength of individual stock groups contributing to these early-season mixed stock fisheries. Information available on individual coho indicator stocks is considered in management actions. The southeast Alaska wild coho indicator stocks are Auke Creek coho, Berners River coho, Ford Arm Lake coho, and Hugh Smith Lake coho. The overfishing definitions for tier 2 and 3 are based on the State's MSY escapement goal policies. The present policies and status determination criteria would prevent overfishing and provide for rebuilding of overfished stocks in the manner and timeframe required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

Annually, ADF&G reports on the status of these salmon stocks relative to the Salmon FMP's status determination criteria. The following information is from ADF&G's 2011 status of the stocks report.

Tier 1: Chinook Stocks

The stocks exploited include the north migrating Chinook salmon stocks managed under the Pacific Salmon Treaty. The Pacific Salmon Commission's Chinook Technical Committee (CTC) has developed a suite of indicator stocks which have CTC approved escapement goals established. The determination of the status of overfishing is made based on the determination of whether or not the fishing mortality rate (F_t) exceeds the $MFMT_t$. Fishing mortality rate is the sum of the prior 5-year, all gear catch, and the $MFMT_t$ is 1.075 (the allowable overage under the Pacific Salmon Treaty) times the sum over the prior 5 years of the post-season all gear quota, specified by the CTC. The F_t is below the $MFMT_t$ (Table 5-9) and clearly indicates that the stocks are not being over fished.

Table 5-9 All gear catch, all gear post-season quota, and the fishing mortality rate (F_t), and maximum fishing mortality rate ($MFMT_t$), for 2003–2010.

Year	Catch (C_t)	Quota=MSY (Y_t)	F_t	F target	$MFMT_t$
1999	198,842	184,200			
2000	186,493	178,500			
2001	186,919	250,300			
2002	357,133	371,900			
2003	380,152	439,600	1,309,539	1,424,500	1,531,338
2004	417,019	418,300	1,527,716	1,658,600	1,782,995
2005	387,749	387,400	1,728,972	1,867,500	2,007,563
2006	358,601	354,500	1,900,654	1,971,700	2,119,578
2007	328,419	329,400	1,871,940	1,929,200	2,073,890
2008	172,322	152,900	1,664,110	1,642,500	1,765,688
2009	229,509	176,000	1,461,542	1,400,200	1,505,215
2010	227,720	221,800	1,088,851	1,234,600	1,327,195

The Chinook salmon indicator stocks which have approved escapement goals (CTC in prep.) include 8 stocks in southeast Alaska (Table 5-10), 3 transboundary rivers (Table 5-10), 1 stock in British Columbia (Table 5-11), 3 stocks in the Columbia River (Table 5-11), 5 stocks on the Washington coast (Table 5-11), and 3 stocks on the Oregon coast (Table 5-11). The determination of whether any stocks are over fished is based on comparison of the productive capacity which is the aggregate escapements (sum over all Chinook salmon indicator stocks for which escapement goals have been established and approved) summed over the prior 5 years and the $MSST_t$ which is one half the sum of the indicator stock MSY escapement goals. Productive capacities for the years 1995–2010 range from 1.38 to 2.52 million and well above the $MSST_t$ (0.61 million) for the stocks.

Tier 2: Coho salmon stocks managed as individual units.

There are no tier 2 coho stocks as no single stock terminal fisheries for coho salmon exist in the EEZ.

Tier 3: Sockeye salmon, pink salmon, and chum salmon stocks managed as complexes.

There is no significant exploitation of these species in EEZ fisheries. This is clear from the troll fishery catch these species (Table 5-12), with the EEZ troll fishery catch averaging 0.0%, of the all gear catch of sockeye salmon, pink salmon, and chum salmon during the last 10 years, 2001-2010 (Table 5-12).

Tier 3: Coho salmon managed as complexes.

The catch of coho salmon in EEZ fisheries is a significant component of the total all gear catch. The troll catch has averaged 57% of the total all-gear catch during the last 10 years. The coho salmon stocks exploited are entirely from Southeast Alaska. Because coho salmon spawn in hundreds of streams throughout Southeast Alaska, it is not feasible to conduct assessments for the stock as a whole. ADF&G initiated a coho indicator stock assessment program in the early 1980s to assess abundance and exploitation rate in the Southeast Alaska sport, troll, and net fisheries. Indicator stocks were chosen over

a broad area and considered representative of the aggregate coho salmon stocks exploited in the Southeast Alaska fisheries.

There are 4 full indicator stocks of coho salmon (Auke Creek, Berners River, Ford Arm Lake, and Hugh Smith Lake). Long-term stock assessment programs have been in place for these stocks since the early 1980s (Shaul et al. 1991, 2008). Coho salmon smolts or presmolts are coded wire tagged in each system. The tagging, together with comprehensive sampling of commercial and sport fisheries, as well as sampling and counting adult escapement at counting weirs, enables the estimation of the total return (escapement and contributions to sport, troll, and net fisheries) for each stock. Overfishing is assessed for each indicator stock by comparing the prior 4-year average F_t to the prior 4-year average $MFMT_t$. The maximum fishing mortality rate is the ratio of the surplus (numbers above the point MSY escapement goal and 0 when run is below the escapement goal) to the total run. For Auke Creek coho salmon F_t has been well below $MFMT_t$ every year since 1983 (Table 5-13). For Berners River coho salmon F_t has been well below $MFMT_t$ every year except 1988 and 1989 (Table 5-14). For Ford Arm Lake coho salmon F_t has been well below $MFMT_t$ every year since 1988 (Table 5-15). For Hugh Smith Lake coho salmon Ft has been well below $MFMT_t$ every year since 1985 (Table 5-16).

The determination of whether any stocks are over fished is based on comparison of the productive capacity escapements summed over the prior 4 years and the $MSST_t$ which is one half the sum of the indicator stocks MSY escapement goal. Assessment of status was made for each indicator stock. Productive capacities for Auke Creek coho salmon for the years 1993–2009 range from 1,800 to 4,100 (Table 5-13), well above the $MSST_t$ (680). Productive capacities for Berners River coho salmon for the years 1985–2009 range from 14,000 to 72,000 (Table 5-14), well above the $MSST_t$ (12,600). Productive capacities for Ford Arm Lake coho salmon for the years 1985–2009 range from 8,400 to 21,700 (Table 5-15), well above the MSSTt (4,100). Productive capacities for Hugh Smith Lake coho salmon for the years 1985–2009 range from 2,900 to 7,400 (Table 5-16), well above the $MSST_t$ (1,700). Most coho salmon indicator stocks have decreased in total adult abundance during the past 4 years from peak levels during 1990–2005 but have been exploited at only moderate rates relative the their productive capacity. Escapement goal ranges have been achieved annually in all cases except for the Berners River in 2007 when escapement was 2% below the lower goal bound.

Table 5-10 Historical Chinook salmon, escapements, escapement goals, and MSST indicator for Transboundary Rivers and stocks in Southeast Alaska which have approved escapement goals.

Year	Situk	King Salmon Creek	Andrew Cr.	Blossom Index Esc.	Keta Index Esc.	Alsek	Taku R.	Stikine R.	Unuk	Chikamin Index Esc.	Chilkat R.
1991	889	134	800	239	272	11,625	51,645	23,206	3,165	487	5,897
1992	1,595	99	1,556	150	217	5,773	55,889	34,129	4,223	346	5,284
1993	952	259	2,120	303	362	13,855	66,125	58,962	5,160	389	4,472
1994	1,271	207	1,144	161	306	15,863	48,368	33,094	3,435	388	6,795
1995	4,330	144	686	217	175	24,772	33,805	16,784	3,730	356	3,790
1996	1,800	284	670	220	297	15,922	79,019	28,949	5,639	422	4,920
1997	1,878	357	586	132	246	12,494	114,938	26,996	2,970	272	8,100
1998	924	132	974	91	180	6,833	31,039	25,968	4,132	391	3,675
1999	1,461	300	1,210	212	276	14,597	19,734	19,947	3,914	492	2,271
2000	1,785	137	1,380	231	300	7,905	30,529	27,531	5,872	801	2,035
2001	562	149	2,055	204	343	6,705	46,544	63,523	10,541	1,010	4,517
2002	1,000	155	1,708	224	411	5,569	55,044	50,875	6,988	1,013	4,051
2003	2,163	119	1,160	203	322	5,904	36,435	46,824	5,546	964	5,657
2004	696	135	2,991	333	376	7,083	75,032	48,900	3,963	798	3,422
2005	595	143	1,979	445	497	4,478	38,725	40,501	4,742	924	3,366
2006	695	150	2,124	339	747	2,323	42,296	24,400	5,645	1,330	3,039
2007	677	181	1,736	135	311	2,827	14,854	16,442	5,718	893	1,445
2008	413	120	981	257	363	1,860	27,383	21,900	3,109	1,086	2,832
2009	902	109	628	123	172	6,095	20,762	12,596	3,103	611	4,429
2010	167	158	1,205	180	475	9,428	29,307	15,177	4,290	1,023	1,852
Goal LL	500	120	650	250	250	3,500	30,000	14,000	1,800	450	1,750
Goal UL	1,000	240	1,500	500	500	5,300	55,000	28,000	3,800	900	3,500
Goal	750	180	1,075	375	375	4,400	42,500	21,000	2,800	675	2,625
MSST	375	90	538	188	188	2,200	21,250	10,500	1,400	338	1,313

Table 5-11 Historical Chinook salmon, escapements, escapement goals, and MSST indicator stocks for British Columbia, Columbia River, Washington coast, and Oregon coast, which have approved escapement goals. Also shown are the pooled escapements and productive capacity, 1991–2010.

Year	Harrison	Columbia Summers	Columbia Upriver Brights	Lewis River	Quillayute Fall	Queets Spring/Summer	Queets Fall	Hoh Spring/ Summer	Hoh Fall	Nehalem	Siletz	Siuslaw	Pooled Escapement	Productive Capacity
1991	90,638	9,593	28,926	9,066	6,292	630	4,795	1,078	1,420	5,557	5,633	26,100	299,273	
1992	130,411	6,009	27,708	6,307	6,342	375	4,911	1,018	4,003	9,060	6,044	26,090	351,230	
1993	118,998	8,090	19,520	7,025	5,254	713	3,463	1,411	2,280	5,345	4,342	10,446	363,219	
1994	98,334	10,153	28,313	9,939	4,932	705	4,233	1,699	3,967	6,486	10,475	23,570	353,629	
1995	28,616	7,613	45,567	9,718	5,532	625	3,127	1,132	2,202	5,194	5,164	26,715	236,458	1,603,809
1996	37,394	6,689	52,266	13,971	7,316	776	4,218	1,371	3,022	9,211	7,394	33,051	316,430	1,620,966
1997	70,514	6,688	74,206	8,670	5,405	540	2,872	1,826	1,773	10,026	3,726	22,305	355,295	1,625,031
1998	188,425	9,173	93,051	5,929	6,752	492	3,859	1,287	4,257	8,245	5,516	24,708	375,237	1,637,049
1999	107,016	15,747	126,153	3,184	3,334	373	1,918	928	1,924	8,063	4,166	23,963	275,664	1,559,084
2000	77,035	12,733	98,220	9,820	3,730	248	3,755	492	1,749	6,855	6,787	15,730	286,474	1,609,100
2001	73,134	25,979	83,281	13,886	5,136	548	3,099	1,159	2,560	11,662	10,563	38,717	413,721	1,706,391
2002	89,968	51,010	49,020	16,380	6,067	738	2,589	2,464	4,415	18,089	14,054	41,058	499,912	1,851,008
2003	247,121	50,397	40,132	18,505	7,398	189	4,979	1,228	1,649	10,906	11,149	57,795	680,868	2,156,639
2004	128,990	36,880	41,434	15,342	3,831	604	5,105	1,786	3,237	9,975	3,902	34,427	536,623	2,417,598
2005	86,730	33,207	42,515	11,348	6,406	298	4,557	1,193	4,180	7,038	6,426	16,619	388,444	2,519,568
2006	50,942	33,729	66,645	10,522	5,642	330	3,051	904	1,632	4,711	4,108	28,082	304,084	2,409,931
2007	79,176	13,936	50,595	3,468	3,066	352	878	810	1,559	4,304	528	6,764	203,990	2,114,009
2008	41,603	15,326	53,049	5,200	3,612	305	2,790	671	2,849	3,810	1,202	11,119	221,959	1,655,100
2009	70,141	17,787	50,215	5,410	3,083	495	4,156	880	2,081	4,070	2,905	14,094	263,276	1,381,753
2010	103,515	23,994	167,007	8,701	4,635	NA	4,022	828	2,599	5,384	4,225	22,197	410,369	1,403,678
Goal	75,100													
Goal	98,500													
Goal	86,800	17,857	40,000	5,700	3,000	700	2,500	900	1,200	6,989	2,944	12,925	243,270	1,216,350
MSST	43,400	8,929	20,000	2,850	1,500	350	1,250	450	600	3,495	1,472	6,463	121,635	608,175

Table 5-12 Southeast Alaska EEZ catch as a percentage of the total all gear catch by species, 1991–2010.

	Chinook			Sockeye			Coho			Pink			Chum		
Year	EEZ	Total	EEZ as % of	EEZ	Total	EEZ as % of	EEZ	Total	EEZ as % of	EEZ	Total	EEZ as % of Total	EEZ	Total	EEZ as % of Total
1991	16,615	333,959	5.0%	288	2,063,585	0.0%	58,275	3,197,004	1.8%	3,602	61,926,339	0.0%	609	3,336,042	0.0%
1992	3,266	225,924	1.4%	3,872	2,666,422	0.1%	405,598	3,696,207	11.0%	31,794	34,963,308	0.1%	8,979	4,936,516	0.2%
1993	13,589	295,767	4.6%	692	3,190,960	0.0%	214,212	3,665,435	5.8%	4,921	57,299,350	0.0%	5,347	7,879,870	0.1%
1994	10,286	216,289	4.8%	1,596	2,392,489	0.1%	257,957	5,721,700	4.5%	2,691	57,274,877	0.0%	1,376	10,403,083	0.0%
1995	10,484	214,077	4.9%	1,267	1,795,331	0.1%	303,489	3,345,678	9.1%	6,244	47,965,506	0.0%	5,869	11,225,693	0.1%
1996	11,986	220,884	5.4%	319	2,799,848	0.0%	138,434	3,156,951	4.4%	1,370	64,629,714	0.0%	2,041	16,043,397	0.0%
1997	18,172	300,456	6.0%	3,372	2,477,396	0.1%	106,422	1,974,427	5.4%	1,336	28,975,224	0.0%	1,480	11,789,139	0.0%
1998	18,262	237,085	7.7%	237	1,375,356	0.0%	170,710	2,989,080	5.7%	2,348	42,535,402	0.0%	887	15,695,285	0.0%
1999	16,566	198,568	8.3%	98	1,160,730	0.0%	83,863	3,630,234	2.3%	396	77,848,284	0.0%	203	14,930,932	0.0%
2000	14,264	226,235	6.3%	143	1,229,354	0.0%	62,764	1,957,028	3.2%	972	20,313,426	0.0%	1,480	15,910,909	0.0%
2001	11,061	249,205	4.4%	170	2,035,230	0.0%	53,639	3,300,950	1.6%	1,024	67,055,991	0.0%	497	8,754,416	0.0%
2002	52,024	387,878	13.4%	114	806,447	0.0%	56,412	3,242,498	1.7%	1,286	45,331,007	0.0%	654	7,455,007	0.0%
2003	58,588	410,698	14.3%	192	1,525,356	0.0%	38,870	2,498,375	1.6%	1,340	52,515,632	0.0%	602	11,115,085	0.0%
2004	49,372	483,635	10.2%	287	2,037,745	0.0%	144,193	3,084,663	4.7%	822	45,333,012	0.0%	1,585	11,371,625	0.0%
2005	13,499	442,324	3.1%	504	1,607,835	0.0%	85,413	3,002,784	2.8%	333	59,182,242	0.0%	47	6,427,530	0.0%
2006	35,792	360,552	9.9%	606	1,333,496	0.0%	78,566	2,091,875	3.8%	721	11,695,411	0.0%	221	14,002,610	0.0%
2007	32,014	351,525	9.1%	312	1,904,664	0.0%	82,952	2,062,603	4.0%	681	44,884,740	0.0%	1,243	9,416,164	0.0%
2008	20,176	241,083	8.4%	32	422,049	0.0%	69,373	2,381,524	2.9%	358	15,967,050	0.0%	301	9,065,196	0.0%
2009	23,615	268,597	8.8%	135	925,469	0.0%	69,912	2,635,471	2.7%	784	38,101,020	0.0%	748	9,660,209	0.0%
2011	28,831	261,432	11.00%	102	717,586	0.0%	98,946	2,580,951	3.8%	1,081	24,208,300	0.0%	466	9,474,546	0.0%
10-yr average			9.3%			0.0%			3.0%			0.0%			0.0%

Table 5-13 Assessment data for Auke Creek coho salmon.

Year	Total Catch	Total Run	Target Catch	Maximum Catch	Fishing Mortality Rate	Target Fishing Mortality Rate	Maximum Fishing Mortality Rate	Escapement	Productive Capacity
1991	371	1,179	839	979	0.444	0.726	0.839	808	2,763
1992	855	1,875	1,535	1,675	0.463	0.759	0.858	1,020	3,027
1993	730	1,589	1,249	1,389	0.448	0.778	0.869	859	3,384
1994	1,618	3,055	2,715	2,855	0.464	0.823	0.896	1,437	4,124
1995	360	820	480	620	0.485	0.815	0.891	460	3,776
1996	626	1,141	801	941	0.505	0.794	0.879	515	3,271
1997	148	757	417	557	0.477	0.764	0.861	609	3,021
1998	551	1,413	1,073	1,213	0.408	0.671	0.806	862	2,446
1999	590	1,435	1,095	1,235	0.403	0.713	0.831	845	2,831
2000	286	969	629	769	0.344	0.703	0.825	683	2,999
2001	541	1,406	1,066	1,206	0.377	0.740	0.847	865	3,255
2002	424	1,600	1,260	1,400	0.340	0.749	0.852	1,176	3,569
2003	319	904	564	704	0.322	0.721	0.836	585	3,309
2004	332	748	408	548	0.347	0.708	0.828	416	3,042
2005	277	727	387	527	0.340	0.658	0.799	450	2,627
2006	299	880	540	680	0.376	0.583	0.755	581	2,032
2007	184	536	196	336	0.378	0.530	0.723	352	1,799
2008	377	977	637	777	0.364	0.564	0.744	600	1,983
2009	229	594	254	394	0.365	0.545	0.732	365	1,898
2010	350	767	427	567	0.397	0.527	0.722	417	1,734
							Goal LL	200	
							Goal UL	500	
							Goal	340	1,360
							MSST	170	680

Table 5-14 Assessment data for Berners River coho salmon.

Year	Total Catch	Total Run	Target Catch	Maximum Catch	Fishing Mortality Rate	Target Fishing Mortality Rate	Maximum Fishing Mortality Rate	Escapement	Productive Capacity
1991	23,632	35,162	28,862	31,162	0.683	0.757	0.846	11,530	32,813
1992	30,550	45,850	39,550	41,850	0.662	0.813	0.881	15,300	45,389
1993	33,924	49,594	43,294	45,594	0.674	0.847	0.903	15,670	53,550
1994	57,808	73,728	67,428	69,728	0.714	0.877	0.922	15,920	58,420
1995	23,855	28,800	22,500	24,800	0.738	0.873	0.919	4,945	51,835
1996	17,750	23,800	17,500	19,800	0.758	0.857	0.909	6,050	42,585
1997	5,392	15,442	9,142	11,442	0.739	0.822	0.887	10,050	36,965
1998	16,958	23,760	17,460	19,760	0.697	0.725	0.826	6,802	27,847
1999	22,663	32,583	26,283	28,583	0.657	0.736	0.833	9,920	32,822
2000	11,005	21,655	15,355	17,655	0.600	0.730	0.829	10,650	37,422
2001	12,671	31,961	25,661	27,961	0.576	0.771	0.854	19,290	46,662
2002	22,384	50,084	43,784	46,084	0.504	0.815	0.883	27,700	67,560
2003	18,870	28,980	22,680	24,980	0.489	0.810	0.879	10,110	67,750
2004	18,687	33,137	26,837	29,137	0.504	0.825	0.889	14,450	71,550
2005	7,585	12,805	6,505	8,805	0.540	0.798	0.872	5,220	57,480
2006	10,537	16,007	9,707	12,007	0.612	0.723	0.824	5,470	35,250
2007	4,767	8,682	2,382	4,682	0.589	0.643	0.773	3,915	29,055
2008	7,214	14,084	7,784	10,084	0.584	0.511	0.690	6,870	21,475
2009	5,138	9,368	3,068	5,368	0.574	0.477	0.668	4,230	20,485
2010	14,160	21,680	15,380	17,680	0.581	0.532	0.703	7,520	22,535
							Goal LL	4,000	
							Goal UL	9,200	
							Goal	6,300	25,200
							MSST	3,150	12,600

Table 5-15 Assessment data for Ford Arm Lake coho salmon.

Year	Total Catch	Total Run	Target Catch	Maximum Catch	Fishing Mortality Rate	Target Fishing Mortality Rate	Maximum Fishing Mortality Rate	Escapement	Productive Capacity
1991	3,257	6,018	3,968	4,718	0.563	0.651	0.778	2,761	10,156
1992	5,485	9,351	7,301	8,051	0.590	0.694	0.806	3,847	10,975
1993	8,360	12,562	10,512	11,262	0.608	0.753	0.843	4,202	13,000
1994	8,259	11,486	9,436	10,186	0.643	0.792	0.868	3,228	14,038
1995	4,341	6,787	4,737	5,487	0.658	0.796	0.871	2,445	13,722
1996	3,364	5,864	3,814	4,564	0.663	0.777	0.858	2,500	12,375
1997	5,053	9,771	7,721	8,471	0.620	0.758	0.847	4,965	13,138
1998	9,075	16,124	14,074	14,824	0.566	0.787	0.865	7,049	16,959
1999	6,395	10,195	8,145	8,895	0.569	0.805	0.876	3,598	18,112
2000	5,744	8,048	5,998	6,748	0.595	0.814	0.882	2,287	17,899
2001	6,415	8,624	6,574	7,324	0.643	0.809	0.879	2,178	15,112
2002	8,009	15,118	13,068	13,818	0.633	0.805	0.876	7,109	15,172
2003	6,429	13,218	11,168	11,918	0.591	0.818	0.884	6,789	18,363
2004	8,564	12,103	10,053	10,803	0.600	0.833	0.894	3,539	19,615
2005	5,867	10,124	8,074	8,824	0.571	0.838	0.897	4,257	21,694
2006	5,078	9,815	7,765	8,515	0.573	0.819	0.885	4,737	19,322
2007	6,098	8,665	6,615	7,365	0.629	0.799	0.872	2,567	15,100
2008	5,887	11,060	9,010	9,760	0.578	0.793	0.869	5,173	16,734
2009	4,945	7,126	5,076	5,826	0.600	0.776	0.858	2,181	14,658
2010	2,863	4,473	2,423	3,173	0.632	0.738	0.834	1,610	11,531
							Goal LL	1,300	
							Goal UL	2,900	
							Goal	2,050	8,200
							MSST	1,025	4,100

Table 5-16 Assessment data for Hugh Smith Lake coho salmon.

Year	Total Catch	Total Run	Target Catch	Maximum Catch	Fishing Mortality Rate	Target Fishing Mortality Rate	Maximum Fishing Mortality Rate	Escapement	Productive Capacity
1991	3,931	5,767	4,917	5,267	0.747	0.764	0.861	1,836	3,652
1992	3,469	4,895	4,045	4,395	0.744	0.810	0.888	1,426	4,565
1993	3,410	4,242	3,392	3,742	0.748	0.827	0.898	832	4,964
1994	7,711	9,464	8,614	8,964	0.760	0.860	0.918	1,753	5,847
1995	4,927	6,708	5,858	6,208	0.771	0.866	0.921	1,781	5,792
1996	2,998	3,948	3,098	3,448	0.782	0.860	0.918	950	5,316
1997	1,964	2,696	1,846	2,196	0.771	0.851	0.912	732	5,216
1998	3,388	4,371	3,521	3,871	0.749	0.808	0.887	983	4,446
1999	2,975	4,221	3,371	3,721	0.743	0.777	0.869	1,246	3,911
2000	746	1,346	496	846	0.718	0.731	0.842	600	3,561
2001	1,539	3,119	2,269	2,619	0.662	0.740	0.847	1,580	4,409
2002	2,115	5,406	4,556	4,906	0.523	0.759	0.858	3,291	6,717
2003	2,166	3,676	2,826	3,176	0.485	0.749	0.852	1,510	6,981
2004	1,652	2,492	1,642	1,992	0.509	0.769	0.864	840	7,221
2005	1,920	3,652	2,802	3,152	0.516	0.777	0.869	1,732	7,373
2006	1,035	1,926	1,076	1,426	0.577	0.711	0.830	891	4,973
2007	2,065	3,309	2,459	2,809	0.586	0.701	0.824	1,244	4,707
2008	2,035	3,776	2,926	3,276	0.557	0.732	0.842	1,741	5,608
2009	2,102	4,383	3,533	3,883	0.540	0.746	0.851	2,281	6,157
2010	2,539	5,417	4,567	4,917	0.518	0.799	0.822	2,878	8,144
							Goal LL	500	
							Goal UL	1,600	
							Goal	850	3,400
							MSST	425	1,700

5.1.4 Impacts of the alternatives

The status of the salmon stocks in the East Area, under Alternative 1, has not substantially changed since the FPEIS. Alternative 2 maintains the existing geographic scope of the FMP, and while it revises and updates the FMP, none of the options under consideration would impact the State salmon management of salmon stocks. As shown in section 5.1.2, none of the salmon stocks are overfished and overfishing is not occurring. New information on the status of the salmon stocks in the East Area is not significant relative to the environmental impacts of the FMP salmon management analyzed in the previous NEPA documents: the impacts on salmon stocks are insignificant and the new information raises no new environmental concerns significantly different from those previously analyzed.

In the West Area, the impacts of Alternative 1 are shown in Table 5-3 through Table 5-8 which provide an overview of salmon stocks in Upper Cook Inlet, Prince William Sound, and the Alaska Peninsula for which escapement goals exist, a numerical description of the goal, type of goal, year the current goal was first implemented, and recent years' escapement data for each stock. In addition, summary statistics documenting performance in achieving goals is presented. Between 2002 and 2006, it was typical to observe greater than 80 percent success in achieving or exceeding escapement goals for Southeast Alaska, Upper Cook Inlet, Prince William Sound, and the Alaska Peninsula. In recent years, the proportion of escapements falling below the lower bound of goals has increased in each of these regions. Statewide, the percentage of escapement goals within the goal range (or above the lower bound if a lower-bound SEG) has been between 35 percent and 58 percent since 2002. Alternative 2 maintains the existing geographic scope of the FMP, and while it revises and updates the FMP, none of the options under consideration would impact the State salmon management of salmon stocks. Therefore, the impacts of Alternatives 1 and 2 are not significant.

Alternative 3, the preferred alternative, would modify the scope of the FMP to exclude three traditional net commercial salmon fishing areas from the FMP. The salmon fisheries in those areas would remain under State management and that would not change as a result of removing these areas from the FMP. However, as discussed in section 2.5.2, there is a risk that vessels not registered with the state could harvest salmon in these three areas. Any salmon harvested by unregistered vessels would be an off-the-top removal and that salmon would no longer be available for harvest by other user groups. Most likely, escapement goals could still be met and therefore biological consequences would be avoided by restricting harvest in other fisheries. Therefore, the impacts of Alternative 3 on salmon stocks would not be significant.

Alternative 4 would maintain the FMP in the East Area only and remove the FMP and its prohibition on commercial fishing in the West Area. The current salmon fisheries in the West Area would remain under State management and that would not change as a result of removing these areas from the FMP. However, as discussed in section 2.5.2, there is a risk that vessels not registered with the state could harvest salmon in the West Area. At this point, it is not possible to predict the extent of possible fishing in the West Area in the absence of the federal prohibition. Any fishing in the West Area would be unregulated by state or federal managers and therefore it would not be possible to know the extent of harvest or bycatch. Up to a point, the State could ameliorate impacts to Alaska salmon stocks by restricting harvests in State managed fisheries to achieve escapement goals. The potential removal of non-Alaska salmon stocks is unknown. Since it is not possible to predict the extent of fishing, the impacts of this alternative on salmon stocks are unknown.

5.2 Endangered Species Act

The Endangered Species Act of 1973 as amended (16 U.S.C. 1531 *et seq.*; ESA), provides for the conservation of endangered and threatened species of fish, wildlife, and plants. The program is

administered by NMFS (for most marine mammal species, marine and anadromous fish species, and marine plants species) and by the United States Fish and Wildlife Service (USFWS; for bird species, some marine mammals, and terrestrial and freshwater wildlife and plant species). The designation of an ESA listed species is based on the biological health of that species. The status determination is either threatened or endangered. Threatened species are those likely to become endangered in the foreseeable future [16 U.S.C. § 1532(20)]. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range [16 U.S.C. § 1532(20)]. Species can be listed as endangered without first being listed as threatened. The Secretary of Commerce (Secretary), acting through NMFS, is authorized to list marine fish, plants, and mammals (except for walrus, polar bear, and sea otter) and anadromous fish species. The Secretary of the Interior, acting through the USFWS, is authorized to list walrus, polar bear, sea otter, seabirds, terrestrial plants and wildlife, and freshwater fish and plant species. In addition to listing species under the ESA, the critical habitat of a newly listed species must be designated concurrent with its listing to the "maximum extent prudent and determinable" [16 U.S.C. § 1533(b)(1)(A)].

The ESA defines critical habitat as those specific areas that are essential to the conservation of a listed species and that may be in need of special consideration. Federal agencies are prohibited from undertaking actions that destroy or adversely modify designated critical habitat. Some species, primarily the cetaceans, which were listed in 1969 under the Endangered Species Conservation Act and carried forward as endangered under the ESA, have not received critical habitat designations.

The key section of the ESA relevant to federal actions is section 7. Section 7 outlines procedures for interagency cooperation to conserve federally listed species and designated critical habitats. Section 7 requires federal agencies to consult to ensure that they are not undertaking actions that are likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat.

The key sections of the ESA relevant to non-federal actions are section 9 and section 10. Section 9 prohibits the taking of endangered species of fish and wildlife. Section 10 provides exceptions to the section 9 prohibition by allowing NMFS or USFWS to issue a permit to take listed species incidental to otherwise legal activity. Specifically, Section 10(a)(1)(B) allows non-federal parties planning activities that have no federal nexus, but which could result in the incidental taking of listed animals, to apply for an incidental take permit.

For federal fishery actions, NMFS-Sustainable Fisheries Division is the action agency that initiates the section 7 consultation. The North Pacific Fishery Management Council (Council) may be invited to participate in the compilation, review, and analysis of data used in the consultations. The determination of whether the action "is likely to jeopardize the continued existence of" endangered or threatened species or to result in the destruction or modification of critical habitat, however, is the responsibility of the appropriate consulting agency (NMFS-Protected Resources Division or USFWS). If the action is

determined to result in jeopardy, the resulting BiOp includes reasonable and prudent measures that are necessary to alter the action so that jeopardy is avoided. If an incidental take of a listed species is expected to occur under normal promulgation of the action, an incidental take statement is appended to the BiOp.

Section 7 consultations have been done for the Southeast Alaska troll fishery and ESA-listed species, some individually and some as groups. In 2008, NMFS issued the *Endangered Species Act Section 7(a)(2) Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation on the Approval of Revised Regimes under the Pacific Salmon Treaty and the Deferral of Management to Alaska of Certain Fisheries Included in those Regimes* (2008 BiOp, NMFS 2008a).[64] The 2008 BiOp analyzed the potential effects on 28 salmon and steelhead species that are listed currently as threatened or endangered under the ESA and killer whales, green sturgeon, and Steller sea lions. The subsequent sections summarize the findings of that consultation, provide any relevant new information, and analyze the impacts of the alternatives on ESA-listed species to determine whether re-initiation of the consultation is required.

Section 7 consultations have not been conducted for the FMP salmon fisheries in the three traditional net fishing areas, but these fisheries were included in the cumulative effects analysis for effects on ESA-listed species under NMFS management in the *2010 North Pacific Groundfish Fishery Biological Opinion* (2010 BiOp, NMFS 2010). The best available information on the interactions between these FMP salmon fisheries and ESA-listed Pacific salmon, marine mammals, and seabirds is provided in the following sections. Because amending the FMP is a federal action, any adverse effects of the FMP fishery on listed species or critical habitat and any takings that may occur are subject to an ESA section 7 consultation. NMFS will conduct the appropriate section 7 consultations prior to the decision to approve, partially approve, or disapprove Amendment 12.

5.3 ESA-listed Pacific Salmon

No species of Pacific salmon originating from freshwater habitat in Alaska are listed under the ESA. West coast salmon species currently listed under the ESA originate in freshwater habitat in Washington, Oregon, Idaho, and California. At least some of the listed salmon and steelhead are presumed to range into marine waters off Alaska during ocean migration and growth to maturity phases of their anadromous life history. During ocean migration to the Pacific marine waters a small (undetermined) portion of the stock go into the Gulf of Alaska (GOA) as far east as the Aleutian Islands (Weitkamp 2011). In that habitat they are mixed with hundreds to thousands of other stocks originating from the Columbia River, British Columbia, Alaska, and Asia. The listed fish are not visually distinguishable from the other, unlisted, stocks. Incidental take of ESA-listed salmon occurs in the Alaska groundfish fishery, primarily

[64] Available on the NMFS Alaska Region website at http://www.alaskafisheries.noaa.gov/analyses/salmon/salmonbiop122208.pdf

by pelagic trawl gear, and the salmon fisheries. While the commercial salmon fisheries occur primarily in nearshore waters, they may also incidentally take ESA-listed salmon.

On August 15, 2011, NMFS published the results of an ESA five-year status review for Pacific salmon and steelhead populations (56 FR 58612). Under the ESA, Pacific salmon are categorized by Evolutionary Significant Unit (ESU) and ESA-listed Pacific steelhead are delineated by Distinct Population Segment (DPS). An ESU is a population of salmon that is substantially reproductively isolated from other non-specific populations and represents an important component in the evolutionary legacy of the biological species (ESU Policy). A DPS of steelhead must be discrete from other con-specific populations, and it must be significant to its own taxon (DPS policy) (61 FR 4722). To date, nine ESUs of Chinook salmon, two ESUs of chum salmon, four ESUs of coho salmon, two ESUs of sockeye salmon, and eleven DPSs of steelhead have been listed as either threatened or endangered under the ESA. Of those listed, only six ESUs of Chinook salmon and five DPSs of steelhead are thought to range into marine waters off Alaska during the ocean portion of their life history (NMFS 1999).

NMFS designated critical habitat in 1993 (57 FR 57051) for the Snake River sockeye, Snake River spring/summer Chinook, and Snake River fall Chinook salmon. NMFS designated critical habitat in 2000 (65 FR 7764) for Puget Sound, Lower Columbia River, Upper Willamette River, and Upper Columbia River Spring Chinook salmon and Upper Columbia River, Snake River Basin, Lower Columbia River, Upper Willamette River and Middle Columbia River steelhead. These designations did not include any marine waters; therefore, none of the habitat where the Alaska salmon fishery occurs is designated as critical.

Southeast Alaska troll salmon fishery

From 1993 to 1998, NMFS determined, through the Section 7 consultation process, that the Southeast Alaska salmon troll fishery does not jeopardize the continued existence of the Snake River fall Chinook or result in the destruction or adverse modification of critical habitat. NMFS issued six BiOps, including no-jeopardy determinations and incidental take statements for listed Pacific salmon. Each BiOp contained one-year expiration dates, except the 1998 opinion lasted while the Letter of Agreement between ADF&G and the Pacific Salmon Commission was in effect (Attachment 1 to NMFS 1997). Conservation measures contained in these past opinions varied somewhat, but generally were recommendations related to limiting Chinook harvest in the commercial all-gear fishery consistent with United States/Canada treaty negotiations.

In 1999, NMFS issued a BiOp on approval of the Pacific Salmon Treaty by the U.S. Department of State and management of the Southeast Alaska salmon fisheries subject to the Pacific Salmon Treaty (NMFS 1999). The BiOp concluded that the Pacific Salmon Treaty and the decision by the Council to continue to delegate its management authority to the State is not likely to jeopardize any of the sixteen threatened or endangered ESUs of Pacific salmon, steelhead, or cutthroat trout or destroy or adversely modify any of the critical habitat that has been designated for these species. The BiOp contains an incidental take

statement and prescribes reasonable and prudent measures that must be undertaken. These measures are necessary to minimize and reduce the anticipated level of incidental take of listed species. The BiOp also details terms and conditions and conservation recommendations for NMFS and the State.

In 2008, NMFS issued a BiOp that concluded no jeopardy and included an Incidental Take Statement that covers the Pacific Salmon Treaty, and the deferral of management to the State for the duration of this management program, subject to the conditions that require re-initiation of consultation (NMFS 2008a). None of the alternatives would change management in the East Area.

Summary of salmon harvest in the West Area commercial salmon fisheries and the federally managed groundfish fisheries

As described in Section 4.3, four commercial salmon fisheries occur in the West Area; the Cook Inlet drift gillnet, the Prince William Sound drift gillnet, and the Alaska Peninsula drift gillnet and purse seine fisheries. Detailed information on the management of each fishery is provided in Section 4.3. Table 5-17 shows the annual average amount of Chinook salmon harvested in each area from 1991 and 2010, with an estimate of the portion of the Chinook salmon harvested in these fisheries that were harvested from EEZ waters. This table also shows the Chinook salmon harvested in each fishery as a percent of the total Chinook salmon commercial harvest in each area. These amounts represent the maximum amount that could be estimated to be harvested from EEZ waters in these districts. The Chinook salmon harvest in Prince William Sound is much higher than harvests in Cook Inlet and the South Alaska Peninsula.

The harvests of Chinook salmon in the commercial salmon fisheries in the West Area are similar or less than harvests of Chinook salmon as bycatch in the Alaska groundfish fisheries. As of November 4, 2011, the amount of Chinook salmon incidental catch in the BSAI groundfish fisheries was well below the annual average on record since 1991 and is estimated at 26,253 fish. This amount is also well below the incidental catch range of 36,000 to 87,500 Chinook salmon in the supplemental BiOp for the BSAI groundfish fisheries (NMFS 2009). The majority of the salmon bycatch occurs in the pollock fishery and primarily is taken by catcher vessels delivering to shoreside processors.

Since November 4, 2011, the GOA groundfish fisheries estimated incidental catch of Chinook salmon is 22,492 fish. In 2010, the incidental catch of Chinook salmon in the GOA groundfish fisheries (54,561 fish) was above the incidental take statement of 40,000 fish. Of the estimated Chinook salmon incidentally caught in 2010, 79% was taken in the pelagic trawl fishery. NMFS Alaska Region reinitiated ESA Section 7 consultation with the NMFS Northwest Region on November 17, 2010 regarding the GOA groundfish fisheries. On January 9, 2012, the NMFS Northwest Region issued a supplemental biological opinion that maintains that 40,000 Chinook salmon incidental take statement and concluded that the action to authorize the GOA groundfish fisheries is not likely to jeopardize the continued existence of either the UWR or LCR Chinook salmon ESUs (NMFS 2012).

Table 5-17 Chinook salmon harvest information for West Area salmon fisheries

Area/Fishery	Annual Average No. of Chinook salmon harvested 1991-2010	Estimated Percent Harvested in EEZ waters	Average Percent of total commercial Chinook salmon harvest in Area 1991-2010	Primary Salmon harvested
Cook Inlet drift gillnet fishery	609	50%-60%	3.4%	Sockeye
Prince William Sound drift gillnet	42,349	22%	98%	Sockeye and Coho
Unimak and SW/S Alaska Pen.	2,159	<25%	13.9%	Pink, Sockeye, and Chum
Gulf of Alaska groundfish fisheries	21,986	100%	NA	Chinook
Bering Sea and Aleutian Islands groundfish fisheries	46,574	100%	NA	Chinook

Source: Table 4-4 through Table 4-6 in section 4.3 of this document

Cook Inlet drift gillnet fishery

In 2011, coded-wire tag (CWT) information was queried for ESA-listed Chinook, coho, sockeye, and steelhead recovered in Cook Inlet drift gillnet fishery. There has been limited sampling of Chinook salmon from drift fishing in Districts 244, 245, and 249. ADF&G sampled this fishery in Areas 244 and 245 from 1997-2004 (excluding 2000-2003). During this time period, a total of 43 Chinook salmon were sampled, and only one CWT was recovered from an Alaska hatchery fish. No CWTs have been recovered from ESA-listed salmon or steelhead in the sampling for the Cook Inlet drift gillnet fishery. ADF&G is establishing a genetic baseline for possible future studies of stock composition of Chinook salmon in Cook Inlet commercial and subsistence fisheries.

Prince William Sound drift gillnet fishery

In 2011, CWT information was queried for ESA-listed Chinook, coho, sockeye, and steelhead recovered in the Prince William Sound drift gillnet fishery. ADF&G sampled the Copper River drift gillnet fishery from 1984 through 2002 (excluding 1998). Sampling for CWTs is usually done with district and stat week stratum and samplers usually examine 20% of the catch by district. Samplers rarely get specific sub-district information because most catch is delivered to tenders before sampling. Out a total of

115,513 Chinook salmon sampled during this time period, 3,028 Chinook salmon were examined that were known to have been caught in the outer sub-districts, which include areas inside and outside the EEZ (Ron Josephson, ADF&G, personal communication, August 22, 2011). A total of two CWTs from Chinook salmon ESA-listed ESUs were recovered in the sub-districts of the Copper River drift net fishery that extends into the EEZ. In 1998, one Chinook salmon was recovered from the Lewis River, Lower Columbia River ESU, and in 2002, one Chinook salmon was recovered from the Clackamas River, Upper Willamette ESU.

Genetic analyses provide limited insight as to occurrence of specific ESA-listed Chinook salmon stocks in the fisheries managed by this FMP; however, the ADF&G has estimated stock composition for the Copper River Delta fishery (unpublished data) using the published GAPS Chinook salmon baseline (Seeb et al. 2007). Approximately 95% of the Chinook salmon in the Copper River Delta fishery are estimated to originate from areas outside the range of Chinook salmon ESA-listed ESUs. The baseline includes Chinook salmon populations from Southeast Alaska, British Columbia and Washington/Oregon, and analyses show typically less than 5% contribution from this geographically broad reporting group (Eric Volk, personal communication, 8/30/11). Therefore, the impacts to ESA-listed Chinook salmon are expected to be quite limited, a small fraction of this 5% of fish. The CWT data reinforces the genetic stock information data, suggesting that the take of ESA-listed Chinook salmon is a rare event in this fishery.

Sampling in the GOA and BSAI groundfish fisheries confirms that the take of ESA-listed fish in this broad geographic area is very low and limited too few of the salmon ESA-listed ESUs. ESA-listed Chinook salmon from the Lower Columbia River (LCR), Upper Willamette River (UWR), and Upper Columbia River (UCR) Spring ESUs have been recovered in the GOA trawl fishery. Since 1984, CWTs have been recovered from 23 LCR, 97 UWR, and 1 UCR Chinook salmon in the GOA trawl fishery, and from 9 LCR and 12 UWR Chinook salmon in the BSAI trawl fishery, both pre- and post-listing. By applying mark expansion factors, the estimated numbers increase to 112 LCR, 275 UWR, and 1 UCR Chinook salmon in the GOA and 9 LCR and 62 UWR Chinook salmon in the BSAI groundfish fisheries.

South Alaska Peninsula drift gillnet and purse seine fisheries

In 2011, CWT information was queried for ESA-listed Chinook, coho, sockeye, and steelhead recovered in the South Alaska Peninsula drift gillnet and purse seine fisheries. There was no sampling done in the Alaska Peninsula drift gillnet and purse seine fisheries, therefore, there is no stock composition data available for Chinook salmon captured in state fisheries along the Alaska Peninsula (Ron Josephson, ADF&G, personal communication, August 29, 2011).

5.3.1 Impacts of the Alternatives

The interactions between the FMP salmon fishery and ESA-listed salmon stocks in the East Area, under Alternative 1, has not substantially changed since the 2008 BiOp and therefore Alternative 1 would have

no effects beyond those previously considered in the 2008 BiOp. Alternatives 2, 3, and 4 would not change salmon management in the East Area. The State will continue to manage the fisheries subject to the FMP and the terms of the Pacific Salmon Treaty, and NMFS and the Council will continue to delegate management to the State subject to on-going review of state actions for consistency with applicable law. Therefore, the alternatives are not likely to adversely affect the salmon species currently listed as endangered or threatened under ESA and which may occur in the East Area, or affect their critical habitat beyond those effects previously analyzed in the 2008 BiOp (NMFS 2008a).

The new information on interactions between the FMP salmon fisheries and listed salmon stocks in the West Area, presented in the previous section, indicates that impacts of these fisheries on ESA-listed salmon is negligible. The Prince William Sound fishery harvests a large amount of Chinook salmon compared to the Cook Inlet and South Alaska Peninsula fisheries and the sampling of the Prince William Sound fisheries showed that the recovery of CWTs from ESA-listed ESUs has occurred but is rare. Therefore, it is not likely that sampling a portion of the small number of Chinook salmon harvested in the Cook Inlet or South Alaska Peninsula fisheries would recover any CWTs from ESA-listed ESUs. In the GOA groundfish trawl fisheries since 1984, CWTs have been recovered from 23 Chinook salmon from Lower Columbia River ESUs, 97 Chinook salmon from Upper Willamette River ESUs, and 1 Chinook salmon from Upper Columbia River. In consideration of the thousands of samples analyzed over this time period, the occurrence of these CWT recoveries in the GOA groundfish fisheries is a rare occurrence. The amounts of recoveries of CWTs from salmon taken in the Cook Inlet, Prince William Sound, and South Alaska Peninsula commercial salmon fisheries are less than the GOA groundfish fisheries. Any effect that the EEZ commercial salmon fisheries in the West Area may have on ESA-listed ESUs is likely not measurable and probably insignificant. This conclusion is supported by analysis of the distribution of CWT recoveries that shows where tagged fish are recovered and that tagged fish fade out as you get farther north into the GOA (Weitkamp 2011). The very few recoveries that we do see are consisted with the results from this analysis.

This information is not significant relative to the environmental impacts of the FMP salmon management analyzed in the previous NEPA documents: it raises no new environmental concerns significantly different from those previously analyzed. Alternative 2 maintains the existing geographic scope of the FMP, and while it revises and updates the FMP, none of the options under consideration would impact the prosecution of the salmon fisheries in a way that would change the impacts on ESA-listed salmon stocks. Thus, the new information available for Alternatives 1 and 2 is not of a scale and scope that require an SEIS and Alternative 2 would have no affect on the salmon species currently listed as endangered or threatened under ESA and which may occur in the West Area, beyond those effects previously analyzed in the 2008 BiOp (NMFS 2008a).

Alternative 3 (preferred) would modify the scope of the FMP to exclude three historical net commercial salmon fishing areas from the FMP. The salmon fisheries in those areas would remain under state management and that would not change as a result of removing these areas from the FMP. However, as

discussed in section 2.5.2, there is a risk that vessels not registered with the state could harvest salmon in these three areas. While it is not possible to predict whether any unregulated fishing would occur in these three areas, if it did occur, the impacts on listed salmon would be negligible given the likely low occurrence of ESA-listed stocks in the three areas based on CWT recoveries in the groundfish fisheries and in the commercial salmon fisheries. Therefore, Alternative 3 would have no affect the salmon species currently listed as endangered or threatened under ESA and which may occur in the West Area.

In addition, Alternative 3 would also eliminate future requirements for ESA § 7 consultations on salmon fishing activities in the EEZ waters within the traditional net salmon fishing areas that may affect ESA-listed salmon species. Persons participating in salmon fisheries within these areas would continue to be subject to ESA § 9 prohibition on the taking of listed species. ESA § 10 would allow the Secretary to grant incidental take permits to persons who take listed species incidentally as part of their lawful fishing activities as long as such person mitigates the risk of take. The State is also obligated under the ESA to ensure that it does not license fishing operations to use fishing gear in a manner that is likely to result in a violation of the ESA. Given that salmon fishing activities in these areas are subject to ESA §§ 9 and 10, NMFS does not believe that elimination of ESA § 7 consultation requirement for salmon fishing activities in the EEZ waters within the traditional net salmon fishing areas will have significant impact on the ESA-listed salmon species in these areas.

Alternative 4 would maintain the FMP in the East Area only and remove the FMP and its prohibition on net fishing in the West Area. The current salmon fisheries in the West Area would remain under state management and that would not change as a result of removing the West Areas from the FMP. However, as discussed in section 2.5.2, there is a risk that vessels not registered with the state could harvest salmon in the West Area. At this point, it is not possible to predict the extent of possible fishing in the West Area in the absence of the federal prohibition. Any fishing in the West Area would be unregulated by state or federal managers and therefore it would not be possible to know the extent of harvest or catch of ESA-listed salmon. Additionally, unregulated fishing could occur off-shore and therefore the likelihood of catching ESA-listed salmon species may increase. However, since it is not possible to predict the extent of fishing, the impacts of this alternative on ESA-listed salmon stocks are unknown.

5.4 Marine Mammals

The GOA supports one of the richest assemblages of marine mammals in the world. Twenty-two species are present from the orders Pinnipedia (seals and sea lions), Carnivora (sea otters), and Cetacea (whales, dolphins, and porpoises). Some marine mammal species are resident throughout the year, while others migrate into or out of Alaska fisheries management areas. Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf (Lowry et al. 1982). Table 5-19 provides a summary of the status of the marine mammals potentially affected by these salmon

fisheries. The 2010 marine mammal stock assessment report[65] provides background information, population estimates, population trends, and estimates of the potential biological removal levels for each stock.

Interactions between marine mammal species and the salmon fishery occur when fishing vessels disturb marine mammals, marine mammals prey on hooked salmon, and marine mammals become snagged or entangled in fishing gear. The term incidental take in regards to commercial fishing refers to the catch or entanglement of animals that were not the intended target of the fishing activity. Reports of marine mammal injuries or mortalities incidental to commercial fishing operations have been obtained from fisheries reporting programs (self-reporting or logbooks), observer programs, and reports in the literature. The known interactions between marine mammals and the FMP salmon fisheries and the reported incidental takes are detailed in section 5.4.1 for the troll and purse seine fisheries and in section 5.4.2 for the drift gillnet fisheries.

The impacts of the current FMP salmon fisheries on ESA-listed species are described in section 5.4.3 for Cook Inlet Beluga whales, in section 5.4.4 for Humpback whales, section 5.4.5 for Steller sea lions, section 5.4.7 for sea otters, and section 5.4.6 for Southern Resident killer whales. An analysis of the impacts of the alternatives on marine mammals is in section 5.4.8.

Humpback whales, beluga whales, killer whales, seals, Northern fur seals, and Steller sea lions eat salmon (Table 5-18). Salmon is primarily a summer prey species for Steller sea lions, resident killer whales, spotted seals, beluga whales, and northern fur seals (NPFMC 2011b). Salmon harvested in the commercial salmon fisheries may otherwise be available as prey for marine mammals.

[65] The 2010 Marine Mammal Stock Assessment Report (Allen and Angliss 2011) is available at http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2010.pdf.

Table 5-18 Marine Mammals that eat salmon

Species	Prey
Humpback whale	Zooplankton, schooling fish (pollock, herring, capelin, saffron cod, sand lance, Arctic cod, and **salmon** species)
Beluga whale	Wide variety invertebrates and fish including **salmon** and pollock
Killer whale	Marine mammals and (resident) fish (including herring, halibut, **salmon,** and cod)
Seals	Primarily pelagic and nearshore fish (pollock and **salmon**), occasionally cephalopods and crustaceans
Northern fur seal	Pollock, squid, and bathylagid fish (northern smoothtongue), herring, **salmon,** and capelin. (Females at Bogoslof eat primarily squid and bathylagid fish and less pollock than in the Pribilofs, and salmon irregularly.)
Steller sea lion	pollock, Atka mackerel, Pacific herring, Capelin, Pacific sand lance, Pacific cod, and **salmon**

Source: NPFMC 2011b

Table 5-19 Status of marine mammal stocks potentially affected by the FMP salmon fisheries

Marine mammal species and stock	Status under the ESA	Status under the MMPA	Population Trends	Distribution in action area
Steller sea lion - Western and Eastern DPS	Endangered (WDPS) Threatened (EDPS)	Depleted & a strategic stock	For the WDPS, regional increases in counts in trend sites of some areas have been offset by decreased counts in other areas so that the overall population of the WDPS appears to have stabilized (NMFS 2010). The EDPS is steadily increasing and is being considered for delisting.	WDPS inhabits Alaska waters from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters. EDPS inhabit waters east of Prince William Sound to Dixon Entrance. Occur throughout AK waters, terrestrial haulouts and rookeries on Pribilof Is., Aleutian Is., St. Lawrence Is. and off mainland. Use marine areas for foraging. Critical habitat designated around major rookeries and haulouts and foraging areas.
Northern fur seal – Eastern Pacific	None	Depleted & a strategic stock	Recent pup counts show a continuing decline in the number of pups surviving in the Pribilof Islands. NMFS researchers found an approximately 9% decrease in the number of pups born between 2004 and 2006. The pup estimate decreased most sharply on Saint Paul Island.	Fur seals occur throughout Alaska waters, but their main rookeries are located in the Bering Sea on Bogoslof Island and the Pribilof Islands. Approximately 55% of the worldwide abundance of fur seals is found on the Pribilof Islands. Forages in the pelagic area of the Bering Sea during summer breeding season, but most leave the Bering Sea in the fall to spend winter and spring in the N. Pacific.
Harbor seal – Gulf of Alaska Bering Sea	None	None	Moderate to large population declines have occurred in the Bering Sea and Gulf of Alaska stocks.	GOA stock found primarily in the coastal waters and may cross over into the Bering Sea coastal waters between islands. Bering Sea stock found primarily around the inner continental shelf between Nunivak Island and Bristol Bay and near the Pribilof Islands.
Spotted seal	Status under review	None	Reliable data on population trends are unavailable.	Found throughout the Bering Sea.

Marine mammal species and stock	Status under the ESA	Status under the MMPA	Population Trends	Distribution in action area
Northern sea otter – SW Alaska	Threatened	Depleted & a strategic stock	The overall population trend for the southwest Alaska stock is believed to be declining, particularly in the Aleutian Islands.	Coastal waters from Central GOA to W. Aleutians within the 40 m depth contour. Critical habitat designated in primarily nearshore waters with few locations into federal waters in the GOA.
Harbor porpoise	None	Strategic	Reliable data on population trends are unavailable.	Primarily in coastal waters in the GOA, usually less that 100 m.
Pacific white-sided dolphin	None	None	Reliable data on population trends are unavailable.	Found throughout the GOA.
Killer whale – AT1 Transient; Eastern North Pacific GOA, AI, and BS transient; West Coast transient; and Eastern North Pacific Alaska Resident	Southern resident – endangered. The rest of the stocks – none.	AT1 Transient - depleted & a strategic stock. The rest of the stocks – none.	Southern residents have declined by more than half since 1960s and 1970s. Unknown abundance for the Alaska resident; and Eastern North Pacific GOA, Aleutian Islands, and Bering Sea transient stocks. The minimum abundance estimate for the Eastern North Pacific Alaska Resident stock is likely underestimated because researchers continue to encounter new whales in the Alaskan waters.	Transient-type killer whales from the Aleutian Islands and Bering Sea are considered to be part of a single population that includes Gulf of Alaska transients. Killer whales are seen in the northern Bering Sea and Beaufort Sea, but little is known about these whales. Southern resident do not occur in the GOA.
Dall's porpoise – Alaska	None	None	Reliable data on population trends are unavailable.	Found in the offshore waters from coastal western Alaska to Bering Sea.
Humpback whale- Western North Pacific Central North Pacific	Endangered and under status review	Depleted & a strategic stock	Increasing. The Structure of Populations, Levels of Abundance, and Status of Humpbacks (SPLASH) abundance estimate for the North Pacific represents an annual 4.9% increase since 1991–93. SPLASH abundance estimates for Hawaii show annual increases of 5.5% to 6.0% since 1991-1993(Calambokidis et al. 2008).	W. Pacific and C. North Pacific stocks occur in Alaskan waters and may mingle in the North Pacific feeding area. Humpback whales in the Bering Sea cannot be conclusively identified as belonging to the western or Central North Pacific stocks, or to a separate, unnamed stock.

Marine mammal species and stock	Status under the ESA	Status under the MMPA	Population Trends	Distribution in action area
Beluga Whale – Bristol Bay, Eastern Bering Sea, Cook Inlet, and eastern Chukchi Sea	None for all stocks except Cook Inlet, which are endangered	Depleted & a strategic stock	Abundance estimate is 3,710 animals and population trend is not declining for the eastern Chuckchi Sea stock. Minimum population estimate for the eastern Bering Sea stock is 14,898 animals and population trend is unknown. The minimum population estimate for the Bristol Bay stock is 1,619 animals and the population trend is stable and may be increasing. For Cook Inlet Belugas, estimated decline of 71 percent in 30 years with 375 animals estimated in 2008.	Summer in the Arctic Ocean and Bering Sea coastal waters, and winter in the Bering Sea in offshore waters associated with pack ice. Cook Inlet belugas remain in Cook Inlet year round and eat salmon.
Source: Allen and Angliss 2011 and List of Fisheries for 2011 (75 FR 68468, November 8, 2010). *Northern fur seal pup data available from http://www.alaskafisheries.noaa.gov/newsreleases/2007/fursealpups020207.htm.* *Northern sea otter information from http://www.nmfs.noaa.gov/pr/pdfs/sars/seaotter2008_ak_sw.pdf and 74 FR 51988, October 8, 2009.*				

5.4.1 Alaska Troll Fishery and Alaska Purse Seine Fishery

The Alaska troll fishery and Alaska purse seine fishery are classified as a category III fishery under the Marine Mammal Protection Act (MMPA) with little or no suspected serious injury or mortality effect. A fishery with no known interactions, or that interacts only with non-strategic stocks, or whose level of take has an insignificant impact on the stocks is placed in category III.

5.4.2 Drift Gillnet Fisheries in Cook Inlet, Prince William Sound, and the Alaska Peninsula

The Cook Inlet, Prince William Sound, and Alaska Peninsula drift gillnet fisheries are classified as category II fisheries under the MMPA. A fishery that has occasional incidental mortality or serious injury of marine mammals is placed in category II. Fishermen participating in a category II fishery are required to accommodate an Alaska Marine Mammal Observer Program (AMMPO) observer onboard the vessel(s) upon request by NMFS (50 CFR 229.7). NMFS has placed observers on vessels in these fisheries in the past and this observer data is used to understand the impacts of these fisheries on marine mammals and seabirds detailed in the following sections. NMFS may develop and implement take reduction plans for any Category II fishery that interacts with a strategic stock. Fishermen participating in a category II fishery are required to comply with any applicable take reduction plans. NMFS has not developed a take reduction plan for these fisheries. Additionally, each vessel fishing in a category II fishery must have a NMFS-issued certificate under the MMPA.

It is important to note that the classification of fisheries and the requirements NMFS places on the category II fisheries under the MMPA are irrespective of whether the fishery is under state or federal jurisdiction. For example, NMFS is currently deploying marine mammal observers on the state-managed Southeast Alaska gillnet fishery.

Cook Inlet drift gillnet fishery

According to the List of Fisheries[66], the Cook Inlet drift gillnet fishery has the potential to interact with the following marine mammal species: Cook Inlet beluga whale *(Delphinapterus leucas),* Dall's porpoise (*Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), harbor seal (*Phoca vitulina*), and the Steller sea lion (*Eumetopias jubatus*). The reported interactions between this fishery and marine mammals are shown in Table 5-20. This fishery was categorized as a Category II based on logbook data. Observer coverage levels were inadequate to determine mortality and serious injury levels across all fisheries, but available data suggested that, if observer data were available, the data would likely indicate that serious injury and mortality were more than 10% of the Potential Biological Removal (PBR) for at least one stock with which this fishery interacts. Data suggests that levels of mortality and serious injury would be similar to those in other Category II drift gillnet fisheries which interact with similar marine mammal species.

A marine mammal observer program for the Cook Inlet salmon drift gillnet fisheries was implemented in 1999 and 2000 in response to the concern that there may be significant numbers of marine mammal

[66] The 2011 List of Fisheries is available at http://www.nmfs.noaa.gov/pr/interactions/lof/final2011.htm.

injuries and mortalities that occur incidental to these fisheries (Manly 2006). Observer coverage in the Cook Inlet drift gillnet fishery was 1.75% and 3.73% in 1999 and 2000, respectively. This fishery has not been observed since 2000; therefore, no additional observer data are available. Self-reporting information is available from 1990 to 1994 (see Appendix 7 to Allen and Angliss 2011).

Table 5-20 Reported interactions between the Cook Inlet drift gillnet fishery and marine mammals. (Source: 2011 List of Fisheries and Allen and Angliss 2011)

Marine Mammal	Year	Observed mortality in that year	Extrapolated mortality in that year	Estimated Mean annual mortality	Self-reporting
Harbor Seal	No takes reported by observers.				6 incidents were self-reported in 1990 and 1 in 1992
Harbor Porpoise	1999	0	0	15.6	3 incidents were self-reported in 1990.
	2000	1	31.2		
Cook Inlet Beluga whale	No takes reported by observers.			0- based on a lack of reported mortalities	None
Dall's Porpoise	No takes reported by observers.				1 incident was self-reported in 1990 and in 1992
Steller sea lions	No takes reported by observers and no additional information on interactions is available.				

Prince William Sound drift gillnet fishery

According to the List of Fisheries, the Prince William Sound drift gillnet fishery has the potential to interact with the following marine mammal species: Dall's porpoise, harbor porpoise, harbor seal, Northern fur seal (*Callorhinus ursinus*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), sea otter (*Enhydra lutris*), and the Steller sea lion WDPS. The reported interactions between this fishery and marine mammals are shown in Table 5-20. Category II classification is based on the total annual mortality and serious injury of harbor porpoise (GOA stock) and Steller sea lion (WDPS) in this fishery being greater than 1% and less than 50% of the stocks' PBR level.

Observers monitored the Prince William Sound salmon drift gillnet fishery in 1990 and 1991 (Wynne et al. 1991 and Wynne et al. 1992). In 1990, observers were onboard 300 (57.3%) of the 524 vessels that fished in the Prince William Sound salmon drift gillnet fishery, monitoring a total of 3,166 sets, or roughly 4% of the estimated number of sets made by the fleet. In 1991, observers were onboard 531 (86.9%) of the 611 registered vessels and monitored a total of 5,875 sets, or roughly 5% of the estimated sets made by the fleet. This fishery has not been observed since 1991; therefore, no additional observer

data are available. Self-reporting information is available from 1990 to 1994 (see Appendix 7 to Allen and Angliss 2011).

Table 5-21 Reported interactions between the Prince William Sound drift gillnet fishery and marine mammals. (Source: 2011 List of Fisheries and Allen and Angliss 2011)

Marine Mammal	Year	Observed mortality in that year	Extrapolated mortality in that year	Estimated Mean annual mortality	Additional notes
Harbor Seal	1990	2	36	24	Self-reports of harbor seal mortalities are 19, 4, 7, 24, and 0 mortalities in 1990, 1991, 1992, 1993, and 1996, respectively. The mean annual mortality accounts for these mortalities
	1991	1	12		
Harbor Porpoise	1990	1	8	20	From 1990 to 1994, 12 harbor porpoise scarred with gillnet marks were discovered stranded in Prince William Sound (Copper River Delta). No confirmed harbor porpoise strandings in this area during 1999-2003.
	1991	3	32		
Northern Fur Seal	No takes reported by observers and 1 incident was self-reported in 1990 and in 1991.				
Dall's Porpoise	No takes reported by observers and 2 incidents were self-reported in 1991.				
Pacific white-sided dolphin	No takes reported by observers and 1 incident was self-reported in 1990 and 4 were reported in 1991.				
Sea otters	In 1990, self-report records show one mortality and four injuries due to gear interaction, and three injuries due to deterrence.				
Steller sea lions	1990	0	0	14.5	None
	1991	2	29		

Alaska Peninsula drift gillnet fishery

According to the List of Fisheries, the Alaska Peninsula drift gillnet fishery has the potential to interact with the following marine mammal species: Dall's porpoise, harbor porpoise, harbor seal, and Northern fur seal. The reported interactions between this fishery and marine mammals are shown in Table 5-22. This fishery was categorized as a Category II by analogy with other category II AK drift gillnet fisheries, and because of inadequate observer data since 1991. The low levels of observer coverage across all

fisheries were inadequate to determine mortality and serious injury levels of marine mammals across all fisheries, but available data suggested that mortality and serious injury may have exceeded 10% of the PBR level for Dall's porpoise and harbor porpoise.

In 1990, observers were onboard 59 (38.3%) of the 154 vessels participating in the Alaska Peninsula/Aleutian Island salmon drift gillnet fishery, monitoring a total of 373 sets, or roughly 4% of the estimated number of sets made by the fleet (Wynne et al. 1991). This fishery has not been observed since 1990; therefore, no additional observer data are available. Self-reporting information is available from 1990 to 1994 (see Appendix 7 to Allen and Angliss 2011).

Table 5-22 Reported interactions between the Alaska Peninsula drift gillnet fishery and marine mammals. (Source: 2011 List of Fisheries and Allen and Angliss 2011)

Marine Mammal	Year	Observed mortality in that year	Extrapolated mortality in that year	Estimated Mean annual mortality	Additional notes
Dall's Porpoise	1990	1	28	28	1.8% of PBR (PBR=1,556)
Harbor Seal	No takes reported by observers and self-reported incidents were 9 in 1990, 2 in 1991, 12 in 1992, and 5 in 1993.				
Harbor Porpoise	No takes reported by observers and 2 incidents were self-reported in 1990 and 1 in 1992.				
Northern Fur Seal	No takes reported by observers and two incidents were self-reported in 1990.				

5.4.3 Cook Inlet Beluga Whale

In 2008, the Cook Inlet DPS of beluga whales was listed as an endangered species under the ESA following a significant population decline (73 FR 62919, October 22, 2008). In 2010, NMFS estimated the Cook Inlet beluga whale population to be 340 individuals, up from the 2009 estimate of 321 whales, although the 10-year annual trend is still declining 1.1% per year. Historical abundance is estimated at approximately 1,300 whales (NMFS 2008b). Cook Inlet belugas primarily occur in the northern portion of Cook Inlet. Beluga whales do not normally transit outside of Cook Inlet.

Based on the best scientific data available of the ecology and natural history of Cook Inlet beluga whales and their conservation needs, NMFS determined the following physical or biological features are essential to the conservation of this species (74 FR 63080[67]):

> 1. Intertidal and subtidal waters of Cook Inlet with depths <30 feet (9.1 m) (MLLW) and within 5 miles (8.0 km) of high and medium flow accumulation anadromous fish streams;

[67] http://www.fakr.noaa.gov/prules/74fr63080.pdf

2. Primary prey species consisting of four species of Pacific salmon (Chinook, sockeye, chum, and coho), Pacific eulachon, Pacific cod, walleye pollock, saffron cod, and yellowfin sole;

3. The absence of toxins or other agents of a type or amount harmful to beluga whales;

4. Unrestricted passage within or between the critical habitat areas; and

5. Absence of in-water noise at levels resulting in the abandonment of habitat by Cook Inlet beluga whales.

NMFS has identified more than one third of Cook Inlet as critical habitat (Figure 5-1, 76 FR 20180, April 11, 2011). Pacific salmon constitute one of the primary constituent elements for the Cook Inlet beluga whale's critical habitat. When designating critical habitat under the ESA, NMFS is required to identify specific areas, within the geographical area occupied by the species, on which are found those physical or biological features (i) essential to the conservation of the species and (ii) which may require special management considerations or protection.[68] As a primary constituent element, NMFS concluded that salmon are essential to the conservation of the Cook Inlet beluga whale and may require special management considerations or protection in the future. The term "special" does not necessarily mean "beyond existing". This conclusion does not mean that salmon are presently impaired or limiting, or that existing laws and regulations managing salmon are not sufficient. NMFS continues to work with the State to ensure that Cook Inlet Beluga whales are considered in fish management planning for Cook Inlet.

This analysis focuses on incidental take of belugas and reduction of prey, as these were the two areas identified in the Conservation Plan for the Cook Inlet beluga whale that are impacted by salmon fisheries (NMFS 2008b). The largest fisheries in Cook Inlet, in terms of participant numbers and landed biomass, are the state-managed salmon drift and set gillnet fisheries concentrated in the Central and Northern districts of Cook Inlet. Only the drift gillnet fishery occurs in the EEZ. Operation times change depending upon management requirements, but in general the drift gillnet fishery operates from late June through August. Belugas in Cook Inlet have been documented feeding on salmon (Chinook, chum, coho, and sockeye) during June through September, when the salmon fisheries occur.

Incidental Take NMFS designed a rotational observer program to identify potential interaction 'hot spots' among commercial fisheries operations in Alaska. With the heightened concern in Cook Inlet, the program observed two Cook Inlet fisheries, salmon drift gillnet and upper and lower Cook Inlet set gill net, in 1999 and 2000. Manly (2006) reported that the Cook Inlet drift net fishery had a total of 5,709 permit days (one permit fished for one day) of fishing in 1999 and 3,889 permit days of fishing in 2000, with all or part of 241 permit days of fishing observed for both years. No interactions with belugas were reported in the Cook Inlet salmon fisheries in 1999 and 2000 (Manly 2006). The Conservation Plan for the Cook Inlet beluga whale concluded that the current rate of direct mortality from commercial fisheries in Cook Inlet appears to be insignificant and should not delay recovery of these whales (NMFS 2008b). The proposed action would not change the likelihood of incidental takes in the Cook Inlet drift gillnet fishery.

[68] 16 U.S.C. § 1532(5)(A)(i) and § 1533(b)(6)(C).

Reduction of Prey Aside from direct mortality and injury from fishing activities, commercial fisheries may compete with beluga whales in Cook Inlet for salmon and other prey species. The following information is summarized from the Conservation Plan for the Cook Inlet beluga whale (NMFS 2008b). In the summer, as eulachon runs begin to diminish, belugas rely heavily on several species of salmon as a primary prey resource. There is strong indication beluga whales are dependent on access to relatively dense concentrations of high value prey throughout the summer months. Any diminishment in the ability of beluga whales to reach or utilize spring/summer feeding habitat, or any reductions in the amount of prey available, may impact the energetics of these animals and delay recovery. Feeding habitat occurs near the mouths of anadromous fish streams, coinciding with the spawning runs of returning adult salmon. These habitats may change quickly as each species of salmon, and often each particular river, is characterized as having its individual run timing.

Any escapement necessary to meet the needs of wild belugas would have to consider the feeding efficiency of these whales (which is unknown). The amount of fish required to sustain this population is unknown. However, data from captive beluga whales show daily consumption rates of 4-7 percent of body weight per day. Additional research, such as continued stomach and fatty acid analyses, may shed more light on feeding and prey requirements for beluga whales.

The current State salmon management plan oversees Cook Inlet fisheries in the lower, middle, and northern districts. Most of fisheries occur "upstream" of the river mouths and estuaries where beluga whales typically feed. However, the Cook Inlet drift gillnet fishery occurs in the off-shore waters of Cook Inlet. Whether the escapement into these rivers, having passed the gauntlet of the commercial fisheries, is sufficient for the wellbeing of Cook Inlet beluga whales is unknown.

However, while known salmon escapement numbers and commercial harvests have fluctuated widely throughout the last 40 years; samples of harvested and stranded beluga whales have shown consistent summer blubber thicknesses. Even if large salmon runs must be present for a beluga whale to efficiently capture a single fish, this would still be a small fraction of the total salmon return. The State carefully manages the salmon fisheries to meet escapement goals for various waters, and fisheries open and close throughout the season, presenting many opportunities for adequate numbers of salmon to reach their spawning streams. There also are salmon hatcheries operating in Cook Inlet, which have measurably added to the numbers of adult fish returning to the upper Inlet.

NMFS has recognized and acknowledged that the current management structure of the salmon fisheries has generally provided for the sustained harvest and productivity of salmon in Cook Inlet (76 FR 20180, April 11, 2011). While the Conservation Plan for the Cook Inlet beluga whale concluded that it is unknown whether competition with commercial fishing operations for prey resources is having any significant or measurable effect on Cook Inlet beluga whales (NMFS 2008b), NMFS has no information to suggest prey availability is or has been a factor in the decline or is in need of improvement to promote the recovery of the Cook Inlet beluga whale (76 FR 20180, April 11, 2011).

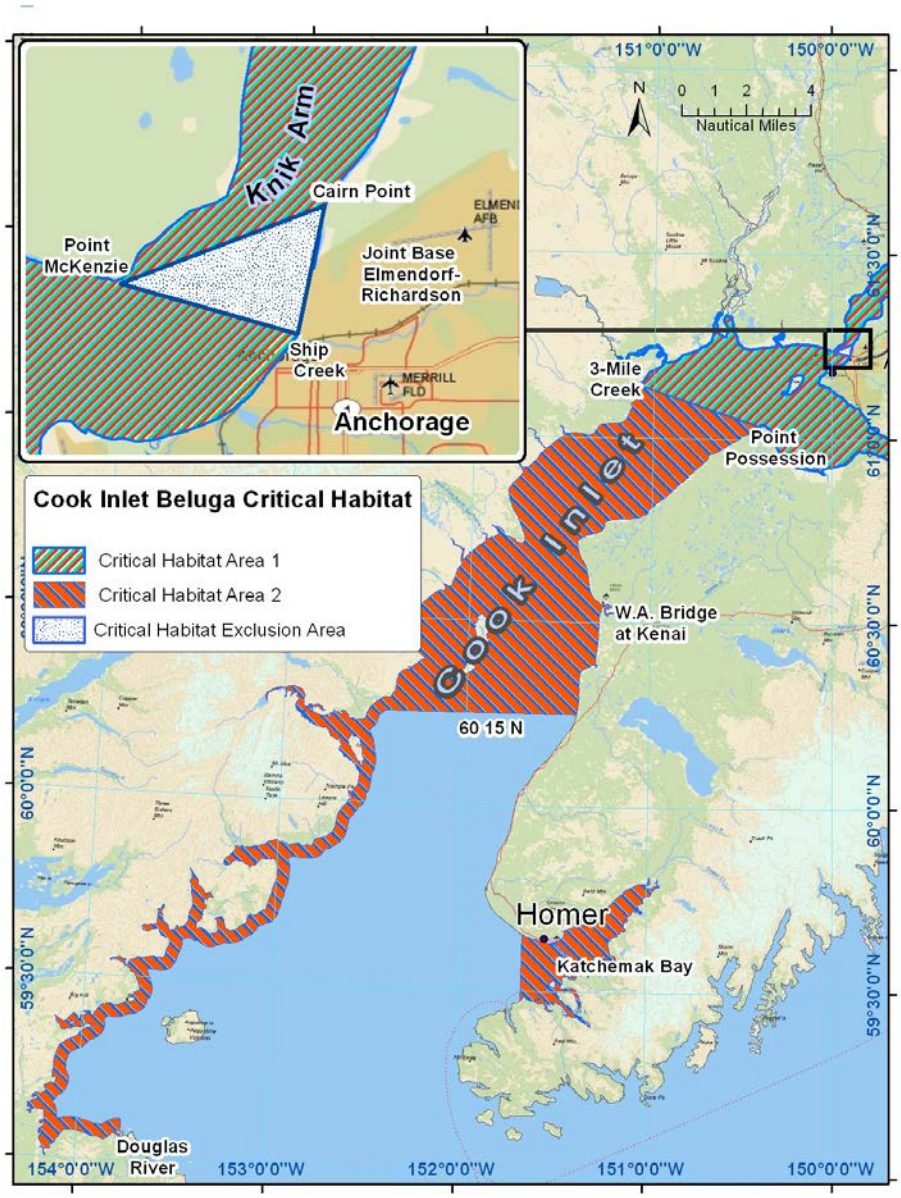

Figure 5-1. Cook Inlet Beluga Critical Habitat. NMFS Alaska Region

5.4.4 Humpback Whales

Humpback whales were initially listed in 1969 with the Endangered Species Conservation Act, and maintained in the status of endangered when the ESA passed into law in 1973. No critical habitat has been designated. A Recovery Plan for Humpback whales has been adopted (NMFS 1991). The historic summering range in the North Pacific encompasses coastal and inland waters around the Pacific rim from Point Conception, California, north to the Gulf of Alaska and the Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and into the Sea of Okhotsk. The humpback whale population in much of this range was considerably reduced as a result of intensive commercial exploitation during this century.

Four stocks are recognized in the North Pacific: the two that come to Alaska are the Central North Pacific, and the Western North Pacific. NMFS has determined that for humpback whale, the mortality and serious injury incidental to commercial fishing operations will have a negligible impact (60 FR 45399; August 31, 1995). A 'negligible impact' is defined as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through an effect on annual rates of recruitment or survival. Section 7 consultation was completed on this determination (NMFS 1995a) including issuance of an incidental take statement for humpback whales for commercial fishing operations of an average annual incidental mortality and serious injury in commercial fishery of up to 2.8 humpback whales from the Central North Pacific stock.

While there are no reported interactions with FMP salmon fisheries and humpback whales, the 2010 Stock Assessment notes that there are reported interactions with humpback whales and the Cook Inlet salmon set gillnet and purse seine fisheries and the Southeast salmon drift gillnet fisheries. None of these fisheries are managed by the FMP.

Additionally, there is the potential for reduction in prey because humpback whales eat salmon. However, this potential competition for salmon prey is not likely to have a significant effect on humpback whales because salmon is one of many prey species eaten by humpback whales in the GOA.

5.4.5 Steller Sea Lions

The Steller sea lion range extends from California and associated waters to Alaska, including the GOA and Aleutian Islands, and into the Bering Sea and North Pacific and into Russian waters and territory. In 1997, based on biological information collected since the species was listed as threatened in 1990 (60 FR 51968), NMFS reclassified Steller sea lions as two distinct population segments under the ESA (62 FR 24345). The Eastern Distinct Population Segment (EDPS) of Steller sea lion (east of 144° W. longitude, a line near Cape Suckling, Alaska) is listed a threatened. The Western Distinct Population Segment (WDPS) Steller sea lion (west of 144° W. longitude) is listed as endangered.

NMFS designated critical habitat in 1993 (58 FR 45278) for the WDPS of Steller sea lion based on the Recovery Team's determination of habitat sites essential to reproduction, rest, refuge, and feeding. Listed critical habitats in Alaska include all rookeries, major haul-outs, and specific aquatic foraging habitats of the BSAI and GOA.

In 2006, NMFS reinitiated an FMP-level Section 7 consultation on the effects of the groundfish fisheries on Steller sea lions, humpback whales, fin whales, and sperm whales to consider new information on these species and their interactions with the fisheries. The final BiOp was released in October 2010, and NMFS implemented the Steller sea lion protection measures on January 1, 2011 (NMFS 2010) by interim final rule (75 FR 77535, December 13, 2010, corrected 75 FR 81921, December 29, 2010). Background information on the life history and status of Steller sea lions is contained in the final 2010 BiOp (NMFS 2010).

Southeast Alaska Troll Fishery

The salmon troll fishery occurs in the eastern portion of the GOA, in the range of the EDPS of Steller sea lions. And, while this fishery is classified as a category III fishery under the MMPA, there is information

that may indicate interactions with Steller sea lions. In the 2008 BiOp, NMFS consulted on the impacts of the Southeast Alaska troll fishery on the EDPS of Steller sea lions (NMFS 2008a). The BiOp concluded that prey reductions caused by the Southeast Alaska troll fishery is discountable or insignificant to the EDPS of Steller sea lions, as supported by their ability to adapt to changing prey abundance as generalist predators, combined with the lack of threats to recovery and increasing population trend. Therefore, the FMP salmon fishery is not likely to adversely affect Steller sea lions, or their critical habitat.

The following information on Steller sea lion interactions with the Southeast Alaska troll fishery is summarized from the 2010 Alaska Marine Mammal Stock Assessment (Allen and Angliss 2011). During the 5-year period from 2004-2008, there were three mortalities of Steller sea lions due to ingestion of J-hooks attached to a "flasher" (an attractor used in salmon trolling) in which the hook was lodged in the esophagus and penetrating adjacent tissue. A total of 121 observations of Steller sea lions with flashers hanging from their mouth were reported in Southeast Alaska and northern British Columbia between 2003 and 2007 indicating an average rate of hook ingestion of 24.2 per year. However, it is important to note that these were data collected incidental to other studies. The animals were nearshore or on-shore when seen; however, it is not possible to tell where a Steller sea lion ingested the flasher or became entangled in the line, unless the type of gear was fishery specific. Therefore, it is not clear whether entanglements with hooks and flashers involved the sport or commercial component of the salmon troll fishery or whether the entanglements occurred in the EEZ.

These entanglements are called "serious injuries". Mortality records from the Alaska stranding database indicate a rate of incidental mortality of at least 0.6/year from the troll fishery. Based on currently available data, the minimum estimated total U. S. commercial fishery-related mortality and serious injury for this stock (25.6) is less than that 10% of the calculated PBR (200) and, therefore, can be considered to be insignificant and approaching a zero mortality and serious injury rate (Allen and Angliss 2011). Therefore, Southeast Alaska troll fishery's estimated incidental mortality rate (0.6) is insignificant and this fishery is not likely to adversely affect the EDPS of Steller sea lions beyond those effects already analyzed in the 2008 BiOp (NMFS 2008a).

Drift Gillnet Fisheries in Cook Inlet, Prince William Sound, and Alaska Peninsula

The Cook Inlet, Prince William Sound, and Alaska Peninsula drift gillnet fisheries occur in the western portion of the GOA, in the range of the WDPS of Steller sea lions. Both the Prince William Sound and Alaska Peninsula drift gillnet fisheries occur in Steller sea lion critical habitat (Figure 5-2 and Figure 5-3, respectively). The following information on Steller sea lion interactions with the drift gillnet fisheries is summarized from the 2010 Alaska Marine Mammal Stock Assessment (Allen and Angliss 2011) and the 2010 BiOp (NMFS 2010). The 2010 BiOp provided a review of the State managed salmon fisheries, including:

- A description of the fishery management strategy including any special measures pertaining to Steller sea lions;
- Recent changes in the spatial and temporal distribution of the fisheries; and
- A description of direct and indirect Steller sea lion interactions.

Incidental Take No incidental takes of Steller sea lions have been observed in the Cook Inlet drift gillnet fishery or the South Alaska Peninsula drift gillnet or purse seine fisheries. Cook Inlet drift gillnet fishery is thought to have the potential to interact with Steller sea lions, however, no takes have been reported by observers and no additional information on interactions is available (Table 5-20, Kruse et al. 2000, Ferrero et al. 2000). There is no documentation of the Alaska Peninsula drift gillnet fisheries interacting with Steller sea lions. The Alaska Peninsula salmon drift gillnet fishery was observed in 1990, and no Steller sea lion mortalities were observed (Table 5-22).

The Prince William Sound drift gillnet fishery interacts with Steller sea lions and causes an estimated mean annual mortality of 14.5 Steller sea lions (Table 5-21). Based on currently available data, the minimum estimated total U. S. commercial fishery-related mortality and serious injury for this stock (25.8) is less than that 10% of the calculated PBR (254) and, therefore, can be considered to be insignificant and approaching a zero mortality and serious injury rate (Allen and Angliss 2011). Therefore, the Prince William Sound drift gillnet fishery's estimated incidental mortality rate (14.5) is insignificant and none of the alternatives would change how these fisheries interact with WDPS of Steller sea lions. Note, however, that given the limited observer data, it is not known whether these incidental mortality levels are representative of the current incidental mortality levels in these fisheries.

Reduction of Prey Potential indirect effects of State managed fisheries include the competition for prey resources and the modification of Steller sea lion critical habitat. Prey items which occurred in greater than 10% of the Steller sea lion scats by area, season, and DPS-wide were determined to be important prey species. Salmon, pollock, and Pacific cod were identified as important prey species. Salmon was ranked fairly high, and was often higher than Pacific cod or pollock depending upon area and season. Salmon are high-energy forage species that may be important components (at least seasonally) of the diet of Steller sea lions. Salmon fisheries remove important Steller sea lion prey species, and many fisheries are concentrated in space (usually bays or river outlets) and in time (usually spawning aggregations and salmon congregating near rivers for their return to spawning grounds in spring and summer).

To date, there have been few studies specifically designed to address the effects of the salmon fisheries on Steller sea lions. Soboleff (2005) analyzed State fisheries (salmon, herring, shellfish, groundfish) fish ticket data for 1976-2002 and Steller sea lions counts by rookery (32) groupings (7). He indicated that within 50 nm of rookeries, SSL counts were both negatively and positively correlated with certain State fisheries, but few were significant and some probably spurious. This study also found negative correlation between State salmon fisheries and the Steller sea lions decline across all regions or all years, which disappeared at a regional scale. Soboleff (2005) felt this could be plausible as salmon fisheries occur near Steller sea lions haulouts and rookeries and salmon are important Steller sea lions prey. The study concluded that few data, low power, and concentration of State fisheries outside areas where Steller sea lions declines have been most severe all may be factors that indicate a low likelihood of State-managed fisheries adversely affecting Steller sea lions.

The early summer salmon fisheries could affect Steller sea lions during an important weaning period for juveniles and leading up to the birth of pups. Due to intensive salmon fishing activity in such areas during the same times when Steller sea lions target concentrations of salmon, individual Steller sea lions may feed less efficiently or may avoid these feeding opportunities entirely. The salmon escapement goals limit the commercial harvest to the surplus above the amount needed for spawning (Kruse et al. 2000),

but these harvest controls probably do not eliminate competition for available salmon between Steller sea lions and the fishery. However, as noted in Kruse et al. (2000) the abundance of salmon biomass increased dramatically during the time period that the WDPS of Steller sea lion has been in decline.

The State employs various management measures that indirectly provide some measure of protection to Steller sea lions. All waters within 3 nm of shore within Steller sea lion rookery critical habitat are closed to vessel entry, including vessels fishing under the State programs. State managed salmon fisheries are open for relatively short periods, and only rarely remain open for 24 hours per day, 7 days per week (Kruse et al. 2000). Nevertheless, many of these fisheries take place at stream or river outlets where salmon congregate before moving upstream to spawn (Kruse et al. 2000). These same areas may provide important Steller sea lion foraging opportunities on high-density prey, enabling the Steller sea lions to feed efficiently and survive other periods of low prey availability.

The 2010 Biop concluded that based on available information that State managed salmon fisheries are likely to continue to compete for fish with foraging Steller sea lions. Given the importance of near shore habitats to Steller sea lions, this competition for fish may have consequential effects for animals that forage in locations where state fisheries may be prosecuted. More data on the foraging habits of Steller sea lions from research in key geographic areas could aid understanding of where and when these effects might be most important. The 2010 Biop identified as a research priority the re-initiation of Marine Mammal Observer Program studies in the GOA to assess the significance of mortality incidental to Category II commercial fisheries with special emphasis placed on evaluating mortalities associated with the Prince William Sound salmon drift gillnet fishery.

However, salmon is one of many prey species eaten by Steller sea lions in the GOA and Steller sea lion population trends in the GOA in general are increasing and do not appear to be limited by prey availability (NMFS 2010). Therefore, the salmon drift gillnet fisheries in the EEZ are not likely to adversely affect the WDPS of Steller sea lions or its critical habitat beyond those effects already analyzed in the previous 2010 BiOp (NMFS 2010).

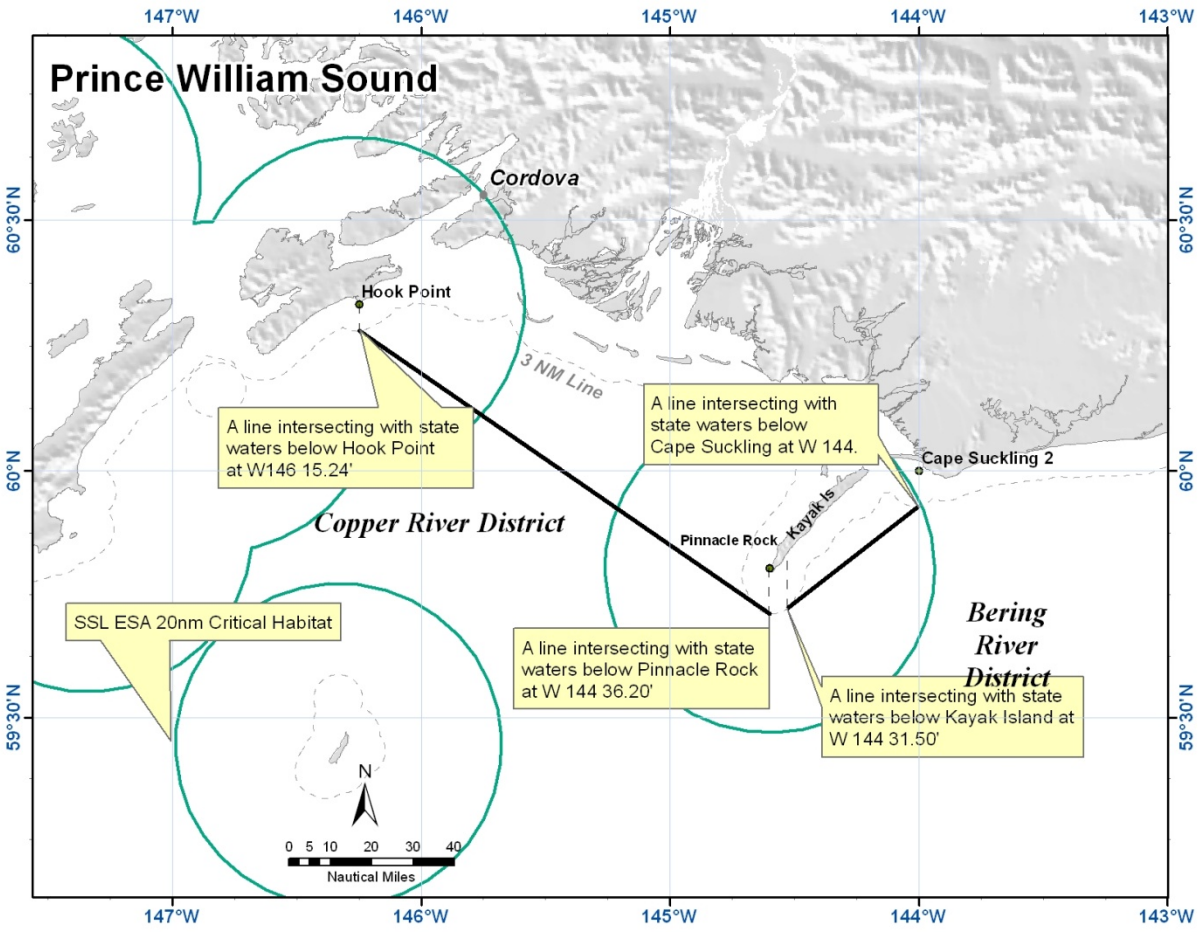

Figure 5-2 Overlap of Steller sea lion critical habitat and the Prince William Sound traditional net fishing area (Steve Lewis, NMFS Alaska Region)

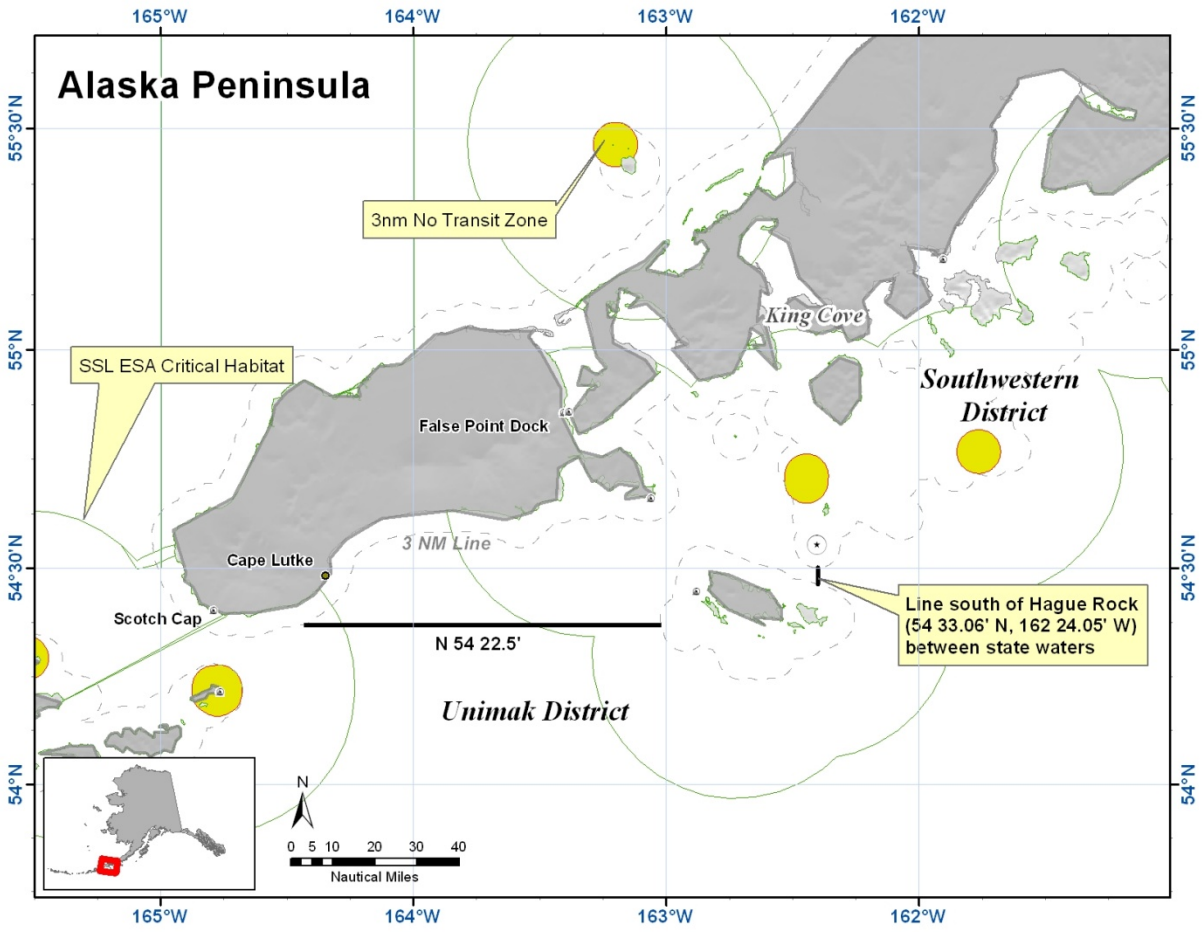

Figure 5-3 Overlap of Steller sea lion critical habitat and the Alaska Peninsula traditional net fishing area (Steve Lewis, NMFS Alaska Region)

5.4.6 Southern Resident Killer Whales

The Southern Resident killer whale DPS was listed as endangered under the ESA on November 18, 2005 (70 FR 69903), and critical habitat was designated on November 29, 2006 (71 FR 69054). Southern Residents are designated as "depleted" and "strategic" under the MMPA (68 FR 31980; May 29, 2003). The final recovery plan for Southern Residents Killer Whales, issued in January of 2008, provides more detailed information about this DPS (NMFS 2008c).[69] This section summarizes information taken largely from the recovery plan and 2008 BiOp (NMFS 2008a).

Several potential factors identified in the final recovery plan for Southern Residents may have caused the decline or may be limiting recovery of the DPS. These are: quantity and quality of prey, toxic chemicals which accumulate in top predators, and disturbance from sound and vessel effects. Oil spills are also a

[69] Available at www.nwr.noaa.gov.

potential risk factor for this species. Research has yet to identify which threats are most significant to the survival and recovery of Southern Residents. It is likely that multiple threats are acting in concert to impact the whales.

Southern Residents are found throughout the coastal waters off Washington, Oregon, and Vancouver Island and are known to travel as far south as central California and as far north as the Queen Charlotte Islands, British Columbia.

The FMP salmon fisheries occur outside of the range of the Southern Resident killer whales, therefore, there are no direct interactions between the whales and these fisheries. The FMP salmon fisheries may, however, affect Southern Residents indirectly by reducing availability of their primary prey, Chinook salmon. Based on the high percentage of Chinook in the diet of the whales, this analysis focuses on Chinook salmon.

Southern Resident killer whales consume a variety of fish species, but salmon are identified as their preferred prey. Feeding records for Southern and Northern Residents show a strong preference for Chinook salmon (72 percent of identified salmonids) during late spring to fall (Ford and Ellis 2006). Chum salmon (23 percent) are also taken in significant amounts, especially in autumn. Other salmon eaten include coho (2 percent), pink (3 percent) steelhead and sockeye (*O. mykiss, O. nerka* < 1 percent). The non-salmonids included Pacific herring, sablefish, Pacific halibut, quillback and yelloweye rockfish. Chinook were preferred despite the much lower abundance of Chinook in the study area in comparison to other salmonids (primarily sockeye), probably because of the species' large size, high fat and energy content and year-round occurrence in the area.

The 2008 BiOp concludes, for the Southeast Alaska fisheries, while the Southeast Alaska troll fishery has the potential to adversely affect Southern Resident killer whales and their critical habitat by reducing prey in their range and critical habitat, the many factors reduce the severity of the impacts or mitigate concerns. For example, the extent of adverse impact is limited by management measures that define catch or total mortality limits on Chinook in the Pacific Salmon Treaty Agreement. Therefore, the Southeast Alaska troll fishery is not likely to adversely affect the Southern Resident killer whales or critical habitat beyond those effects previously analyzed in the 2008 BiOp (NMFS 2008a).

For the fisheries in the West Area, the potential for impacts on prey availability is nominal because of the *de minimus* amount of Chinook salmon caught in the FMP salmon fisheries that may return to the range of Southern Resident killer whales. Spatially, only a fraction of Chinook salmon stocks caught in the FMP salmon fisheries overlap with stocks commonly found in the Southern Resident killer whale's range and diet. Additionally, only a small fraction of those fish would have potentially entered inland waters of Washington that are designated critical habitat for Southern Residents, and that reduction is not anticipated to affect the conservation value of the critical habitat. Table 5-17 summarizes the Chinook salmon harvest information for the FMP salmon fisheries in the West Area compared to the federally-managed groundfish fisheries. Section 5.3 provides the best available information on the potential for take of salmon that originate in the Pacific Northwest.

NMFS has consulted on the impacts of the Chinook salmon bycatch caught in the BSAI and GOA groundfish fisheries (NMFS 2012b). In that consultation, NMFS Protected Resources, Northwest Region,

found that, given the total quantity of prey available to Southern Residents in coastal waters, the anticipated reduction in prey is extremely small, and although measurable is anticipated to be less than a 1% reduction under all scenarios analyzed. Therefore, NMFS Protected Resources, Northwest Region, NMFS concurs with the determination of "may effect, not likely to adversely affect" for Southern Resident killer whales because all potential adverse effects to the Southern Resident killer whales would be insignificant. In addition, because all potential adverse effects to the Southern Resident killer whale critical habitat would be insignificant, NMFS makes a determination that the proposed project may effect, but is not likely to adversely affect Southern Resident killer whale critical habitat.

The FMP salmon fisheries in the three traditional net fishing areas are further away from the Southern resident killer whale critical habitat, and target more Alaska salmon, and harvest fewer Chinook salmon than the groundfish fisheries. Therefore NMFS concludes these fisheries will not effect on the Southern Resident killer whales or critical habitat beyond those effects previously analyzed in the 2008 BiOp (NMFS 2008a).

5.4.7 Sea Otters

USFWS determined the status of the Southwest Alaska DPS of the northern sea otter as threatened on August 9, 2005, effective September 8, 2005. The Southwest Alaska DPS has declined from an estimated 94,050 to 128,650 sea otters in the mid-1970s to an estimated 53,674 sea otters, based on surveys conducted from 2000 to 2008 and adjusted for animals not detected (USFWS 2010a). Evidence suggests that increased predation by killer whales, rather than disease, starvation or contaminants, is responsible for the increase in morality (USFWS 2009).

There have been no reported takes of the Southwest Alaska DPS northern sea otter in the FMP salmon fisheries: Cook Inlet and Alaska Peninsula drift gillnet and Alaska salmon purse seine. The Prince William Sound drift gillnet fishery is out of the range of this DPS. The only recorded incidental takes resulting in mortalities for Southwest Alaska DPS northern sea otter is the AK Kodiak set gillnet through a logbook record in 1991 (Funk 2003) and a fisherman's NMFS self-report in 2002. Entanglements in the AK Kodiak set gillnet have also been observed. In 2002, sea otters were observed entangled in four sets and entangled in one set in 2005. Two of the entanglements in 2002 and the one in 2005 were of a short duration, and the sea otters freed themselves unharmed. The two entangled sea otters in 2002 were released unharmed with human assistance (USFWS 2010a).

With respect to the non-ESA listed South Central Alaska DPS of the northern sea otter, in 1990, one mortality and four injuries due to gear interaction, and three injuries due to deterrence in the Prince William Sound drift gillnet fishery were recorded in a fisher self-report. Between 2000 and 2004, the estimated mean annual mortality and serious injury of sea otters is zero as there were no records of incidental take by commercial fisheries in this region (Allen and Angliss 2011).

5.4.8 Impacts of the Alternatives

The interactions between the FMP salmon fishery and marine mammals in the East Area, under Alternative 1, has not substantially changed since the FPEIS (NMFS 2003) and the 2008 BiOp (NMFS 2008a). Alternative 2 maintains the existing geographic scope of the FMP, and while it revises and

updates the FMP, none of the options under consideration would impact the prosecution of the salmon fisheries in a way that would change the impacts on marine mammals or change the fact that the Southeast Alaska troll fishery is a category III fishery. Thus, the new information available for Alternatives 1 and 2 is not of a scale and scope that requires a supplemental EIS.

For the West Area, the best available information on the interactions between the FMP fisheries and marine mammals is presented in section 5.4. This information indicates that impacts of the salmon fisheries in each of the three EEZ areas on marine mammals are not significant. Alternative 2 maintains the existing geographic scope of the FMP, and while it revises and updates the FMP, none of the options under consideration would impact the prosecution of the salmon fisheries in a way that would change the impacts on marine mammals.

Alternative 3, the preferred alternative, would modify the scope of the FMP to exclude three traditional net commercial salmon fishing areas from the FMP. The salmon fisheries in those areas would remain under state management and that would not change as a result of removing these areas from the FMP. Therefore, the impacts of the State managed fisheries on marine mammals would be similar to Alternatives 1 and 2. However, as discussed in section 2.5.2, there is a risk that vessels not registered with the state could harvest salmon in these three areas. While it is not possible to predict whether any unregulated fishing would occur in these three areas, if it did occur, the impacts on marine mammals would be insignificant given the limited history of interactions in the existing fisheries.

Alternative 3 would eliminate federal discretion or control over salmon fishing activities in the EEZ within the traditional net fishing areas that may affect listed species or critical habitat, and thus would remove the federal nexus that triggers ESA section 7 consultation (Table 5-19). Persons participating in salmon fisheries within these areas would continue to be subject to ESA § 9 prohibition on the taking of listed species. ESA § 10 would allow the Secretary to grant incidental take permits to persons who take listed species incidentally as part of their lawful fishing activities as long as they mitigate the risk of take. The State is also obligated under the ESA to ensure that it does not license operations to use fishing gear in a manner that is likely to result in a violation of the ESA. Given that salmon fishing activities in these areas would be subject to ESA § 9 and 10, NMFS does not believe that elimination of ESA § 7 consultation requirements for salmon fishing activities in the EEZ waters within the traditional net fishing areas will have significant impact on the listed species in these areas. Note that, if the Council recommends an alternative that may affect an ESA-listed marine mammal in a way that was not previously analyzed, NMFS would conduct a § 7 consultation on the proposed action as part of the approval process for the revised FMP.

Alternative 3 would not change how NMFS manages marine mammals under the MMPA. The fisheries in the three areas that would be removed from the FMP are category II fisheries and all of the requirements for category II fisheries, summarized in section 5.4.2, would still apply regardless of whether or not the FMP applied to those areas. This analysis highlights that the primary source of information on salmon fishery interactions with marine mammals is the Marine Mammal Observer Program and that the observer data was limited to begin with and is now between 11 and 21 years old. NMFS Protected Resources may determine that it is necessary to place marine mammal observers on the drift gillnet vessels in any of these three areas, based on NMFS's priorities and available funding.

However, the decision to place observers to gather data on interactions with marine mammals is irrespective of an FMP or state/federal boundaries.

Alternative 4 would maintain the FMP in the East Area only and remove the FMP and its prohibition on net fishing in the West Area. The salmon fisheries in the three traditional net areas would remain under state management and that would not change as a result of removing these areas from the FMP. And, it is assumed that the State would not open new State managed fisheries in other EEZ waters. Therefore, the impacts of the State managed fisheries on marine mammals under Alternative 4 would be similar to Alternatives 1 and 2.

At this point, it is not possible to predict the extent of possible fishing in the West Area in the absence of the federal prohibition. Any salmon fishing in the West Area, outside of the existing state managed fisheries, would be unregulated by state or federal managers and therefore it would not be possible to know the extent of salmon harvest or interactions with marine mammals. Since it is not possible to predict the extent of fishing, the impacts of this alternative on marine mammals are unknown.

Like Alternative 3, Alternative 4 would also eliminate future requirements for ESA § 7 consultation on salmon fishing activities in the West Area that may affect ESA-listed species or critical habitat. Under Alternative 4, salmon could be harvested with any gear-type and in areas where NMFS has no existing information on potential interactions with ESA-listed species. Persons participating in salmon fisheries within the West Area would continue to be subject to ESA § 9 prohibition on the taking of listed species. ESA § 10 would allow the Secretary to grant incidental take permits to persons who take listed species incidentally as part of their lawful fishing activities only so long as such person mitigates the risk of take. While salmon fishing activities in the West Area would be subject to ESA §§ 9 and 10, NMFS cannot predict the impacts of eliminating the ESA § 7 consultation requirement for salmon fishing activities in the EEZ waters on the listed species in this area.

5.5 Seabirds

Effects of fishing activity on seabirds occur through direct mortality from collisions with vessels and entanglement with fishing gear. Indirect impacts include competition with the commercial fishery for prey, alteration of the food web dynamics due to commercial fishery removals, disruption of avian feeding habits resulting from developed dependence on fishery waste, fish-waste related increases in gull populations that prey on other bird species, and marine pollution and changes in water quality. Competition between seabirds and fisheries for forage fish is difficult to evaluate. Climatic fluctuations undoubtedly contribute to fluctuations in seabird food resources, but so may fisheries.

Fish processing provides food directly to scavenging species such as Northern Fulmars and large gulls. This can benefit populations of some species but it can be detrimental to others, which may be displaced or preyed upon. Predation by birds has effects on fish populations, which have variously been estimated as minor to significant.

Thirty-eight species of seabirds breed in Alaska. Breeding populations are estimated to contain 36 million individual birds in Alaska, and total population size (including subadults and nonbreeders) is

estimated to be approximately 30% higher. Five additional species that breed elsewhere but occur in Alaskan waters during the summer months contribute another 30 million birds.

Species nesting in Alaska

Tubenoses-Albatrosses and relatives: Northern Fulmar, Fork-tailed Storm-petrel, Leach's Storm-petrel

Kittiwakes and terns: Black-legged Kittiwake, Red-legged Kittiwake, Arctic Tern, Aleutian Tern, Caspian Tern

Pelicans and cormorants: Double-crested Cormorant, Brandt's Cormorant, Pelagic Cormorant, Red-faced Cormorant

Jaegers and gulls: Pomarine Jaeger, Parasitic Jaeger, Long-tailed Jaeger, Bonaparte's Gull, Mew Gull, Herring Gull, Glaucous-winged Gull, Glaucous Gull, Sabine's Gull, Slaty-backed Gull

Auks: Common Murre, Thick-billed Murre, Black Guillemot, Pigeon Guillemot, Marbled Murrelet, Kittlitz's Murrelet, Ancient Murrelet, Cassin's Auklet, Parakeet Auklet, Least Auklet, Whiskered Auklet, Crested Auklet, Rhinoceros Auklet, Tufted Puffin, Horned Puffin, Dovekie

Species that visit Alaska waters

Tubenoses: Short-tailed Albatross, Black-footed Albatross, Laysan Albatross, Sooty Shearwater, Short-tailed Shearwater

Gulls: Ross's Gull, Ivory Gull

Seabird life history includes low reproductive rates, low adult mortality rates, long life span, and delayed sexual maturity. These traits make seabird populations extremely sensitive to changes in adult survival and less sensitive to fluctuations in reproductive effort. The problem with attributing population changes to specific impacts is that, because seabirds are long-lived animals, it may take years or decades before relatively small changes in survival rates result in observable impacts on the breeding population.

Several species of conservation concern occur in the GOA (Table 5-23). Short-tailed Albatross is listed as endangered, Steller's Eider is listed as threatened, and Kittlitz's Murrelet is a candidate species[70] for listing under the ESA.

[70] For more information on the Kittlitz's Murrelet's candidate status, see http://alaska.fws.gov/media/murrelet/qa.pdf.

Table 5-23 ESA-listed and candidate seabird species that occur in the GOA

Common Name	Scientific Name	ESA Status
Short-tailed Albatross	Phoebaseotria albatrus	Endangered
Steller's Eider	Polysticta stelleri	Threatened
Kittlitz's Murrelet	Brachyramphus brevirostris	Candidate

5.5.1 Alaska Troll Fishery

Impacts on seabirds from the salmon troll fishery are minimal, if any. The FPEIS concludes that troll gear is not known to harvest birds and salmon troll fishing is not known to provide significant waste and offal to attract scavenging birds (NMFS 2003). The salmon harvested in the fishery are mature, fully grown salmon, not the size range of forage fish utilized by seabird populations. Thus, no effects by the fishery have been identified. Likewise, seabirds are not known to become entangled in the gear used in this fishery. The proposed action and its alternatives would have no effect on listed seabirds relative to status quo because it would not change the prosecution of the troll fishery.

5.5.2 Drift Gillnet Fisheries in Cook Inlet, Prince William Sound, and the South Alaska Peninsula

The impacts of the salmon fisheries in the three historic net fishing areas on seabirds has not been previously analyzed. Under Section 118 of the MMPA, NMFS is required to monitor the rate of incidental take of marine mammals in commercial fisheries. NMFS manages the Alaska Marine Mammal Program to observe State fisheries, including salmon gillnet fisheries, to estimate take of marine mammals. Observers for this program have also collected information related to seabird bycatch, but the study methodologies are designed for estimating marine mammal take, not seabird take. However, seabird bycatch information collected by this program is the best available information we have to assess the potential impact of this fishery on seabirds.

USFWS has identified gillnet fisheries as one sources of human-caused mortality for Kittlitz's Murrelets (USFWS 2010b). Being small-bodied, nearshore divers, these birds sometimes get caught in gillnets and drown (Day et al. 1999). Mortalities have been documented in gillnet fisheries in Alaska in Prince William Sound (Wynne et al. 1992), Kodiak (Manly et al. 2007), and Yakutat Bay (Manly 2009). The Kittlitz's Murrelet forages in shallow waters for schooling fishes (including capelin, Pacific sandlance Pacific herring, and walleye pollock), zooplankton, and other invertebrates. In areas with tidewater glaciers within its range, the Kittlitz's Murrelet associates with icebergs (but not heavy ice) and outflows of glacial streams (Day et al. 1999, USFWS 2010b), sometimes nesting up to 45 miles inland on rugged mountains near glaciers. Most recent population estimates indicate a global population between 30,900 and 56,800 individuals (USFWS 2010b). Significant population declines have been reported in several of its core population centers (USFWS 2010b).

USFWS recently lowered the listing priority for Kittlitz's Murrelet from a 2 (highest possible priority for the species) to an 8 (out of 12) (76 FR 66370, October 26, 2011). This change was based on growing doubts about severity of population declines and lack of a clear link between melting glaciers and population change. USFWS has shifted focus from the loss of glaciers to poor reproductive success. Poor nest success (as opposed to adult mortality) could be the underlying reason for the population decline, and if it is occurring rangewide, the population would be expected to continue to decline.

USFWS maintains that loss of the adult Kittlitz's Murrelets is particularly important and has identified several sources of adult mortality such as hydrocarbon contamination, entanglement in gillnets, and predation. Although none of these sources of mortality alone rises to the level of a threat, in total, the chronic, low level loss of adults, in combination with evidence that a small proportion of the population is breeding, and the low reproductive success leads the USFWS to conclude that it will be difficult for this species to maintain a stable population level or rebound from a stochastic event that causes population loss. However, the USFWS concludes that the magnitude of threat from these sources is low to moderate, depending on events that occur in a given year (number and location of oil spills/ship wrecks, number and location of gillnets) (76 FR 66370, October 26, 2011).

The following analysis provides the best available information on seabird interactions with the Cook Inlet, Prince William Sound, and Alaska Peninsula draft gillnet fisheries and the Alaska Peninsula purse seine fishery

Cook Inlet drift gillnet fishery

Potential marine bird interactions are of concern in the drift gillnet fisheries, because of the high numbers of marine birds in Cook Inlet in the summer, perhaps as high as two to three million birds. Densities of up to 300 birds/km^2 have been reported. In particular, there is very high primary productivity around Kachemak Bay on the eastern side of Lower Cook Inlet, leading to high concentrations of birds.

Bird species in Cook Inlet include Short-tailed Shearwaters (*Puffinus tenuirostris*), Tufted Puffins (*Fratercula cirrhata*), Black-legged Kittiwakes (*Rissa tridactyla*), Common Murres (*Uria aalge*), *Brachyramphus* murrelets, phalaropes (mainly Rednecked Phalaropes, *Phalaropus lobatus*), Fork-tailed Storm-petrels (*Oceanodroma furcata*), Northern Fulmars (*Fulmarus glacialis*), Glaucous-winged Gulls (*Larus glaucescens*), Horned Puffins (*Fratercula corniculata*), and Pigeon Guillemots (*Cepphus columba*).

The Alaska Marine Mammal Observer Program for the Cook Inlet salmon drift gillnet fisheries was implemented in 1999 and 2000 (Manly 2006). Observer coverage in the Cook Inlet drift gillnet fishery was low; 1.75% in 1999 and 3.73% in 2000. In 1999, the observed incidental take of seabirds consisted of Common Murres (three released dead) and gulls (two released alive without serious injuries). This extrapolated to an estimated take of 182.6 Common Murres and 121.7 gulls (Manly 2006). In 2000, the observed incidental take of seabirds was one Common Murre (released alive without serious injuries). This extrapolated to an estimated take of 31.2 Common Murres (Manly 2006). Although Kittlitz's Murrelets occur in Cook Inlet (Kuletz et al. 2011), none were noted by observers in 1999 or 2000. No Short-tailed Albatrosses or Steller's Eiders were encountered, which means they were not observed within 10m of active drift gillnets in these fisheries. Although observer coverage rates were very low in this region for both years of the Alaska Marine Mammal Observer Program, these are the only quantifiable data we have for seabird bycatch in this area. This fishery has not been observed since 2000; therefore, no additional observer data are available.

Prince William Sound and Alaska Peninsula salmon fisheries

The Prince William Sound salmon drift gillnet fishery was observed in 1990 and 1991 (Wynne et al. 1991 and Wynne et al. 1992). In 1990, observers were onboard 300 (57.3%) of the 524 vessels that fished in the Prince William Sound salmon drift gillnet fishery, monitoring a total of 3,166 sets, or roughly 4% of the estimated number of sets made by the fleet. In 1991, observers were onboard 531 (86.9%) of the 611 registered vessels and monitored a total of 5,875 sets, or roughly 5% of the estimated sets made by the fleet. This fishery has not been observed since 1991; therefore, no additional observer data are available.

The South Unimak drift gillnet fishery was observed in 1990 (Wynne et al. 1991). Observers were onboard 59 (38.3%) of the 154 vessels participating in this salmon drift gillnet fishery, monitoring a total of 373 sets, or roughly 4% of the estimated number of sets made by the fleet. This fishery has not been observed since 1990; therefore, no additional observer data are available.

In 1990, a total of 615 marine birds, representing at least 20 species, were encountered, which means they were observed within 10m of active drift gillnets in these fisheries. Of the 336 marine birds that were observed to encounter PWS drift gillnets, 41 became entangled. Of the 279 marine birds that were observed to encounter South Unimak drift gillnets, 19 became entangled. Two Kittlitz's Murrelets were encountered but not entangled. No Short-tailed albatrosses or Steller's Eiders were encountered.

In 1991, nearly 2000 marine birds, representing at least 19 species, were encountered. Of these, 62 birds became entangled in driftnets. Gulls and kittiwakes were the marine birds most commonly observed near driftnets, but murres and murrelets were the species most frequently entangled and killed. Ten Kittlitz's Murrelets were observed and seven were entangled and killed in PWS drift gillnets. This is estimated to equate to 5-30% of the total murrelet bycatch in salmon gillnets during 1990 and 1991. No Short-tailed Albatrosses or Steller's Eiders were encountered.

5.5.3 Impacts of the Alternatives

The interactions between the FMP salmon fisheries and seabirds in the East Area, under Alternative 1, has not substantially changed since the PFEIS and the new information on interactions between the FMP salmon fisheries and seabirds, presented in the preceding sections, is not significant relative to the environmental impacts of the FMP salmon management analyzed in the PFEIS: it raises no new environmental concerns significantly different from those previously analyzed. Alternative 2 maintains the existing geographic scope of the FMP, and while it revises and updates the FMP, none of the options under consideration would impact the prosecution of the salmon fisheries in a way that would change the impacts on seabirds. Thus, the new information available for Alternatives 1 and 2 is not of a scale and scope that require an SEIS.

In the West Area, the best available information on the FMP fisheries interactions with seabirds is presented in section 5.5.2. This information indicates that impacts of the salmon fisheries in each of the three EEZ areas on seabirds are not significant. Alternative 2 maintains the existing geographic scope of the FMP, and while it revises and updates the FMP, none of the options under consideration would impact the prosecution of the salmon fisheries in a way that would change the impacts on seabirds.

Alternative 3, the preferred alternative, would modify the scope of the FMP to exclude three traditional net commercial salmon fishing areas from the FMP. The salmon fisheries in those areas would remain under state management and that would not change as a result of removing these areas from the FMP. Therefore, the impacts of the State managed fisheries on seabirds would be similar to Alternatives 1 and 2. However, as discussed in section 2.5.2, there is a risk that vessels not registered with the State could also harvest salmon in these three areas. While it is not possible to predict whether any unregulated fishing would occur in any of these three areas, if it did occur, the available information indicates that the impacts on seabirds would be small given the low occurrence of known interactions in Cook Inlet and the Alaska Peninsula. The one potential concern is interactions between Kittlitz's Murrelets and the Prince William Sound drift gillnet fishery because that fishery has known mortalities. Available information does not provide an understanding of whether those interactions occurred in the EEZ or in State waters, however, given the nearshore feeding habits of Kittlitz's Murrelets, interactions may not have occurred in the EEZ. Therefore, if unregulated fishing did occur under Alternative 3, the available information indicates that the impacts on seabirds would be insignificant given the low occurrence of known interactions in the EEZ.

In addition, as mentioned in section 5.4.8, Alternative 3 would also eliminate future federal discretion over salmon fishing activities in the EEZ within the traditional net salmon fishing areas that may affect listed species or critical habitat, and thus would remove the federal nexus that triggers ESA section 7 consultations. Persons participating in salmon fisheries within these areas would continue to be subject to ESA § 9 prohibition on the taking of listed species. ESA § 10 would allow the Secretary to grant incidental take permits to persons who take listed species incidentally as part of their lawful fishing activities as long as they mitigate the risk of take. The State is also obligated under the ESA to ensure that it does not license operations to use fishing gear in a manner that is likely to result in a violation of the ESA. Given that salmon fishing activities in these areas are subject to ESA §§ 9 and 10, NMFS does not believe that elimination of ESA § 7 consultation requirement for salmon fishing activities in the EEZ waters within the traditional net salmon fishing areas will have significant impact on the ESA-listed seabird species in these areas. Note that, if the Council recommends an alternative that may affect an ESA-listed seabird in a way that was not previously analyzed, NMFS would conduct a § 7 consultation with the USFWS on the proposed action as part of the approval process for the revised FMP.

Alternative 4 would maintain the FMP in the East Area only and remove the FMP's prohibition on net fishing in the West Area. At this point, it is not possible to predict the extent of possible fishing in the West Area in the absence of the federal prohibition. Any fishing in the West Area, outside of the existing State managed fisheries, would be unregulated by State or federal managers and therefore it would not be possible to know the extent of harvest or seabird entanglements. Most likely, the encounters would decrease if harvests are further from shore, but the species encountered may change as well to include more off-shore seabirds. However, since it is not possible to predict the extent of fishing, the impacts of this alternative on seabirds are unknown.

Alternative 4 would also eliminate future requirements for ESA § 7 consultation on salmon fishing activities in the West Area that may affect listed species. Under Alternative 4, salmon could be harvested with any gear-type and in areas where NMFS has no existing information on potential interactions with ESA-listed species. Persons participating in salmon fisheries within the West Area would continue to be

subject to ESA § 9 prohibition on the taking of listed species. ESA § 10 would allow the Secretary to grant incidental take permits to persons who take listed species incidentally as part of their lawful fishing activities only so long as such person mitigates the risk of take. While salmon fishing activities in the West Area would be subject to ESA §§ 9 and 10, NMFS cannot predict the impacts of eliminating the ESA § 7 consultation requirement for salmon fishing activities in the EEZ waters on the listed species in this area.

5.6 Essential Fish Habitat

Section 303(a)(7) of the MSA requires all FMPs to describe and identify EFH , which it defines as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." In addition, FMPs must minimize effects on EFH caused by fishing and identify other actions to conserve and enhance EFH. These EFH requirements are detailed in Amendment 7 to the Salmon FMP and the accompanying EFH EIS (NMFS 2005).

No evidence suggests salmon troll, drift gillnet, or purse seine gear impacts habitat. The activity targets only adult salmon in the water column, successfully avoiding any significant disturbance of the benthos, substrate, or intertidal habitat. The EEZ salmon fisheries do not occur on any areas designated as Habitat Areas of Particular Concern. The proposed action would not increase the amount of harvest, the intensity of harvest, or the location of harvest, therefore, this action is presumed not to increase the impacts of the fishery on EFH.

EFH designations are done through a prescribed process and EFH can be designated in both federal and state waters depending on the habitat (water) needs for each life history stage of each FMP species. Because of habitat characteristics, salmon EFH is (1) all federal and state waters (0-200nm) covering juvenile and adult maturing life history stages and ranges from Dixon Entrance to Demarcation Bay (Arctic) and (2) all freshwaters listed as anadromous for mature, juvenile, and egg stages of the five salmon species. Alternatives 1, 2, and 3 would not result in a change to salmon EFH. For example, under Alternative 3, removing the Cook Inlet traditional net fishing area from the FMP would not affect the salmon EFH designation in that region because salmon EFH is due to the life history needs of salmon. Alternative 4 could result in a change to EFH because EFH would only be designated for salmon that are caught in the Southeast Alaska troll fishery.

As part of the 5-year review process, Alaska Fisheries Science Center (AFSC) staff have developed a new methodology using oceanic variables to refine EFH descriptions for all marine life stages of salmon. This methodology is undergoing peer review for publication. Once the methodology and new salmon EFH descriptions are finalized, the Council may consider amending the FMP to include these new EFH descriptions.

5.7 Cumulative Effects

Analysis of the potential cumulative effects of a proposed federal action and its alternatives is a requirement of NEPA. Cumulative effects are those combined effects on the quality of the human environment that result from the incremental impact of the proposed actions when added to other past, present, and reasonably foreseeable future actions, regardless of which federal or non-federal agency or

person undertakes such other actions (40 CFR 1508.7, 1508.25(a) and 1508.25(c)). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The concept behind cumulative effects analysis is to capture the total effects of many actions over time that would be missed if evaluating each action individually. Concurrently, the Council on Environmental Quality (CEQ) guidelines recognize that it is most practical to focus cumulative effects analysis on only those effects that are truly meaningful. Based on the preceding analysis, the effects that are meaningful are potential effects on salmon. The cumulative effects on the other resources have been analyzed in numerous documents and the impacts of this proposed action on those resources is minimal, therefore there is no need to conduct an additional cumulative impacts analysis.

This EA analyzes the cumulative effects of each alternative and the effects of past, present, and reasonably foreseeable future actions (RFFA). Past and present actions that are related to the other resources analyzed are contained in the appropriate section of Chapter 5. The past and present salmon-related actions are described in Chapter 4, the fishery impact statement, and several other documents which are incorporated by reference. These documents include the 1997 EA for the salmon fisheries in the EEZ and State waters off Alaska (NMFS 1997), the FPEIS (NMFS 2003), the 2008 BiOp (NMFS 2008a), and the 2010 BiOp (NMFS 2010).

This section provides a review of the RFFA that may result in cumulative effects on salmon. Actions are understood to be human actions (e.g., a proposed rule to designate northern right whale critical habitat in the Pacific Ocean), as distinguished from natural events (e.g., an ecological regime shift). CEQ regulations require consideration of actions, whether taken by a government or by private persons, that are reasonably foreseeable. This requirement is interpreted to indicate actions that are more than merely possible or speculative. In addition to these actions, this cumulative effects analysis includes climate change.

Actions are considered reasonably foreseeable if some concrete step has been taken toward implementation, such as a Council recommendation or NMFS's publication of a proposed rule. Actions only "under consideration" have not generally been included because they may change substantially or may not be adopted, and so cannot be reasonably described, predicted, or foreseen. Identification of actions likely to impact a resource component within this action's area and time frame will allow the public and Council to make a reasoned choice among alternatives.

The following RFFAs are identified as likely to have an impact on a resource component within the action area and timeframe:

- Salmon bycatch in the federally managed groundfish fisheries and measures to minimize that bycatch;
- Ongoing State management of the EEZ salmon fisheries;
- Harvest of salmon in other salmon fisheries, including other commercial, personal use, sport, and subsistence fisheries;
- International salmon harvests and international hatchery production;
- Actions that impact salmon habitat;
- Northern pike control and eradication; and

- Climate change.

5.7.1 Salmon Bycatch in the Federally Managed Groundfish Fisheries and Measures to Minimize that Bycatch

Salmon are caught as bycatch in the federally managed groundfish fisheries in the GOA. Salmon are a prohibited species in the groundfish fisheries. Prohibited species must be avoided while fishing groundfish and must be immediately returned to the sea with a minimum of injury when caught and brought aboard, except when their retention is authorized by other applicable law or they are retained for the Prohibited Species Donation Program. The Donation Program authorizes the distribution of salmon taken as bycatch in the groundfish trawl fisheries off Alaska to economically disadvantaged individuals through a NMFS-authorized distributor in accordance with federal regulations.

All five salmon species are caught in the federal groundfish fisheries (Table 5-24). On average, 83 percent of the salmon bycatch is Chinook salmon. In 2010, the NMFS catch accounting system estimated that 54,631 Chinook salmon were taken in federal groundfish fisheries in the GOA—an unprecedented level of bycatch. Almost all of that bycatch occurred in the Central and Western GOA pollock trawl fisheries.

Table 5-24 Estimates of the number of salmon, by species, caught in the federal groundfish fisheries in the GOA. (source: NMFS Catch Accounting data run on 8/12/11)

Year	Sockeye	Coho	Pink	Chum	Non-Chinook total	Chinook
2003	6	349	120	9,054	9,530	15,396
2004	-	253	343	5,213	5,809	17,745
2005	-	218	109	6,281	6,608	31,270
2006	-	560	724	2,943	4,226	19,004
2007	116	166	77	3,067	3,425	40,493
2008	58	310	10	1,767	2,145	16,166
2009	-	112	-	2,046	2,158	8,477
2010	-	215	-	1,644	1,860	54,540
2011	11	208	95	1,503	1,818	8,659
Avg.	21	266	164	3,724	4,175	23,528

The number of salmon caught in the groundfish fisheries does not translate directly into adult salmon that would otherwise survive to return to their spawning streams. Salmon caught in the GOA groundfish fisheries are generally immature salmon. Some proportion of the salmon caught would have been consumed as prey by other marine animals, or been affected by some other source of natural or fishing mortality. Currently, it is not possible to estimate the proportion that any stock has contributed to the total bycatch amount, and most likely the stock composition of bycatch varies by area and time of bycatch.

NMFS is working to bolster the quantity and quality of information about the salmon that are caught incidentally in groundfish fisheries. Beginning in 2011, NMFS is improving the genetic sampling of

salmon caught in the GOA pollock fishery to allow for a better understanding of the stock composition. Researchers at the AFSC are focused on using genetic analysis to determine annual stock composition estimates (i.e., where the fish originate).

In June 2011, the Council took final action to recommend management measures to limit Chinook salmon bycatch in the Western and Central GOA pollock fisheries. These fisheries account for approximately three-quarters of the Chinook salmon bycatch in the GOA. The Council adopted a prohibited species catch (PSC) limit of 25,000 Chinook salmon for the Western and Central GOA pollock fisheries. The annual PSC limit is apportioned by area, and will close the pollock fishery in each area once the PSC limit is reached. The PSC limits are—

Central GOA: 18,316 Chinook salmon

Western GOA: 6,684 Chinook salmon

The Council recommended that vessels under 60 ft that are directed fishing for pollock have observer coverage beginning on January 1, 2013. This requirement would primarily affect vessels in the Western GOA, where a large proportion of the fleet uses smaller boats. If the restructured observer program is implemented in 2013, observers will be deployed under that program, otherwise vessels under 60 ft will need to comply with 30 percent observer coverage requirements until the restructured observer program is implemented.

As part of this action, the Council also recommended full retention of all salmon species by all vessels fishing in the pollock trawl fisheries. Full retention provides an opportunity for collection of scientific data or biological samples; fish that are retained may not be kept for human consumption unless they are donated under the prohibited species donation program. Currently, NMFS is only able to analyze samples from salmon caught on observed pollock trips. Full retention is a key prerequisite to estimating the representative composition, by stock of origin, of Chinook salmon caught in the GOA pollock fishery.

The effects of this action on salmon stocks are analyzed in the *Secretarial Review Draft Environmental Assessment/ Regulatory Impact Review/ Initial Regulatory Flexibility Analysis for Amendment 93 to the Fishery Management Plan for Groundfish of the Gulf of Alaska Chinook Salmon Bycatch in the Gulf of Alaska Pollock Fishery* (Amendment 93 EA, NPFMC 2011). According to the Amendment 93 EA, it is not possible to draw any correlation between patterns of bycatch and the status of salmon stocks, especially given the uncertainty associated with estimates of bycatch in the groundfish fisheries, and the lack of data on river of origin of Chinook salmon bycatch. However, there is also no evidence to indicate that the groundfish fisheries' take of Chinook salmon is causing escapement failures in Alaska rivers. The Amendment 93 EA concluded that, to the extent that direct mortality of Chinook salmon is reduced, the impact to Chinook salmon is likely to be beneficial. Chinook salmon not caught as bycatch may return as escapement or be caught by subsistence, commercial, sport, or personal use salmon fishermen.

The Amendment 93 EA also analyzed the cumulative effects of PSC limit action and ongoing State salmon fisheries management. The EA points out that the State's first priority for salmon management is to meet spawning escapement goals to sustain salmon resources for future generations. The State carefully monitors the status of salmon stocks returning to Alaska streams and controls fishing pressure

on these stocks. The Amendment 93 EA concludes that management of salmon is not likely to result in significant effects when combined with the direct and indirect effects of the PSC limit action (NPFMC 2011).

NMFS approved Amendment 93 on February 17, 2012 and plans to implement the PSC limits for the 2012 C and D pollock seasons. The 2012 PSC limits would be 8,929 Chinook salmon in the Central GOA and 5,598 Chinook salmon in the Western GOA. Additionally, NMFS is committed to working with the industry to improve observed and extrapolated Chinook salmon estimates.

A related RFFA is the Council's amendment package to comprehensively address salmon PSC management in the GOA trawl fisheries, planned for 2012. The Council adopted the following alternatives for the comprehensive package—

Alternative 1: Status quo

Alternative 2: Establish a Chinook salmon PSC limit for the non-pollock trawl fisheries (hard cap, may be apportioned by area and/or directed fishery)

Alternative 3: Require membership in a mandatory salmon bycatch control cooperative in order to fish in any Western/Central GOA trawl fishery

Alternative 4: Require full retention of all salmon in all Western/Central GOA trawl fisheries (includes an option to require electronic monitoring or observers to monitor for discards)

Additionally, the Council requested an analysis of Chinook salmon catch rate data by fishery and season, correlations between Chinook salmon bycatch rate and time of day, flexibility to adjust pollock season dates, pollock trip limits, salmon excluder device deployment in the GOA, impacts on subsistence users, and a discussion of the benefits of developing a cooperative management structure for the GOA pollock fisheries. This information should improve the understanding of Chinook salmon bycatch in the federal groundfish fisheries.

5.7.2 Ongoing State Management of the EEZ Salmon Fisheries

State management of the salmon fisheries in the EEZ is described in chapter 4, the fishery impact statement, and it is assumed that the fishery will continue to be managed in the same way in the foreseeable future.

5.7.3 Harvest of Salmon in Other Salmon Fisheries

Harvest of salmon in occurs in other salmon fisheries, including other commercial, personal use, sport, and subsistence fisheries. This RFFA has the most substantial impacts on the FMP salmon fisheries because the State comprehensively manages salmon stocks and considers each fishery that targets specific stocks or stock groupings. The State's first priority for management is to meet spawning escapement goals to sustain salmon resources for future generations. The State carefully monitors the status of salmon stocks returning to Alaska streams and controls fishing pressure on these stocks. Subsistence use is the highest priority use under both State and federal law. Surplus fish beyond escapement needs and subsistence use are made available for other uses, such as commercial and sport harvests. The Board

allocates the surplus fish among the other users according to Board policy and applicable State law, as described in the fishery impact statement.

5.7.4 International Salmon Harvests and International Hatchery Production

This section describes the possible cumulative effects of international salmon harvests and hatchery releases, both of which are identified as having the potential to impact a resource component within this action area and timeframe. This discussion describes in general terms the harvest of salmon from stocks in foreign fisheries and hatchery releases. Though unable to describe with precision the amount of harvest of these fish that occur in foreign fisheries, the information that is available through the North Pacific Anadromous Fish Commission (NPAFC) is displayed in Table 5-25 through Table 5-29. Neither international harvests nor hatchery releases are expected to result in cumulative effects that are likely to impair the sustainability of the Alaska salmon stocks in this FMP. The available information indicates that international harvest and hatchery production will likely continue at similar levels to the average over the last decade, into the future.

Salmon are harvested in the EEZ of North Pacific Rim countries: the U.S., Canada, the Russian Federation, Japan, and the Republic of Korea, and incidentally in international waters. These salmon-harvesting countries are parties to the *Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean*, which is administered under the NPAFC and is the primary international treaty addressing the international harvest and hatchery releases of pacific salmon. The Convention generally prohibits direct fishing for anadromous fish (i.e., Pacific salmon) in international waters, prohibits retention of anadromous fish taken as incidental catch during fishing for non-anadromous fish in international waters, and requires minimization of any incidental takings in international waters. The NPAFC compiles an annual *Statistical Yearbook* that contains catch statistics for salmon fisheries in the North Pacific Ocean and hatchery production of salmon fry and smolt released by member countries into the North Pacific.

Canada and the U.S. are also parties to the Pacific Salmon Treaty, which governs harvest of Pacific salmon bound for rivers of one country, intercepted in the fisheries of the other. The Treaty addresses the harvest of salmon stocks on rivers that originate in British Columbia or the Yukon Territory and flow to the sea through Southeast Alaska. The U.S. and Canada have also signed the Yukon River Salmon Agreement, which is separate from the Treaty and included as an Annex. The Board adopts harvest regulations through a public process to conserve fisheries resources and to allocate fisheries resources to the various users according to U.S. harvest obligations under the Treaty and the Yukon Agreement with Canada. State management of salmon fisheries under the Treaty are described in the Fishery Impact Statement of this analysis.

International salmon harvests

The average annual harvest of anadromous fish (i.e., Pacific salmon) by NPAFC member countries during 2000 - 2009 was approximately 416 million fish. The total catch in 2009 was approximately 605 million fish, which was the highest during 2000-2009. In 2009, approximate catches were reported by: Russia; 355 million fish; Alaska, 163 million fish; and Japan, 70 million fish (Table 5-25). Pink salmon (435

million fish) and chum salmon (108 million fish) constituted the majority of the catch, followed by sockeye (55 million fish), coho (6 million fish) and Chinook salmon (1 million fish) (Irvine et al. 2009).

Table 5-25 International commercial salmon harvest by country, in thousands of fish.

Year	Russia	Japan	Korea	Canada	USA	TOTAL
2000	127,216	59,106	-	8,538	139,976	334,835
2001	143,026	67,249	-	9,971	178,984	399,285
2002	93,560	67,451	60	11,756	135,627	308,454
2003	147,112	82,486	36	16,066	183,023	428,723
2004	86,298	75,913	29	7,789	171,991	342,021
2005	181,867	74,406	23	10,183	224,690	491,170
2006	168,618	68,652	45	8,222	144,289	389,827
2007	213,751	74,935	92	8,817	215,887	513,483
2008	140,915	56,623	83	1,692	147,934	347,247
2009*	355,034	69,594	50	11,150	169,662	605,490

*2009 data are preliminary. The 2011 and 2010 NPAFC Statistical Yearbooks are not yet available.[71]

Pacific Salmon Treaty

Pacific salmon bound for rivers of one country that are intercepted in fisheries of the other have been identified through research conducted by parties to the Treaty, on species and stocks originating from Alaska, British Columbia, Washington, Oregon and Idaho. The results of this research identified that Alaskan fishers were catching salmon bound for British Columbia, Idaho, Oregon and Washington. Canadian fishers off the West Coast of Vancouver Island were capturing salmon bound for rivers of Washington and Oregon. Fishers in northern British Columbia were intercepting salmon returning to Alaska, Washington, Oregon and Idaho, and U.S. fishers were catching Fraser River salmon as they traveled through the Strait of Juan de Fuca and the San Juan Islands.

[71] Available at http://www.npafc.org/new/pub_statistics.html.

Table 5-26 Summary Table: Catches in Canadian Treaty Limit Fisheries, 2000 to 2007[a].

Fisheries / Stocks	Species	2007	2006	2005	2004	2003	2002	2001	2000
Stikine River (all gears)	Sockeye Coho Chinook - large Chinook - jack	59,237 47 10,576 1,735	101,209 72 15,776 2,078	85,890 276 18,997 2,177	84,866 275 3,857 2,574	58,784 190 1,396 1,052	17,294 82 1,362 578	25,600 233 1,480 103	27,468 301 3,086 628
Taku River commercial gillnet	Sockeye Coho Chinook – large	14,972 5,276 1,146 442	21,093 9,180 7,312 198	21,932 6,860 7,534 821	19,860 5,954 2,074 334	32,730 3,168 1,894 547	31,053 3,082 1,561 291	47,660 2,568 1,458 118	28,009 4,395 1,576 87
Areas 3 (1-4) commercial net	Pink	1,740,270	228,378	878,552	402,459	667,103	876,631	473,318	127,000
Area 1 commercial troll	Pink	61,276	34,854	39,430	27,751	98,347	41,418	175,000	28,295
North Coast	Chinook	137,235	215,985	243,606	241,508	191,657	141,848	43,500	32,048
West Coast, Vancouver Island	Chinook	139,130	146,883	199,407	211,333	175,821	22,009 128,798	36,474 54,770	37,200 63,400
Fraser River, Canadian Commercial Catch	Sockeye Pink	333,300 0	4,633,623 68,325	137,000 338,000	1,993,800 0	1,042,986 1,149,189	2,182,700 0	295,000 579,000	953,000 0
Fraser River, U.S. Commercial Catch	Sockeye Pink	3,900 377,600	701,300 0	0 0	192,200 0	244,000 773,000	434,600 0	240,000 427,000	494,000
West Coast, Vancouver Island commercial troll	Coho	1,424	2,399	5,989	0	0	0	0	0
Johnstone Strait clockwork catch	Chum	494,944	800,363	787,226	1,089,100	1,026,029	700,000	236,000	161,000

Source: Pacific Salmon Commission, 2007/2008 Twenty Third Annual Report, Vancouver, B.C., Canada, September 2010.

[a] 2009 to 2011 catch summary data are not yet published by the Commission.

International hatchery releases

Hatcheries produce salmon fry and release these small salmon into the ocean to grow and mature before returning as adults to the hatchery or local rivers and streams for harvest or breeding. Hatchery production increases the numbers of salmon in the ocean beyond what is produced by the natural system. The number of hatchery salmon released does not translate directly into adult salmon that would otherwise survive to return to their spawning streams. Hatchery salmon released are smolt and fry, and can be consumed as prey by other marine animals, or be affected by some other source of natural or fishing mortality. Currently, it is not possible to estimate the proportion that international hatchery releases contribute to the total international harvest amounts.

A number of hatcheries produce salmon in Korea, Japan, Russia, the United States, and Canada. Commercial salmon fisheries exist around the North Pacific Rim, and most countries release hatchery salmon fry in varying amounts and species. NPAFC summarizes information on hatchery releases by species, country, and area where available in the NPAFC *Statistical Yearbook*. Further, chapters 5 and 6 of the draft Environmental Assessment on Bering Sea Non-Chinook Salmon Bycatch (NPFMC 2011a) and chapter 4 of the Chinook Salmon Bycatch in the GOA Pollock Fishery analysis (NPFMC 2011b) provide more information on current and past hatchery releases, and are summarized in the subsections below.

The NPAFC's annual *Statistical Yearbooks* contain catch estimates of Pacific salmon and other marine species in the North Pacific, as well as the number of salmon released from North Pacific Rim hatcheries. The annual number of salmon (and some steelhead trout) released from hatcheries in NPAFC member countries during 1993-2009 was almost constant, averaging approximately 5 billion fish. No information is available to suggest that salmon hatchery production is likely to change substantially from this amount in the foreseeable future.

In 2009, salmon hatcheries released 1,974 million (41.2%) in Japan, 1,615 million (33.7%) in the U.S., 902 million (18.8%) in Russia, 300 million (6.2%) in Canada, and 6 million (0.1%) in Korea. In 2009, most salmon hatchery releases were chum (3,002 million, 62.6%) and pink salmon (1,334 million, 27.8%), followed by sockeye (228 million, 4.7%), Chinook (155 million, 3.2%), and coho salmon (64 million, 1.3%). Chapters 5 and 6 of the draft Environmental Assessment on Bering Sea Non-Chinook Salmon Bycatch (NPFMC 2011a) and chapter 4 of the Chinook Salmon Bycatch in the GOA Pollock Fishery analysis (NPFMC 2011b) provide more information on current and past hatchery releases, and are summarized in the subsections below. Reports submitted to the NPAFC for its *Statistical Yearbook* were used to summarize hatchery information by country in Table 5-27.

Table 5-27 International annual hatchery releases of salmon by country, in millions of fish.

Year	Russia	Japan	Korea	Canada	U.S.	Total[b]
2000	670.8	1972.1	19.0	364.1	1814.1	4840.1
2001	590.4	1991.7	5.3	338.5	1812.5	4738.3
2002	669.7	2008.9	10.5	475.3	1845.7	5010.0
2003	616.1	1998.3	14.7	511.8	1865.4	5006.3
2004	685.9	1975.9	12.9	534.1	1947.6	5156.4
2005	684.1	2003.0	11.3	518.7	1759.6	4976.7
2006	670.3	2017.2	7.4	425.1	1725.6	4845.5
2007	775.2	2034.4	13.8	378.9	1895.4	5097.7
2008	927.8	2043.6	16.6	329.9	1775.7	5093.6
2009[c]	901.7	1974.4	5.8	299.5	1615.1	4796.5

[a] *The following reports provide more detailed hatchery release information, grouped by country: Russia (Akinicheva and Volobuev 2008; Anon., 2007; TINRO-centre 2008; 2006; 2005); Canada (Cook et al. 2008; Cook and Irvine 2007); U.S. (Josephson 2007; Josephson et al. 2008, Eggers, 2006; 2005; Bartlett, 2008, 2007; 2006; 2005); and Korea (SRT 2008, 2007, 2006, 2005).*
[b] *Totals of hatchery releases include a de minimis amount of steelhead trout and cherry salmon.*
[c] *2009 data are preliminary. The 2011 and 2010 NPAFC Statistical Yearbooks are not yet available.*

Chum hatchery releases

Combined, there are approximately 3 billion chum salmon released each year from hatcheries around the North Pacific Rim. The majority of hatchery releases are from Russia and Japan. Chum salmon hatchery releases by country are shown in Table 5-28. For chum salmon, Japanese hatchery releases far exceed releases by any other Pacific Rim country. Combined Asian hatchery releases in 2007 (Russia, Japan, Korea) account for 74 percent of the total releases; in comparison, Alaskan chum releases account for just 20 percent of the total releases.

Table 5-28 Hatchery releases of juvenile chum salmon, in millions of fish.

Year	Russia	Japan	Korea	Canada	U.S.	Total
2000	326.1	1,817.4	19.0	124.1	546.5	2,833.1
2001	316.0	1,831.2	5.3	75.8	493.8	2,722.1
2002	306.8	1,851.6	10.5	155.3	507.2	2,831.4
2003	363.2	1,840.6	14.7	136.7	496.3	2,851.5
2004	363.1	1,817.0	12.9	105.2	630.2	2,928.4
2005	387.3	1,844.0	10.9	131.8	596.9	2,970.9
2006	344.3	1,858.0	7.3	107.1	578.8	2,895.5
2007	350.4	1,870.0	13.8	142.0	653.3	3,029.5
2008	508.0	1,888.0	16.6	82.0	604.0	3,098.6
2009*	523.3	1,808.4	5.84	78.9	577.7	2,994.1

**2009 data are preliminary. The 2011 and 2010 NPAFC Statistical Yearbooks are not yet available.*

Studies specific to Japanese hatchery chum salmon used genetic stock identification to model migration routes for Japanese chum in the Bering Sea over several years (Figure 5-4). Urawa et al. (2003) estimate that Japanese chum hatchery fish begin to migrate into the Bering Sea in their second summer and fall, migrating south and east late in the fall to the GOA to spend their second winter. In subsequent years, they migrate between feeding grounds in the Bering Sea and GOA in summer and fall prior to returning

as maturing fish to Japan via the western Bering Sea (Urawa et al. 2003). Japanese hatchery production has remained almost constant during 2000 – 2009 and is expected to continue at similar levels into the future.

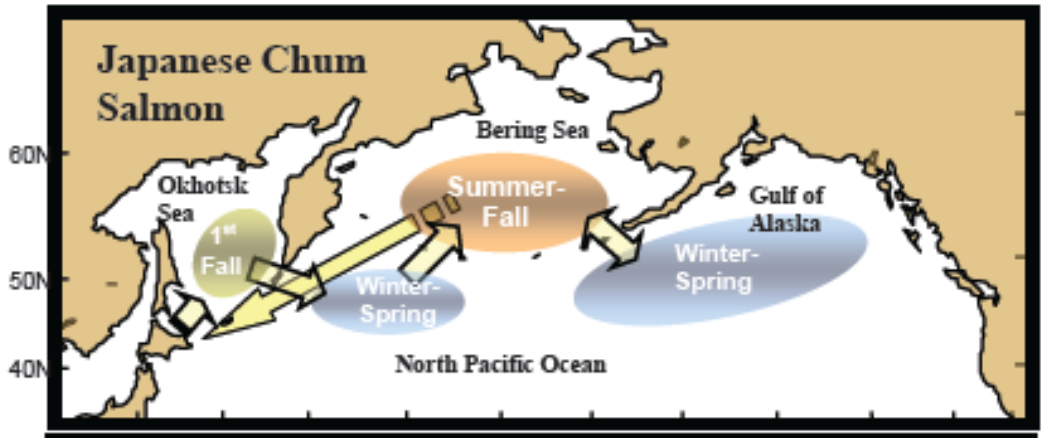

Figure 5-4 **Model for Japanese hatchery chum salmon as estimated by genetic stock identification (Urawa et al. 2003).**

Chinook hatchery releases

Chinook salmon hatchery releases by country are shown below in Table 5-29. There are no hatchery releases of Chinook salmon in Japan and Korea, and only a limited number in Russia. For Chinook salmon fry, the U.S. has the highest number of annual releases (80 percent of total in 2007), followed by Canada (approximately 20 percent in 2007).

Table 5-29 **Hatchery releases of juvenile Chinook salmon, in millions of fish.**

Year	Russia	Japan	Korea	Canada	U.S.	Total
1999	0.6	-	-	54.4	208.1	263.1
2000	0.5	-	-	53.0	209.5	263.0
2001	0.5	-	-	45.5	212.1	258.1
2002	0.3	-	-	52.8	222.1	275.2
2003	0.7	-	-	50.2	210.6	261.5
2004	1.17	-	-	49.8	173.6	224.6
2005	0.84	-	-	43.5	184.0	228.3
2006	0.78	-	-	40.9	181.2	223.7
2007	0.78	-	-	44.6	182.2	227.6
2008	1.0			38.0	198.4	237.4
2009*	0.78	-	-	41.63	111.5	153.92

**2009 data are preliminary. The 2011 and 2010 NPAFC Statistical Yearbooks are not yet available.*

5.7.5 Actions that Impact Salmon Habitat

A number of ongoing and future actions impact salmon spawning habitat, including in-river fisheries, development, and pollution. A complete discussion of fishing and non-fishing impacts to salmon habitat

is contained in Appendix A to the Salmon FMP (per Amendment 11 to the FMP). New information on impacts to EFH from non-fishing activities in Alaska was compiled by NMFS as part of the Council's 5 year review of the FMP's EFH provisions (Appendix 5, NMFS 2011). That document is incorporated by reference.

The waters and substrates that comprise EFH are susceptible to a wide array of human activities unrelated to fishing. Broad categories of such activities include, but are not limited to, mining, dredging, fill, impoundment, discharge, water diversions, thermal additions, actions that contribute to nonpoint source pollution and sedimentation, introduction of potentially hazardous materials, introduction of exotic species, and the conversion of aquatic habitat that may eliminate, diminish, or disrupt the functions of EFH. For each of these activity categories, known and potential adverse impacts to EFH are described in Appendix 5 (NMFS 2011). Further, mechanism or processes that may cause the adverse effects and how these may affect habitat function are described in Appendix 5 (NMFS 2011).

Coordination and consultation on EFH is required by MSA § 305(b). However, this consultation does not supersede the regulations, rights, interests, or jurisdictions of other federal or state agencies. Appendix 5 contains non-binding recommendations for reasonable steps that could be taken to avoid or minimize adverse effects of non-fishing activities on EFH (NMFS 2011).

Non-fishing activities discussed in Appendix 5 are subject to a variety of regulations and restrictions designed to limit environmental impacts under federal, state, and local laws (NMFS 2011). Any future activity that potentially impacts salmon spawning habitat would be subject to these regulations and the MSA's EFH consultation requirements.

5.7.6 Northern pike control and eradication

Although native to much of the state, northern pike (*Esox lucius*) were illegally introduced south and east of their native range, resulting in impacts to fisheries in the Cook Inlet watershed. In 2007, when ADF&G wrote the Alaska Northern Pike Management Plan, widespread damage to resident rainbow trout, grayling and salmon populations in the Susitna River drainage had been observed, resulting in northern pike being identified as the "highest invasive species threat in Southcentral [Alaska]." Since 2007, ADF&G has spent nearly $800,000 and has formed partnerships with the USFWS, the United States Geological Survey (USGS), NOAA, and private organizations to control and eradicate Northern pike from Southcentral Alaska. In 2009, ADF&G received National Invasive Species Act funds from NOAA for pike control and eradication projects.

In the past five years, the State has lead efforts to eliminate northern pike populations from four closed-system lakes in Southcentral Alaska, and has initiated large-scale control efforts in Alexander Creek, a tributary of the Susitna River, where reduction of salmonid abundance has been observed. However, northern pike continue to affect important resident and anadromous fisheries from Anchorage and the Matanuska-Susitna Valley to the Kenai Peninsula.

ADF&G plans to continue to investigate options to control or eradicate northern pike in systems that support valuable commercial, subsistence and sport fisheries in the Cook Inlet watershed, and to implement options as feasible. ADF&G's projects and partnerships to control and eradicate northern pike

are a reasonable foreseeable future action that will mitigate the negative impacts of pike predation on salmonid abundance in freshwater lakes and rivers, and will reduce the potential for pike to move into estuarine waters of Cook Inlet.

Known water bodies with northern pike within Cook Inlet watershed

- Susitna River tributaries, including lakes and sloughs
- Knik Arm drainages, including the Little Susitna River
- West Cook Inlet rivers and lakes
- Matanuska-Susitna Valley lakes (34 lakes- including Nancy Lake Recreational Area)
- Anchorage lakes (5 lakes)
- Kenai Peninsula lakes (13 lakes)

ADF&G's Northern pike management, control, or eradication projects

In 2007, ADF&G—

- developed the Invasive Pike Management Plan as part of Aquatic Nuisance Species Management Plan,
- removed >400 pike from 5 lakes on Kenai Peninsula, and
- gathered data gathered on three pike populations within Cook Inlet drainage.

In 2008, ADF&G—

- removed >600 pike from three lakes in Mat-Su Valley,
- eradicated two populations of pike from closed system lakes - Anchorage and Soldotna,
- evaluated Alexander Lake pike size structure to assess if slot limit is an effective method for controlling pike, and
- initiated telemetry study of pike movement in Stormy Lake on Kenai Peninsula.

In 2009, ADF&G—

- removed >200 pike from three lakes in Matanuska-Susitna valley, including Deshka River sloughs,
- eradicated three populations of pike from closed system lakes: Kenai Peninsula, Anchorage, Yakutat,
- evaluated the 2008 eradication projects,

- completed Stormy Lake pike movement study,
- investigated alternatives for Stormy Lake pike population, including using rotenone for pike eradication, and
- studied the use of gillnets as control measure for northern pike populations in 20 sloughs off Alexander Creek and conclude gillnetting to be a feasible option to control populations from Alexander Lake to Sucker Creek.

In 2010, ADF&G—

- removed >1500 pike during continued gillnetting in 20 sloughs of Alexander Creek from Alexander Lake to Sucker Creek,
- evaluated 2008 and 2009 eradication projects, and
- conducted strategic planning for invasive northern pike priorities and projects.

In 2011, ADF&G—

- removed >4,000 pike from 50 side-channel sloughs of Alexander Creek system by gillnet,
- evaluated 2010 eradication projects,
- used a $50K Alaska Sustainable Salmon Fund (AKSSF) awarded to USFWS/ADF&G partnership for a multi-media education campaign on invasive pike in Southcentral Alaska,
- concluded the Stormy Lake pike movement study, and
- used a Cooperative Agreement with USFWS to secure ~$250K for Stormy Lake pike eradication project - activities completed include public scoping and collection of Stormy Lake arctic char broodstock to preserve remnant population (in significant decline) due to pike predation.

ADF&G's ongoing projects and partnerships for 2012 and into the future include —

- continue to control net in side-channel sloughs of Alexander Creek to reduce pike abundance;
- study pike movement with radio telemetry in Alexander Creek system;
- AKSSF grant (match provided by Kenai River Sportfishing) provided ADF&G $40K for Stormy Lake pike eradication supplies and equipment;
- Stormy Lake pike eradication project scoping and permitting are completed (phase one), plan is to eradicate pike in Stormy Lake in September of 2012 and restock native fish assemblage after the detoxifies in 2012 (phase two);

- NFHAP grant ($16K) for Soldotna Creek drainage invasive pike control/eradication planning and public scoping – scoping was completed in April of 2012 – funding for implementing the preferred alternative (rotenone treatment) is being sought;

- Joint project by USGS, ADF&G Commercial Fish Division, and CIAA to (1) study effectiveness of electrical barrier and hydrogun for controlling pike – to be conducted in June, 2012 at Derks Lake on Kenai Peninsula - and (2) conduct pike movement, distribution, and mitigation studies in Susitna drainage; and

- develop an eDNA study on the Kenai Peninsula to assess the pike detection sensitivity of eDNA in water samples. The USGS is providing technical help to ADF&G to develop this study based on its invasive pike bioenergetics and eDNA study in Susitna drainage.

5.7.7 Climate Change

Compelling evidence from studies of changes in Bering Sea and Arctic climate, ocean conditions, sea ice cover, permafrost, and vegetation indicate that the area is experiencing warming trends in ocean temperatures and major declines in seasonal sea ice. While climate warming trends are being studied and increasingly understood on a global scale, the ability for fishery managers to forecast biological responses to changing climate continues to be difficult. The North Pacific Ocean is subject to periodic climatic and ecological "regime shifts." These shifts change the values of key parameters of ecosystem relationships, and can lead to changes in the relative success of different species.

Many efforts are underway to assess the relationship between oceanographic conditions, ocean mortality of salmon, and their maturation timing to their respective rivers of origin for spawning. Specific ocean temperature preferences for salmon species are poorly understood. Regime shifts and consequent changes in climate patterns in the North Pacific Ocean has been shown to correspond with changes in salmon production (Mantua et al. 1997).

Some evidence exists for a contraction of ocean habitats for salmon species under global warming scenarios (Welch et al. 1998). Studies in the Pacific Northwest have found that juvenile survival is reduced when in-stream temperatures increase (Marine and Cech 2004, Crozier and Zabel 2006). A correlation between sea surface temperature and juvenile salmon survival rates in their early marine life has also been proposed (Mueter et al. 2002). The variability of salmon responses to climate changes is highly variable at small spatial scales, and among individual populations (Schindler et al. 2008). This diversity among salmon populations means that the uncertainty in predicting biological responses of salmon to climate change remains large, and the specific impacts of changing climate on salmon cannot be assessed.

The Council, NMFS, and the State have taken actions that indicate a willingness to adapt fishery management to be proactive in the face of changing climate conditions. The Council currently receives an annual update on the status and trends of indicators of climate change in the GOA through the presentation of the "Ecosystem Considerations" chapter of the annual crab SAFE reports (Boldt 2010). Much of the impetus for Council and NMFS actions in the northern Bering Sea, where bottom trawling is

prohibited in the Northern Bering Sea Research Area, and in the Alaskan Arctic, where the Council and NMFS have prohibited all fishing until further scientific study of the impacts of fishing can be conducted, derives from the understanding that changing climate conditions may impact the spatial distribution of fish, and consequently, of fisheries. In order to be proactive, the Council has chosen to close any potential loopholes to unregulated fishing in areas that have not previously been fished.

Consequently, it is likely that as other impacts of climate change become apparent, fishery management will also adapt in response. Because of the large uncertainties as to what these impacts might be, however, and our current inability to predict such change, it is not possible to estimate what form these adaptations may take.

5.7.8 Cumulative Effect Conclusions

Considering the direct and indirect impacts of the alternatives, when added to the impacts of past and present actions analyzed in this EA, and the other documents that are incorporated by reference, and the impacts of the reasonably foreseeable future actions listed above, the cumulative impacts of the proposed action and its alternative are determined to be not significant.

Beyond the cumulative impacts discussed above and documented in the referenced analyses, no additional past, present, or reasonably foreseeable cumulative negative impacts on the biological and physical environment (including salmon stocks, essential fish habitat, ESA-listed species, marine mammals, or seabirds) have been identified that would accrue from the proposed action or its alternatives.

6 Regulatory Impact Review

This Regulatory Impact Review (RIR) evaluates the costs and benefits of an action to change federal regulations implementing the *Fishery Management Plan for the Salmon Fisheries in the EEZ Off the Coast of Alaska* (FMP). FMP provisions are implemented through federal regulations at 50 CFR 679. The regulations are applicable to participants in directed salmon fisheries under the FMP. This action is needed to improve government processes by revising and updating specific regulations to reflect the revised FMP and remove obsolete regulations.

The FMP alternatives are described in chapter 2 and the options are described in chapter 3. The economic impacts of the alternatives are discussed in chapter 4. The cost and benefits of the alternatives are compared in chapter 2.

This section focuses on changes to the regulations. Regulations implementing the FMP are at §679.1 Purpose and Scope, §679.2 Definitions, §679.3 Relation to other laws, §679.4 Permits, and §679.7 Prohibitions. To implement the Council's revised FMP, NMFS will need to revise the federal regulations. To start that process, this section contains all of the existing regulations that address salmon management under the FMP.

6.1 What is a Regulatory Impact Review?

This RIR is required under Presidential Executive Order (E.O.) 12866 (58 FR 51735, September 30, 1993). The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following statement from the order:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

E.O. 12866 further requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." A significant regulatory action is one that is likely to:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

6.1.1 Statutory Authority for this Action

NMFS manages the U.S. salmon fisheries in the portion of its exclusive economic zone within the management area of the FMP. The FMP was prepared by the Council under the authority of the MSA. Regulations governing fishing by U.S. vessels in accordance with the FMPs appear at 50 CFR part 679.

6.2 Changes to Federal Regulations

The Council is considering four alternative actions: (1) No action, no changes to the FMP; (2) Maintain the existing geographic scope of the FMP and update the FMP; (3) Modify the FMP to specifically exclude three traditional net commercial fishing areas and the sport fishery in West Area from the FMP and update the FMP; and (4) Maintain the FMP in the East Area EEZ only and update the FMP. Alternative 3 is the preferred alternative. Under all the action alternatives, management of the commercial troll and sport fisheries in the East Area would be delegated to the State of Alaska.

Regulatory changes necessary to implement a revised FMP under the Alternative 3, and under Alternative 4, would include (1) revising the purpose and scope to reflect the new FMP title, (2) changing the definition of the Salmon Management Area to reflect the revised FMP, (3) updating the regulations on relation to other laws to reflect the FMP and current laws, (4) removing the salmon permit regulations at §679.4(h) salmon permits, and (5) revising the prohibition in §679.7(h) to reflect the removal of §679.4(h). Measures (1), (3), (4), and (5) would be required under Alternative 2. In addition, Alternative 2 is likely to require creation and maintenance of additional regulatory measures to support ongoing dual federal and state management. These specific measures are not explicitly described in this section, but their costs are addressed here and in Section 2.5 of the EA. FMP Alternative 1 is the status quo, and cost and benefit considerations below treat this alternative as the baseline.

6.2.1 Changes to the Salmon Management Area

FMP Alternatives 3 and 4 would require revisions to the regulatory definitions of "Salmon Management Area." This definition currently reads:

> **§679.2 Definitions**
>
> Salmon Management Area means the waters of the EEZ off the coast of Alaska (see Figure 23 to part 679), including parts of the North Pacific Ocean, Bering Sea, Chukchi Sea, and Beaufort Sea. The Salmon Management Area is divided into a West Area and an East Area with the border between the two at the longitude of Cape Suckling (143º53'36"W):
>
> (1) The West Area is the area of the EEZ off the coast of Alaska west of the longitude of Cape Suckling (143º53'36"W). It includes the EEZ in the Bering Sea, Chukchi Sea, and Beaufort Sea, as well as the EEZ in the North Pacific Ocean west of Cape Suckling.
>
> (2) The East Area is the area of the EEZ off the coast of Alaska east of the longitude of Cape Suckling (143º53'36"W).

Alternative 3 would require that the definition be revised to explicitly exclude the three traditional net fishing areas from the West Area of the Salmon Management Area. Alternative 4 would require that regulations be revised to exclude the West Area from the Salmon Management Area. Alternatives 1 and 2 would not require changes to this section.

6.2.2 Changes to Domestic Fishing for Salmon

Under Alternatives 2, 3, and 4, § 679.3(f) would need to be revised and up-dated. These changes are necessary to ensure that all references to other laws are current. Alternative 1 does not require changes to these regulations. Section 679.3(f) currently reads:

> **§ 679.3 Relation to other laws**
>
> ***(f) Domestic fishing for salmon.***
>
> (1) Additional regulations governing the conservation and management of salmon are set forth in § 600.705 of this chapter.
>
> (2) This part does not apply to fishing for salmon by vessels other than vessels of the United States conducted under subpart H, part 660 (West Coast Salmon Fisheries) under the North Pacific Fisheries Act of 1954, 16 U.S.C. 1021-1035, concerning fishing for salmon seaward of Washington, Oregon, and California.
>
> (3) The Salmon Fishery east of Cape Suckling is administered in close coordination with ADF&G's administration of the State of Alaska's regulations governing the salmon troll fishery off Southeast Alaska. For State of Alaska regulations specifically governing the salmon troll fishery, see 5 Alaska Administrative Code 30 (Yakutat Area), and 5 Alaska Administrative Code 33 (Southeastern Alaska Area).
>
> (4) Commercial fishing for salmon in the EEZ west of Cape Suckling is not allowed except in three net fisheries managed by the State of Alaska as described in Section 2.2.2 and Appendix C of the Salmon FMP. For State of Alaska regulations governing these fisheries, see 5 Alaska Administrative Code 09 (Alaska Peninsula), 5 Alaska Administrative Code 21 (Cook Inlet), and 5 Alaska Administrative Code 24 (Prince William Sound).
>
> (5) For State of Alaska statutes and regulations governing commercial fishing, see Alaska Statutes, title 16--Fish and Game; title 5 of the Alaska Administrative Code, chapters 1-39.
>
> (6) For State of Alaska statutes and regulations governing sport and personal use salmon fishing other than subsistence fishing, see Alaska Statutes, title 16--Fish and Game; 5 Alaska Administrative Codes 42.010 through 75.995.
>
> (7) For State of Alaska statutes and regulations governing subsistence fishing, see Alaska Statutes, title 16--Fish and Game; 5 Alaska Administrative Codes 01, 02, 39, and 99.010.

6.2.3 Changes to Salmon Permits

According to the 1979 FMP, the federal salmon permit was established as a complement to the state limited entry permit, in order to limit capacity in the EEZ (i.e., so that persons who did not receive a state limited entry permit would not simply shift their fishing efforts into federal waters). Additionally, the 1979 FMP explains that there was an interest in ensuring that the half-dozen or so vessels that had fished in the EEZ, but not landed their catch in Alaska, could continue to have access to the EEZ, even if they were not eligible for a state limited entry permit. The problems identified in the 1979 FMP were addressed by this federal permit system. In 1979 or 1980, NMFS issued 2 federal limited entry permits.

These permits were not transferrable and upon retirement for any reason, that permit was retired from the fishery.[72] NMFS has no records for these permits and assumes that they have been retired.

The Council has recommended that federal permits are no longer necessary, because all current participants have state limited entry permits. As long as the FMP retains the requirement to have a state limited entry permit to fish in the EEZ, pursuant to authority delegated to the state by the FMP, capacity is limited in the EEZ. Therefore, the Council's preferred alternative recommends removing the federal limited entry permit from the FMP and federal regulations. Removing this provision from the FMP would also require removing the federal regulations at 50 CFR 679.4 (h) *Salmon permits*.

Alternatives 2, 3, and 4, would require removal of this section or regulations. Alternative 1 would not require changes to this section. Section § 679.4(h) currently reads:

§679.4 Permits

(h) Salmon permits

(1) Operators of commercial fishing vessels using power troll gear.

The operator of a fishing vessel using power troll gear may engage in commercial fishing for salmon in the Salmon Management Area if the operator:

(i) Held a valid State of Alaska power troll permanent entry permit on May 15, 1979, or is a transferee under paragraph (h)(13) of this section from an operator who held such a permit on that date;

(ii) Held a valid State of Alaska power troll interim use permit on May 15, 1979; or

(iii) Holds a Salmon Fishery permit issued by the Regional Administrator under paragraph (h)(7) of this section.

(2) Crew members and other persons not the operator of a commercial fishing vessel using power troll gear.

Crew members or other persons aboard but not the operator of a fishing vessel may assist in the vessel's commercial salmon fishing operations in the High Seas Management Area without a permit if a person described in paragraph (h)(1)(i) through (iii) of this section is also aboard the vessel and is engaged in the vessel's commercial fishing operations.

(3) Personal use fishing.

Any person who holds a valid State of Alaska sport fishing license may engage in personal use fishing in the Salmon Management Area.

(4) Duration.

Authorization under this paragraph (h) to engage in fishing for salmon in the Salmon Management Area constitutes a use privilege which may be revoked or modified without compensation.

(5) Eligibility criteria for permits issued by the Regional Administrator.

(i) Any person is eligible to be issued a Salmon Fishery permit under paragraph (h)(7) of this section if that person, during any one of the calendar years 1975, 1976, or 1977:

(A) Operated a fishing vessel in the Salmon Management Area.

(B) Engaged in commercial fishing for salmon in the Salmon Management Area.

(C) Caught salmon in the Salmon Management Area using power troll gear.

(D) Landed such salmon.

(ii) The following persons are not eligible to be issued a Salmon Fishery permit under paragraph (h)(7) of this section:

(A) Persons described in paragraph (h)(1)(i) or (h)(1)(ii) of this section.

[72] 1979 FMP Sec. 8.3.1.3 (44 FR 33269, June 8, 1979).

(B) Persons who once held but no longer hold a State of Alaska power troll permanent entry or interim-use permit.

(6) Application.

Applications for a Salmon Fishery permit must be in writing, signed by the applicant, and submitted to the Regional Administrator, at least 30 days prior to the date the person wishes to commence fishing, and must include:

(i) The applicant's name, mailing address, and telephone number.

(ii) The vessel's name, USCG documentation number or State of Alaska registration number, home port, length overall, registered tonnage, and color of the fishing vessel.

(iii) The type of fishing gear used by the fishing vessel.

(iv) State of Alaska fish tickets or other equivalent documents showing the actual landing of salmon taken in the Salmon Management Area by the applicant with power troll gear during any one of the years 1975 to 1977.

(7) Issuance.

(i) Except as provided in subpart D of 15 CFR part 904, upon receipt of a properly completed application, the Regional Administrator will determine whether the permit eligibility conditions have been met, and if so, will issue a Salmon Fishery permit.

(ii) If the permit is denied, the Regional Administrator will notify the applicant in accordance with paragraph (h)(16) of this section.

(iii) If an incomplete or improperly completed permit application is filed, the Regional Administrator will notify the applicant of the deficiency. If the applicant fails to correct the deficiency within 30 days following the date of receipt of notification, the application shall be considered abandoned.

(8) Amended application.

Any person who applies for and receives a Salmon Fishery permit issued under paragraph (h)(7) of this section must notify the Regional Administrator within 30 days of a change in any of the information submitted under paragraph (h)(6) of this section.

(9) Replacement.

Replacement permits may be issued for lost or unintentionally mutilated permits. An application for a replacement permit shall not be considered a new application.

(10) Display.

Any permit or license described in paragraph (h)(1) or (h)(3) of this section must be on board the vessel at all times while the vessel is in the Salmon Management Area.

(11) Inspection.

Any permit or license described in paragraph (h)(1) or (h)(3) of this section must be presented for inspection upon request by an authorized officer.

(12) Sanctions.

Procedures governing permit sanctions and denials are found at subpart D of 15 CFR part 904.

(13) Transfer of authority to fish in the Salmon Management Area.

(i) State of Alaska power troll permanent entry permits. The authority of any person to engage in commercial fishing for salmon using power troll gear in the Salmon Management Area shall expire upon the transfer of that person's State of Alaska power troll permanent entry permit to another and shall be transferred to the new holder of that permit.

(ii) Transfer of Authority by the Regional Administrator.

(A) Any person to whom the proposed transfer of a State of Alaska power troll permanent entry permit is denied by the State of Alaska may apply, with the consent of the current holder of that permit, to the Regional Administrator for transfer to the applicant of the current holder's authority to engage in commercial fishing for salmon using power troll gear in the Salmon Management Area.

(B) The application for transfer shall be filed with the Regional Administrator within 30 days of the denial by the State of Alaska of the proposed transfer of the permit.

(C) The application for transfer shall include all documents and other evidence submitted to the State of Alaska in support of the proposed transfer of the permit and a copy of the State of Alaska's decision denying the transfer of the permit. The Regional Administrator may request

additional information from the applicant or from the State of Alaska to assist in the consideration of the application.

(D) The Regional Administrator shall approve the transfer if it is determined that:

(1) The applicant had the ability to participate actively in the fishery at the time the application for transfer of the permit was filed with the State of Alaska.

(2) The applicant has access to power troll gear necessary for participation in the fishery.

(3) The State of Alaska has not instituted proceedings to revoke the permit on the ground that it was fraudulently obtained.

(4) The proposed transfer of the permit is not a lease.

(E) Upon approval of the transfer application by the Regional Administrator, the authority of the permit holder to engage in commercial fishing for salmon in the Salmon Management Area using power troll gear shall expire, and that authority shall be transferred to the applicant.

(14) Other Permits.

(i) Except for emergency transfers under paragraph (h)(15) of this section, the authority of any person described in paragraph (h)(1)(ii), (h)(1)(iii), or (h)(3) of this section to fish for salmon in the Salmon Management Area, may not be transferred to any other person.

(ii) Except for emergency transfers under paragraph (h)(15) of this section, the authority to engage in commercial fishing for salmon which was transferred under paragraph (h)(13)(ii) of this section may not be transferred to any other person except the current holder of the State of Alaska power troll permanent entry permit from which that authority was originally derived.

(iii) The authority described in paragraph (h)(14)(ii) of this section may be transferred to the current holder of that permit upon receipt of written notification of the transfer by the Regional Administrator.

(15) Emergency transfers--authority to use power troll gear.

(i) The authority of any person to engage in commercial fishing for salmon using power troll gear in the Salmon Management Area may be transferred to another person for a period not lasting beyond the end of the calendar year of the transfer when sickness, injury, or other unavoidable hardship prevents the holder of that authority from engaging in such fishing.

(ii) Such a transfer shall take effect automatically upon approval by the State of Alaska of an emergency transfer of a State of Alaska power troll entry permit, in accordance with the terms of the permit transfer.

(iii) Any person may apply to the Regional Administrator for emergency transfer of the current holder's authority to engage in commercial fishing for salmon using power troll gear in the Salmon Management Area for a period not lasting beyond the calendar year of the proposed transfer, if a person:

(A) Is denied emergency transfer of a State of Alaska power troll entry permit by the State of Alaska; or

(B) Requests emergency transfer of a Federal commercial power troll permit previously issued by the Regional Administrator, with the consent of the current holder of that permit.

(iv) The Regional Administrator shall approve the transfer if he determines that:

(A) Sickness, injury, or other unavoidable hardship prevents the current permit holder from engaging in such fishing.

(B) The applicant had the ability to participate actively in the fishery at the time the application for emergency transfer of the permit was filed with the State of Alaska or, in the case of a Federal permit, with the Regional Administrator.

(C) The applicant has access to power troll gear necessary for participation in the fishery.

(D) The State of Alaska has not instituted proceedings to revoke the permit on the grounds that it was fraudulently obtained.

(v) The application in the case of a State of Alaska permit shall be filed with the Regional Administrator within 30 days of the denial by the State of Alaska of emergency transfer of the permit.

(vi) The application shall include all documents and other evidence submitted to the State of Alaska in support of the proposed emergency transfer of the permit and a copy of the State of Alaska's decision denying the emergency transfer of the permit. The Regional Administrator may

request additional information from the applicant or from the State of Alaska to assist in the consideration of the application.
(vii) Upon approval of the application by the Regional Administrator, the authority of the permit holder to engage in commercial fishing for salmon using power troll gear in the Salmon Management Area shall expire for the period of the emergency transfer, and that authority shall be transferred to the applicant for that period.
(16) Appeals and hearings.
(i) A decision by the Regional Administrator to deny a permit under paragraph (h)(7) of this section or to deny transfer of authority to engage in commercial fishing for salmon in the Salmon Management Area under paragraphs (h)(13) and (h)(14) of this section will:
(A) Be in writing.
(B) State the facts and reasons therefore.
(C) Advise the applicant of the rights provided in this paragraph (h)(16).
(ii) Any such decision of the Regional Administrator shall be final 30 days after receipt by the applicant, unless an appeal is filed with the NOAA/ NMFS Assistant Administrator within that time.
(iii) Failure to file a timely appeal shall constitute waiver of the appeal.
(iv) Appeals under this paragraph (h)(16) must:
(A) Be in writing.
(B) Set forth the reasons why the appellant believes the Regional Administrator's decision was in error.
(C) Include any supporting facts or documentation.
(v) At the time the appeal is filed with the Assistant Administrator, the appellant may request a hearing with respect to any disputed issue of material fact. Failure to request a hearing at this time will constitute a waiver of the right to request a hearing.
(vi) If a hearing is requested, the Assistant Administrator may order an informal fact-finding hearing if it is determined that a hearing is necessary to resolve material issues of fact and shall so notify the appellant.
(vii) If the Assistant Administrator orders a hearing, the order will appoint a hearing examiner to conduct the hearing.
(viii) Following the hearing, the hearing examiner shall promptly furnish the Assistant Administrator with a report and appropriate recommendations.
(ix) As soon as practicable after considering the matters raised in the appeal, and any report or recommendation of the hearing examiner in the event a hearing is held under this paragraph (h)(16), the Assistant Administrator shall decide the appeal.
(x) The Assistant Administrator shall promptly notify the appellant of the final decision. Such notice shall set forth the findings of the Assistant Administrator and set forth the basis of the decision. The decision of the Assistant Administrator shall be the final administrative action of the Department of Commerce.

6.2.4 Changes to Prohibitions on Salmon Fisheries

With the removal of § 679.4(h) Salmon permits, the §679.7(h) prohibitions on the salmon fisheries would need to be revised to remove a cross-reference to §679.7(h). Alternatives 2, 3, and 4 would require removal of this cross-reference, and Alternative 1 would not. Section 679.7(h) currently reads:

§679.7 Prohibitions
(h) Salmon Fisheries.
(1) Fish for, take, or retain any salmon in violation of this part.
(2) Engage in fishing for salmon in the Salmon Management Area defined at § 679.2 and Figure 23 to this part, except to the extent authorized by § 679.4(h) or applicable State of Alaska regulations.

6.2.5 Costs and Benefits of the Proposed Changes to Federal Regulations

No costs are associated with these four changes to federal regulations for the following reasons:

- Management is currently undertaken by the State of Alaska, and, as discussed in Section 2.5 of the EA, this will continue under all alternatives. While Alternatives 3 and 4 will require revisions to § 679.2 to either exclude the three traditional net areas or the West Area from the Salmon Management Area, these measures will not affect fishery management. Thus, none of the alternatives will have an impact on costs.
- Revision and updating of § 679.3 is a housekeeping measure to ensure that regulatory references to other laws are up to date. This will not have an impact on costs.
- The revision to § 679.4 eliminates provisions for a limited entry program whose original purpose has been accomplished, and which is not being utilized. Elimination of this section will not have an impact on costs.
- The revision to § 679.7 simply removes a cross-reference to § 679.4(h) which is also being removed. Since the removal of the permits section creates no costs, this editorial change will not have an impact on costs

Alternative 2 would require the creation and implementation of a new federal/state management regime for the fisheries in the three traditional net areas. The general categories of costs associated with this were described in more detail in Section 2.5 of the EA. Three of the regulatory actions described above, would also be required for Alternative 2, and these would create no costs. However, Alternative 2 also requires regulatory measures to support an additional layer of federal management on top of state management for these fisheries. Therefore, while this FMP alternative maintains state management of the salmon fisheries in the EEZ, it would entail an increased level of administrative requirements whose creation and maintenance would involve increased costs for the federal government, the state, and the private sector.

The regulatory changes to § 679.2 under Alternatives 3 and 4 are expected to create a benefit if they reduce potential redundancy between state and federal rule-making, flowing from dual management requirements under the status quo. More generally, while the removal of these sections will have no substantive impact on industry or the public, and will not create any costs, it will provide benefits from the streamlining of federal regulations and removal of obsolete federal regulations.

6.3 Net Benefit to the Nation

Based upon the information contained in the EA, describing the expected effects of the proposed action, and the indication deriving from the RIR discussion, above, there appears to be the potential for, at most, *de minimus* costs associated with the preferred alternative. The same information and analysis suggests it is reasonable to conclude that the preferred alternative will maintain management efficiency, while reducing economic and operational burdens, associated with fishery regulations, on private sector operators engaged in fishing for salmon in waters in and off Alaska. As such, the proposed action is anticipated to result in a net benefit to the Nation.

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9 Appendices

9.1 Appendix 1: Incorporation of Uncertainty into Escapement Goal Development and Management of Pacific Salmon in Alaska

Since statehood Alaska has utilized a fixed escapement goal policy for managing Pacific salmon (Woodby et al. 2005) based on the work of Thompson (1951). Alaska formally adopted this policy into regulation in 2000 as the Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222) and the Policy for Statewide Salmon Escapement Goals (5 AAC 39.223). These two policies dictate that Pacific salmon be managed to achieve escapements that provide for sustained yields per the Alaska constitutional mandate to utilize, develop, and maintain fish based on the sustained yield principle (Alaska Constitution, Article VIII, Section 4). Moreover, these policies define escapement goals that maximize or sustain yields and are expressed as ranges or lower bounds that take into account salmon productivity and data uncertainty.

The biological escapement goal (BEG) is the escapement that provides the greatest potential for maximum sustained yield (MSY). The BEG is the primary fishery management objective in the absence any allocative factors, and is developed from and scientifically defensible based on the best available biological information. The BEG is always specified as a range. The sustainable escapement goal (SEG) is the escapement known to provide for sustained yield over a 5 to 10 year period and is used in situations where a BEG cannot be estimated or managed for. The SEG is the primary fishery management objective in the absence any allocative factors, and is developed from and scientifically defensible based on the best available biological information. The SEG can be a range or a lower bound.

Methods of developing escapement goals that account for salmon productivity and data uncertainty have evolved since statehood, but remain based on principles of Pacific salmon population biology, simple production models, and the stock concept. Improved data collection and methods of statistical modeling have greatly facilitated the direct incorporation of uncertainty into an escapement goal analysis. As a result, management of Pacific salmon in Alaska explicitly accounts for uncertainty by managing for a scientifically defensible escapement goal.

Production Models for Pacific Salmon

Due to the semelparous life history and harvest of largely mature stocks of Pacific salmon in Alaska fisheries, production from a stock of Pacific salmon can be modeled as a simple relationship between escapement of adults and the expectation of subsequent return of offspring as adults,

$$E[R|S] = S \times \alpha \times f\left(S|S_{EQ}\right)$$

where R = production of adults in subsequent generation, S = abundance (escapement) of adults, α = intrinsic rate of increase, and S_{EQ} = carrying capacity (Figure 1).

In this simple model, there is an intrinsic rate of increase (α) due to the average per-adult generation of ova and the survival of these ova to adult in the absence of competition. Counteracting this rate of

increase is a discount due to competition, $f(S|S_{EQ})$, that increases as escapements tend towards a theoretical carrying capacity (i.e., average escapements in the absence of fishing mortality or S_{EQ}).

The intrinsic rate of increase, also known as the density independent parameter, is thought to be species and also regionally specific. Factors influencing the intrinsic rate of increase are variability in life history characteristics such as fecundity, maturation rate, growth rate as well as environmental influences on survival in fresh and salt water.

Carrying capacity is thought to be watershed specific and can be effectuated via rearing or spawning ground limitation. Rearing limitation in Pacific salmon is thought occur as competition among juveniles for food or space in the freshwater rearing environments of some species. Evidence of these limitations can be seen in variation in time spent residing in freshwater or in size of juveniles at the time of smoltification. Spawning ground limitation is thought to occur as adults compete for suitable spawning areas. Evidence of these limitations can be seen in variation in the location and density of redds and in the amount of egg retention in adults due to competitive interactions.

Several specific production models have been postulated for Pacific salmon. The main difference in these models is the mathematical formulation of compensation in survival rates (R/S) as competition increases. Two common models for compensation in survival rates are: 1) asymptotic (*S/R* increases linearly) or 2) exponential (*ln*(*R/S*) decreases linearly) as spawning abundance increases. In relation to the generic production model above, the differing forms for discounting due to competition are:

$$f(S|S_{EQ}) = \frac{1}{1+\frac{(\alpha-1)}{S_{EQ}}S} \text{ or } f(S|S_{EQ}) = exp\left[-\frac{ln(\alpha)}{S_{EQ}}S\right].$$

These two mathematical forms result in the two most common production models for Pacific salmon: 1) Beverton-Holt (Beverton and Holt 1954) and 2) Ricker (1975; Figure 2). The Beverton-Holt model can be used to model competition due to rearing or spawning limitation, whereas the Ricker model can only be used to model spawning limitation (see Quinn and Deriso 1999). The Beverton-Holt model can only exhibit simple or pure compensation, where the expectation of maximum production occurs at carrying capacity. Over-compensation can occur in the Ricker model, where the expectation of maximum production can occur at intermediate levels of escapement depending on the intrinsic rate of increase.

Although choice of production model represents one form of scientific uncertainty that could be accounted for in escapement goal development, Alaska has largely chosen to use the Ricker model. Reasons for extensive use of the Ricker production model in Alaska are both biological and practical. Production in most Pacific salmon stocks in Alaska is arguably driven by competition among adults on the spawning grounds. Biological evidence for competition among adults can be seen in egg retention from overcrowding on spawning grounds, dominance of a age-1 smolts when harvest rate (and competition) is low, size of juveniles is not inversely related to parent escapements when harvest rate is low, and little or no rearing of juveniles in freshwater (i.e., for chum and pink salmon).

Empirical evidence for a Ricker production model comes from dome-shaped production plots, superior statistical fits to Ricker versus Beverton-Holt production models, and poor production from exceptionally large escapements for various stocks in Alaska, indicating that maximum production occurs when

escapements are held at an intermediate level in relation to carrying capacity (see Clark et al. 2007 for examples). Moreover, many stocks of Pacific salmon in Alaska consistently provide surplus production (i.e., meet and exceed lower bound escapement goals) under moderate to high harvest rates, arguable evidence of a dome-shaped production relationship.

From a practical standpoint, use of the Ricker production model will consistently provide for precautionary management under a fixed escapement goal management paradigm. Assuming fixed intrinsic rate of increase and carrying capacity, the Ricker model will provide a lower average harvest rate and higher average escapement than the equivalent Beverton-Holt model (Figure 3).

Incorporation of Uncertainty into Production Models

Two general forms of uncertainty are accounted for in production models used to develop escapement goals in Alaska. Process error is the uncertainty in production introduced by variation in survival rates from ova to adult. Biological mechanisms for process error in Pacific salmon include variation in sex ratio, fecundity, growth (size composition), maturation (age composition). Environmental mechanisms for process error include variation in freshwater habitat (e.g., stream flows, stream temperature) as well as marine habitat (e.g., ocean temperature and circulation patterns). Ecosystem linkages can also create process error in survival rates in the form of predation, inter-specific competition, disease, and starvation for example.

Process error can be easily introduced into a production model as density-independent and stochastic. For example, the Ricker production model has the stochastic version:

$$E[R|S] = exp\left(ln(\alpha) - \frac{ln(\alpha)}{S_{EQ}}S\right)\exp\left(\frac{\sigma_\varepsilon^2}{2}\right),$$

where σ_ε^2 is a log-normally distributed random variable (Peterman 1981) that represents variation from the expectation due to process error. Serially correlated patterns of lag-1 are often seen in process error in Pacific salmon, so that an alternative process error model is used:

$$E[R|S] = exp\left(ln(\alpha) - \frac{ln(\alpha)}{S_{EQ}}S\right)\exp\left(\frac{\sigma_\varepsilon^2}{2(1-\phi_1^2)}\right),$$

where ϕ_1 is the lag-1 correlation coefficient. Random walk Kalman filtering has also been used to assess serially correlated process error in salmon production (Peterman et al. 2003).

Another form of uncertainty in production models comes from measurement errors introduced into the annual stock assessment process. Escapements are routinely estimated rather than counted using weirs, sonar, mark-recapture, aerial survey, or a combination of methods to reconstruct runs. In many cases measurement error in escapements are small (e.g., complete counts at weirs) and can be ignored in development of an escapement goal. However, high measurement error in escapements can create bias in estimates of the intrinsic rate of increase that is high or low depending on the magnitude of harvest rates (Kehler et al. 2002). This bias can directly affect development of an escapement goal. Age composition of annual runs are routinely estimated from a sample of catches and escapements. Catches are also estimated with error, especially when sport or subsistence harvests are substantial and or commercial harvests in

mixed-stock fisheries are estimated from stock identification techniques such as genetic stock identification.

Time series bias can also enter into the escapement goal development process (Walters 1985). Data that are used to estimate to develop production models usually come from annual stock assessments where the escapements in one year are not independent of escapements in proceeding years. This can confound the estimation of the relationship between escapements and production and bias estimates of intrinsic rate of increase and carrying capacity.

When necessary, uncertainty in the form of measurement errors in escapements, catches, age compositions, and other types of run reconstructions can be incorporated into the production model. Time series bias can also be accounted for in these same models. As described below Alaska currently utilizes methods of escapement goal analysis that bring all of these sources of uncertainty into "full probability" state-space models.

Escapement Goal Analysis

Management parameters can be estimated directly from the production models described above. For example the Ricker production model leads to the following estimates of interest to escapement goal development for Pacific salmon (from Hilborn 1985):

$$S_{MSY} \cong S_{EQ}\left(0.5 - 0.07ln(\alpha')\right),$$

where, S_{MSY} is the escapement that maximizes sustained yield on average (*MSY*) and $ln(\alpha') = ln(\alpha) + \frac{\sigma_\varepsilon^2}{2}$ for the log-normal random process error model. Harvest rate at *MSY* (U_{MSY}) can also be estimated in this way:

$$U_{MSY} \cong ln(\alpha')\left(0.5 - 0.07ln(\alpha')\right).$$

MSY is then calculated by plugging S_{MSY} back into the Ricker equation:

$$MSY = S_{MSY}\left(\exp\left(\ln(\alpha') - \frac{\ln(\alpha')}{S_{EQ}} S_{MSY}\right) - 1\right).$$

The limiting rate of exploitation (that drives the stock to extinction) can also be calculated directly from α':

$$U_{lim} = 1 - \frac{1}{\alpha'}.$$

Escapement goals in Alaska are developed directly from these management parameters or their proxies. Moreover, these goals are commonly specified as ranges (see Munro and Volk 2010). Although no specific standard has been set in policy, Alaska has generally developed these ranges based on the premise that when fisheries are managed to keep escapements within the goal range, the targeted stock would produce 90 percent or more of *MSY*. Use of ranges takes advantage of the fact that the Ricker production model provides relatively similar yields across a wide range of escapements close to $S_{MSY.}$ Use

of ranges also addresses uncertainty in implementing fixed escapement goal management of Pacific salmon fisheries, where preseason forecasts of run strength are often imprecise and knowledge of realized run strength improves as the fishery proceeds.

Proxies for S_{MSY}

Empirical development of production models require time series of data on escapements and resultant production. In many cases in Alaska available fishing power is insufficient to cause overfishing (i.e., resultant escapements below the lower bound of the escapement goal), average harvest rates are generally lower than U_{MSY}, and management is largely predicated on a schedule of fixed duration fishery openings. In other cases in Alaska, there are mixed-stock and mixed-species fisheries where catches cannot be resolved by stock during the fishing season. In these fisheries, stock-specific production data are usually lacking, but a time series of post-season escapement data are available to develop an escapement goal.

Based on these realities, Alaska has developed several proxies that are based on production theory, knowledge of fishing power and relative harvest rates, and the ability (or inability) to manage fisheries in-season. Most lower bound SEG and SEG ranges are based on these proxies (Munro and Volk 2010).

Percentile Approach

The most commonly used proxy in Alaska is the percentile approach as described in Bue and Hasbrouck (Unpublished). This proxy approach is largely based on production theory and Hilborn's (1985) approximation for S_{MSY}. In general sustained yields (i.e., surplus production) can be produced from a wide range of escapements (Figure 4). Specifically for the Ricker model, Hilborn (1985) showed that S_{MSY} lies in the range of 29 to 43 percent of carrying capacity (S_{EQ}) over the range of likely productivities of Pacific salmon ($ln(\alpha')$ ranging from 1 to 3), with U_{MSY} ranging from 43 to 87 percent. Given that harvest rates in situations of low fishing power are generally less than U_{MSY}, a trimmed range or lower bound of observed escapements for stocks in the fishery will be a conservative estimate of (i.e., escapements generally larger than) S_{MSY}. Bue and Hasbrouck (Unpublished) showed that for several stocks where S_{MSY} could be estimated, the 15th and 85th percentiles of observed escapements provided the best match to the range that produced 90% of *MSY*. Based on this reasoning, they provided a table of prescribed percentiles of the observed time series of escapements based on the amount of contrast (highest observed escapement divided by lowest observed escapement) and relative harvest rate (Table 1). While not directly accounted for, uncertainty is addressed in the use of a conservative estimate of S_{MSY} based on percentiles of observed escapements for stocks where average harvest rate is likely less than U_{MSY}.

Examples utilizing this approach in Alaska are numerous. A series of SEG ranges were established for pink salmon stocks in lower Cook Inlet using the percentile approach. As is typical for this approach, these stocks are assessed with foot and aerial surveys that do not enumerate the entire escapement, commercial catches cannot be resolved to stock of origin, and harvest rates are low to moderate (Otis et al. 2010). The percentile algorithm in Table 1 was applied to these stocks, with SEG ranges specified using the 25th and 75th percentiles of the observed time series of escapements for each of the 17 pink salmon stocks in lower Cook Inlet.

In a very different situation, two chum salmon stocks in Kuskokwim Bay are managed using lower bound SEGs developed using the percentile approach. These two stocks (Kanektok River and Middle Fork Goodnews River) are not targeted in Kuskokwim Bay commercial fisheries, but experience moderate harvest rates from the targeted Chinook salmon fishery (ADF&G 2004). Assessments of escapement consist of post season aerial survey (Kanektok) or in-season tower/weir counts of one tributary (Middle Fork Goodnews). Lower bound SEGs were developed using the 15th percentile of observed escapements. These stocks are managed to maintain the long-term average escapements with these lower bound SEGs serving as precautionary escapement goals that warn managers of a decrease in productivity and/or an increase in harvest rates.

Risk-based Approach

Another common approach for developing precautionary lower bound SEGs for non-targeted stocks is the risk-based approach of Bernard et al. (2009). While not as common as SEG ranges in Alaska, there are a number of non-targeted stocks for which a precautionary escapement goal is necessary (see Munro and Volk 2010). This approach models the observed time series of escapements to determine the lowest observed escapement that balances the risk of observing three to five consecutive years below the lower bound SEG (i.e., precipitating a management concern per 5 AAC 23.222(f)(21)) due to random chance with the risk of not observing a real drop in the average observed escapements due to either an increase in harvest rate or drop in production. Risk is estimated via simulation of the time series of observed escapements as either a log-normal process or a lag-1 autoregressive process and calculation of tail probabilities (see example output in Figure 5). Drops in average observed escapement are arbitrary, but the range of possible drops are usually determined from the drop from the average observed to the minimum observed escapement. This approach generally results in lower bound SEGs that are similar to the 15th percentile of the observed escapements.

Evenson et al. (2008) used this approach to develop lower bound SEGs for seven non-targeted chum stocks in Prince William Sound. They reasoned that these chum salmon stocks were harvested in the targeted pink salmon fisheries in Prince William Sound, were enumerated by aerial survey after the season, and were not managed for in-season. Estimated risks used to develop these lower bound SEGs ranged from 2 to 8 percent (a 1-in-50 to a 1-in-12 chance) for unwarranted concern over three consecutive years balanced against a 3 to 7 percent risk (a 1-in-33 to a 1-in-14 chance) of ignoring actual reductions in average escapement of 85 to 97%.

Habitat Models

Although less commonly used than the percentile or risk-based approaches in Alaska, habitat models are usually appended to an escapement goal analysis as corroboration of other proxies or in combination with a formal stock-recruit analysis. This approach can be used to develop a BEG or SEG. The most fully developed habitat model is for Chinook salmon and is based on the premise that carrying capacity of a stock is related to the size of the watershed in which the stock resides (Liermann et al. 2010). A Bayesian hierarchical model is used to relate estimated management parameters (S_{MSY} and S_{EQ}) from 25 Chinook salmon populations from Oregon north to Alaska to watershed area. Predictions of management parameters and their posterior distributions can be made using only watershed area or with watershed area and available production data for the stock in question. Nelson et al. (2006) first used this method for

comparison with an estimate of S_{MSY} from stock-recruit analysis in the Nelson River on the Alaska Peninsula. More recently, Fleischman et al. (In prep) developed a Bayesian model of Chinook salmon in the Blossom and Keta rivers in southeast Alaska, with the habitat model of Liermann et al. (2010) providing priors into the stock –recruit analysis.

Similar habitat-based approaches are used for corroborating escapement goals for lake-rearing sockeye salmon in Alaska. Spawning area, euphotic volume, and zooplankton biomass measurements in lakes have all been used as predictors of management parameters for sockeye salmon (for example, see Nelson et al (2006) for Ilnik River, Bear River, Mortensen Lagoon, Thin Point Lake, and Witteveen et al. (2005) for Chignik River analyses).

Theoretical Approaches

There are two proxy methods of escapement goal analysis that are used infrequently in Alaska to develop or evaluate SEGs. Both methods are based on production theory and depend on the history of harvest rates on the stock (Clark et al. 2009). For lightly harvested stocks (harvest rates below 5 percent), one can assume that the average observed escapements is a reasonable proxy for carrying capacity (Figure 6A). Using Hilborn's (1985) approximation, S_{MSY} can be estimated by substituting the average observed escapement for S_{EQ} and supplying an estimate or range of the likely species-specific $ln(\alpha')$ for the stock. Ericksen and McPherson (2004) used this method to develop an escapement goal for Chilkat Chinook salmon during a period of low harvest rates discerned from code-wire tag recoveries..

For heavily harvested stocks in Alaska (harvest rates near U_{MSY}) there is generally production data available for conducting a stock-recruit analysis (see next section). However, when harvest rates are high, often there is not enough information in the data to determine the carrying capacity of the stock (Figure 6B), but there is enough information to determine $ln(\alpha')$. A preponderance of stocks that experience high harvest rates also have an existing escapement goal that can be evaluated using this approach. Using Hilborn's (1985) approximation one can estimate U_{MSY} from $ln(\alpha')$ alone. The estimate of U_{MSY} can be compared to the average harvest rate on the stock to determine if the existing escapement goal is too high or low relative to S_{MSY}. If average harvest rate is higher than U_{MSY} the existing escapement goal is too low, and conversely if average harvest rate is lower than U_{MSY} the existing escapement goal is too high. Baker et al. (2009) used this method to compare estimates of $ln(\alpha')$ during peak and off-cycle years of production of sockeye salmon in the Kvichak River drainage and to corroborate an approach that uses an escapement goal and a maximum harvest rate of 50 percent to manage the fishery.

Stock-Recruit Analysis

When sufficient data and information content are available, stock-recruit analysis is used to develop stock-specific production models to estimate management parameters and develop escapement goals. In Alaska and elsewhere, methods of stock-recruit analysis are currently evolving from simple regression models that provide point estimates of the management parameters to Bayesian state-space models that incorporate uncertainty in process and measurement error to adjust for known biases and provide marginal posterior distributions of the management parameters.

Classical methods of stock-recruit analysis usually involve linear transformation of the production model and following the linear regression recipe to estimate the parameters of interest (Ricker 1975). Recasting the stochastic Ricker production model in the following way:

$$R = Sexp(ln(\alpha) - \beta S)\exp(\varepsilon), \text{where } \beta = \frac{ln(\alpha)}{S_{EQ}},$$

and then dividing by *S* and log-transforming so that

$$ln\left(\frac{R}{S}\right) = ln(\alpha) - \beta S + \varepsilon,$$

allows for the simple linear regression of $ln\left(\frac{R}{S}\right)$ on *S* to estimate $ln(\alpha)$ as the y-intercept and β as the slope. The residual error of the regression provides the estimate of ε. Management parameters can then be estimated in the usual way with $E[\varepsilon] = \frac{\sigma_\varepsilon^2}{2}, ln(\alpha') = ln(\alpha) + \frac{\sigma_\varepsilon^2}{2}, and\ S_{EQ} = \frac{ln(\alpha')}{\beta}$.

Escapement goals (BEGs and SEGs) for many stocks in Alaska were developed using this method (see Fried 1994, Clark 2001, Bue and Hasbrouck Unpublished, and Geiger 2003 for examples). Ranges around the point estimate of S_{MSY} were calculated in a variety of ways, but most commonly using the range that produces 90 percent or more of the point estimate of *MSY* or by applying the results of simulation work by Eggers (1993). Eggers simulated yields from a Ricker production model along with implementation error in management and found that an escapement goal range that was 0.8 to 1.6 times the point estimate of S_{MSY} provided for average yields that were 90% or more of the point estimate of *MSY*.

More recently salmon biologists in Alaska have used probabilistic approaches to the classical method of stock-recruit analysis and extended the analysis to provide information on sustained yield, yield in relation to MSY, and overfishing. These methods include bootstrapping of the linear regression recipe (see Clark and Clark 1994, Bernard et al. 2000, Clark and Etherton 2000, and McPherson and Clark 2001 for examples) and maximum likelihood estimation of the management parameters (e.g., Fair et al. 2004 for Kvichak River sockeye salmon). In addition to point estimates of the management parameters, these methods provide estimates of uncertainty distributions of these parameters. In particular, Alaska has developed probability profiles for attainment of 90% or more of MSY (Szarzi et al. 2007) and for overfishing (probability of low escapements producing less than 90% of MSY (Bernard and Jones 2010)). These profiles are useful for determining and defending escapement goal ranges that are robust to uncertainty in the management parameters (Figure 7). These methods continue to be used in Alaska in situations where escapement is measured with little to no error, harvest rates are low to moderate, and there is no serial correlation in residuals (e.g., Fair et al. 2008 for Eshamy Lake sockeye salmon).

Although probabilistic approaches to classical methods are an improvement in escapement goal analysis, potential for bias in the management parameters due to: measurement error in estimates of escapement; non-independent estimates of escapement through time; and, serially correlated residual errors remain. To address these potential biases, Alaska has developed Bayesian state-space models of production for Pacific salmon (Meyer and Millar, 2001), especially for situations where escapements are estimated with error (e.g., mark-recapture) and stock assessments are the result of a wide range of sampling programs

each with sampling error (e.g., contributions from coded wire tag recoveries to estimate stock-specific harvest or run reconstruction to estimate escapement of a large stock complex). These models mimic the stock assessment processes used to estimate the inputs to the production model. The state-space model allows for non-independence of the time series of escapements as the process to estimate catches and therefore estimate subsequent escapements is accounted for. In the Bayesian framework, marginal posterior distributions of the management parameters are estimated using Markov Chain-Monte Carlo methods (a Gibbs sampler) as implemented in the program WinBUGS (Lunn et al. 2000).

The observation equations of the state-space model are of the general form:

$\hat{S} = S^{true} exp(v^S)$ and $\hat{C} = C^{true} exp(v^C)$,

where, both escapement (*S*) and catch (*C*) are estimated with iid log-normal errors $\left(e.g., v^S \sim N(0, \tau_S^2)\right)$.

The link between successive years is accomplished by fishing (*C*) on the annual run (*N*) to produce escapement (*S*) for the next brood in year *t*:

$$\hat{S}_t = \hat{N}_t - \hat{C}_t.$$

Subsequent production (*R*) from escapement in year *t* is estimated from annual runs and the age compositions for ages *x* to *y*, depending on the maturation schedule of the stock (e.g., *x*=4 and *y*=6 for typical Chinook salmon stocks):

$$\hat{R}_t = \sum_{a=x}^{y} \hat{p}_{t+a,a} \hat{N}_{t+a},$$

where the estimated age compositions $(p_x, p_{x+1}, \ldots, p_y)$ that represent the maturity schedule of a particular brood year are drawn from a $Dirichlet(\gamma_x, \gamma_{x+1}, \ldots, \gamma_y)$ distribution.

The state equation for the Ricker model is then:

$$\hat{R} = \hat{S} exp\left(ln(\alpha) - \beta \hat{S}\right) \exp\left(\frac{\hat{\sigma}_\varepsilon^2}{2}\right).$$

In the Bayesian framework, initial states of the model are specified as priors. It is most common for uninformative priors to be used in these models, although habitat models (Fleischman et al. In prep) and regional summaries of key parameters ($ln(\alpha')$ for example, as in Bernard and Jones 2010) have been used as priors where stock-specific information is lacking information content. Beyond the posterior density of the management parameters, outputs of these models are the same probability profiles previously discussed (Figure 7), with the additional uncertainties directly accounted for. As an extension to this framework, complex run reconstructions have been directly integrated into the stock-recruitment analysis and escapement goal development process (see Fleischman and Borba 2009, Fleischman and Evenson 2010, Bernard and Jones 2010, and Eggers and Bernard 2011 for examples).

Escapement Goal Management

Sustainable Salmon Policy and Escapement Goal Policy

The framework for fishery management in the State of Alaska is guided by the Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222). The policy was born from joint recognition by the Board of Fisheries and ADF&G that 1) there is need for a comprehensive policy to manage and regulate fisheries; 2) fishery management plans must consider a variety of factors including data uncertainty, environmental change, and existing harvest patterns and 3) management plans require guiding principles and criteria. In the policy, state salmon management should be based on several principles and criteria, including:

1. Maintaining wild salmon stocks and habitats at levels of productivity that assure sustained yields,
2. Management of salmon fisheries to allow escapements within ranges necessary to conserve and sustain potential salmon production and maintain normal ecosystem function,
3. Establish effective management systems to regulate human activities that affect salmon,
4. Encourage public support and involvement for sustained use and protection of salmon resources,
5. In the face of uncertainty, salmon stocks, fisheries, artificial propagation, and essential habitats shall be managed conservatively.

Criteria for establishing escapement goals are outlined in the Policy for Statewide Salmon Escapement Goals (5 AAC 39.223). These fixed goals provide managers specific targets for their actions. Previous discussion has documented how various uncertainties are accounted for in establishing those goals.

Management Plans

Management of salmon fisheries in Alaska is guided by management plans developed by the department in consultation with the Board of Fisheries. Salmon management plans typically provide an overview of expected run sizes, regulations, management issues and harvest strategies for a particular fishery. These plans provide commercial fishermen and processors with a generalized picture of how the fishery will be prosecuted, management options, and conditions that may trigger management actions in-season. Recent changes to fishing time, area, gear, or allocations determined by the Board of Fisheries are noted in annual updates to management plans. Plans often identify scheduled fishing periods, subject to change by emergency order. Management plans for Alaska fisheries can be accessed from the ADF&G commercial fisheries web page, http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main.

Pre-season forecasts

In advance of each fishing season, ADF&G prepares pre-season forecasts for salmon runs that affect major fisheries around the state (see Eggers et al. 2010). Selection of species for which to develop regional or area forecasts is based upon management need, economic importance, and data availability. A variety of methods may be employed to develop these forecasts including escapement levels of parent stocks, returns to date from sibling age classes, and outmigrating fry or smolt abundance. While forecasts provide some insight to run strength and possible management strategies, there is substantial uncertainty surrounding these estimates and ADF&G pursues a conservative approach based upon a flexible

management plan until more information is available on actual strength of runs. Hatchery operators typically provide forecasts for hatchery runs of pink, chum and sockeye salmon.

In-season management

Most fishery management decision-making in ADF&G is delegated to area biologists who live and work in the fisheries areas. This approach has worked effectively to help area staff acquire significant expertise about the resources, people, and fisheries within the areas they live and work. A primary management tool is "emergency order authority", delegated by the Commissioner to state area fishery managers. This authority allows the local manager to quickly respond to changing conditions within a fishery to implement conservation measures (restriction of harvest) or to allow harvest when data supports the in-season action. Regional and area research and monitoring staff support management by collecting and analyzing an assortment of data on run abundance, run timing, harvest, escapement and population structure.

A key to in-season management designed around meeting fixed escapement goals is in-season estimates of run strength and escapement levels to local rivers. A variety of methods are employed to provide insight to managers on the strength of salmon runs and escapements including test fishing, sonars, counting towers, weirs, aerial and foot surveys, and fish wheels. Genetic analyses often play an important role in delineating stock composition of salmon runs and harvests. Historical knowledge of salmon run timing allows managers to assess the date-specific strength of escapement against the likelihood of achieving any particular goal. Timely availability of run, catch and escapement information coupled with emergency order authority to restrict fisheries provides a robust mechanism for responding to uncertainties in annual salmon runs.

Performance metrics (accountability measures)

An important measure of management performance, implicit in ADF&G's management regime is success in meeting escapement goals. There are currently 290 escapement goals for all species and management regions in Alaska (Munro and Volk, 2010). During the fishing season, managers can follow escapement trends against historical data to determine the likelihood of meeting an escapement goal. Where escapement information is not yet available during the fishery, due to lengthy fish travel time from commercial fishing districts to escapement projects, manager's gain useful information from in-river counting projects and commercial, subsistence or test fish catch indexes. Because run assessment, catch and escapement data is available in-season, emergency order authority over fishing time and area provides a mechanism for responding quickly to uncertainties in expected run sizes. The system of daily catch reporting on fish tickets provides real time information on commercial catch and emergency order authority provides the tool for mangers to quickly constrain catch, if necessary.

After the fishing season is complete, performance of fisheries and success at meeting escapement goals can be evaluated. An annual review of escapement goals and performance provides a statewide perspective (Munro and Volk, 2010). The sustainable salmon policy outlines a process for regular review of salmon stock status and identification of specific stocks of concern. Three categories of concern exist: yield concern - stocks that fail to produce expected yields; management concern – stocks that fail to meet established escapement goals; or conservation concern – stocks in danger of not being able to rebuild

themselves. Stocks are designated as concerns if the stock fails to meet the escapement goal over a period of 4 to 5 years despite appropriate management taken to address the concern. When stocks of concern are identified, department staff members work with the board and public to develop action plans, management plans, and research plans to help return the stock to health.

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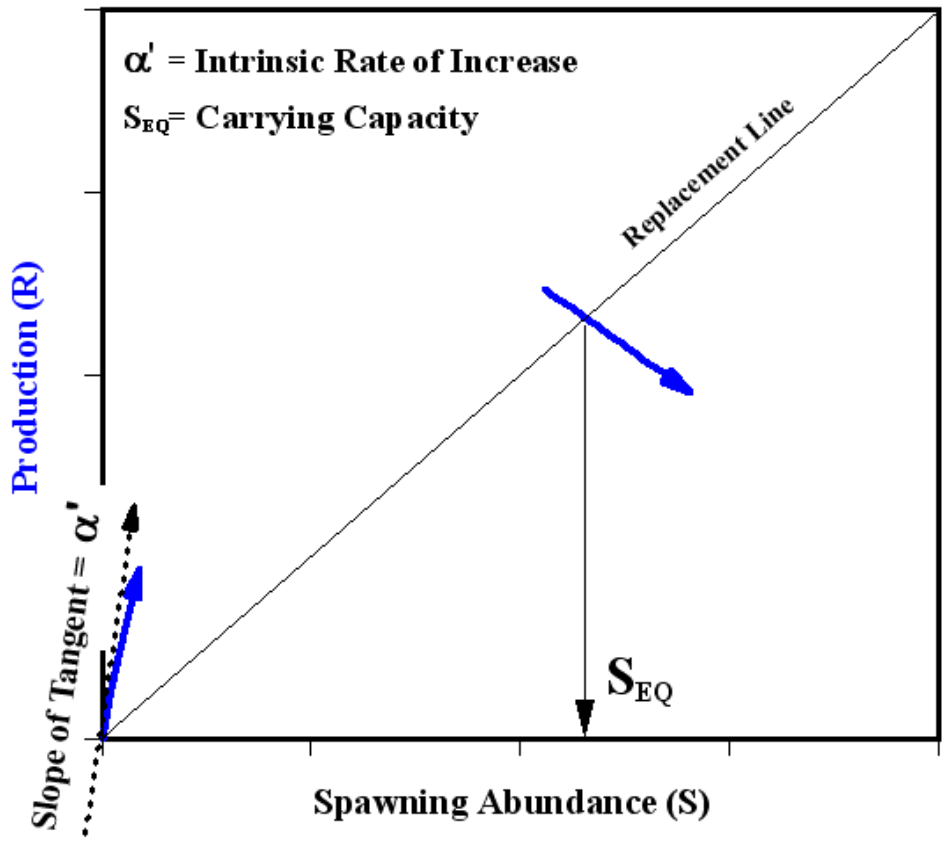

Figure 1. A generic production model for Pacific salmon with the counteracting processes (blue arrows) of reproduction and competition.

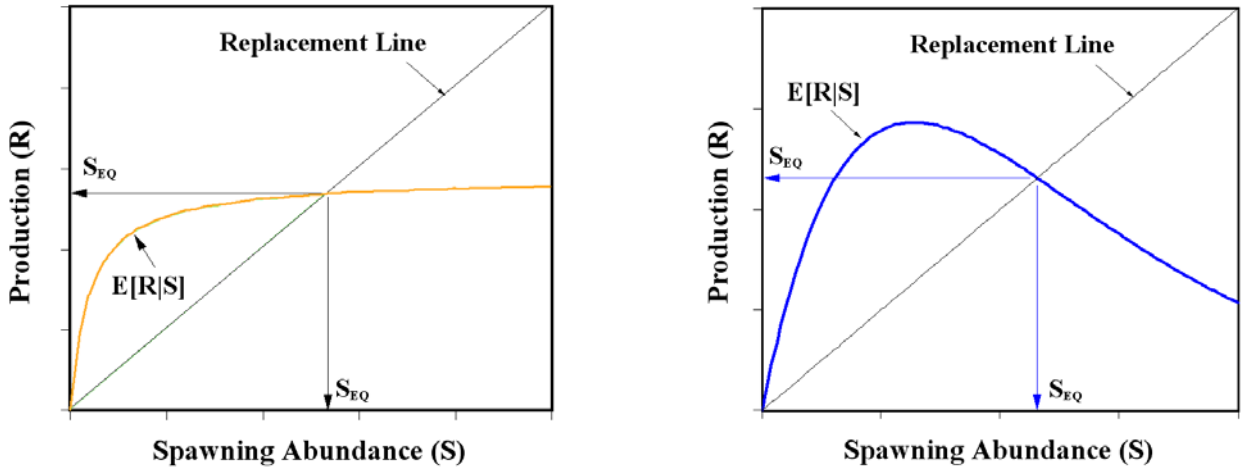

Figure 2. Beverton-Holt (left panel) and Ricker (right panel) production models.

Incorrect Choice →	Ricker	Beverton-Holt
True Model →	Beverton-Holt	Ricker
Esc Goal Mgt →	$S_{MSY} < \hat{S}_{MSY}$ **"Under" fishing**	$\hat{S}_{MSY} < S_{MSY}$ "Over" fishing
Harvest Rate Mgt →	$U_{MSY} < \hat{U}_{MSY}$ "Over" fishing	$\hat{U}_{MSY} < U_{MSY}$ "Under" fishing

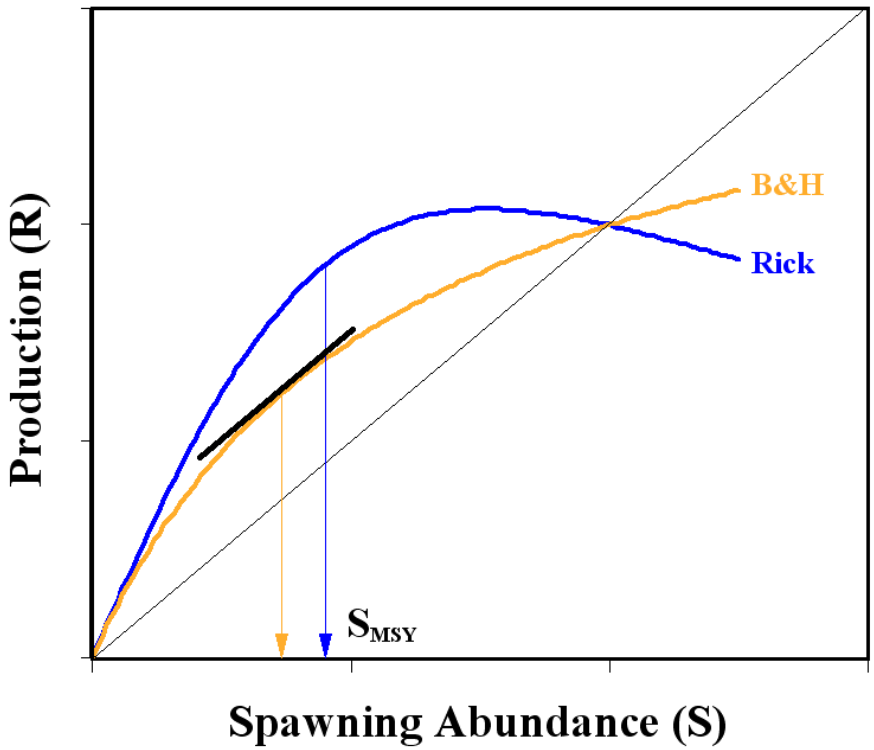

Figure 3. Decision table and graph for precautionary management under differing production models for Pacific salmon. S_{MSY} is the spawning escapement that maximizes sustainable yields and U_{MSY} is the harvest rate that maximizes sustainable yields. Quantities with hat symbols above are estimates, while those without are the true quantities.

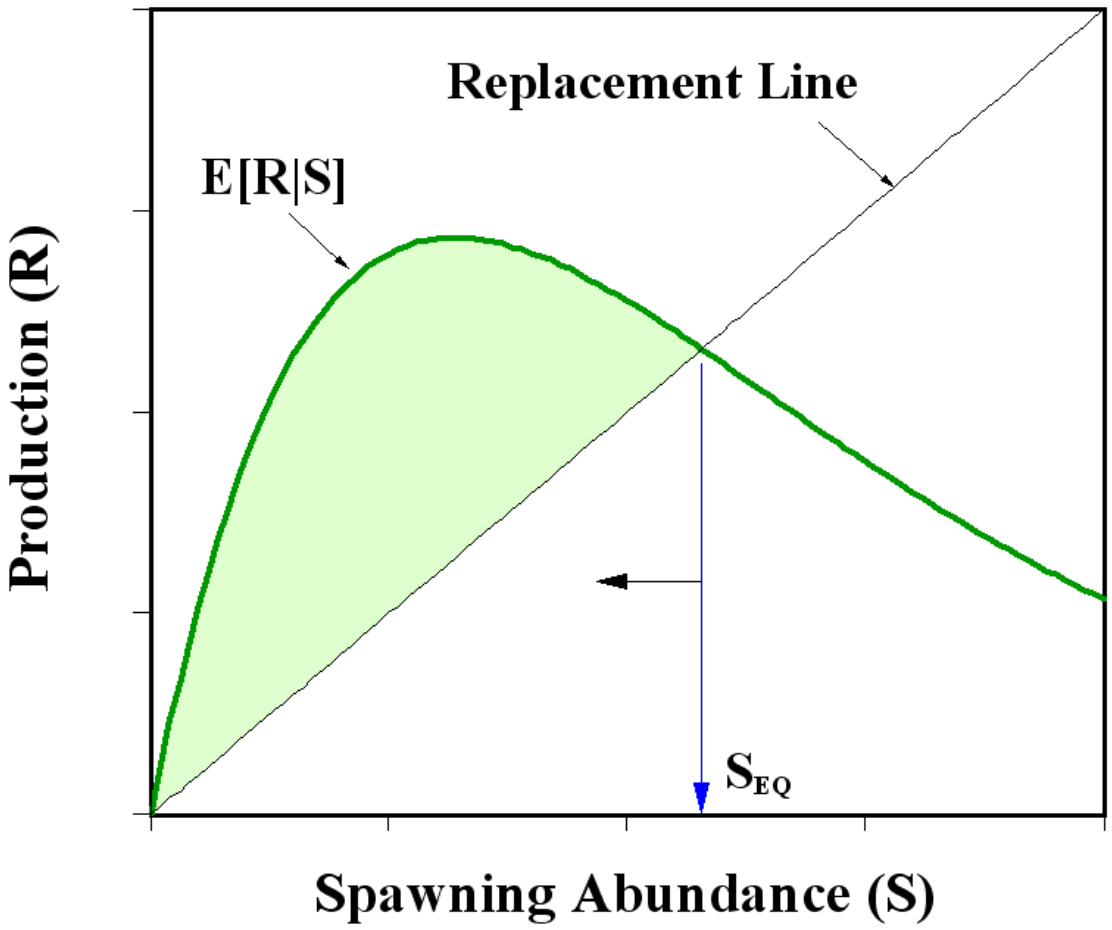

Figure 4. Schematic of the Ricker production model with potential sustained yields in the shaded area between $E[R|S]$ and the replacement line ($R = S$) and escapements less than carrying capacity (S_{EQ}). S_{MSY} generally occurs between 29 and 43 percent of S_{EQ} for Pacific salmon.

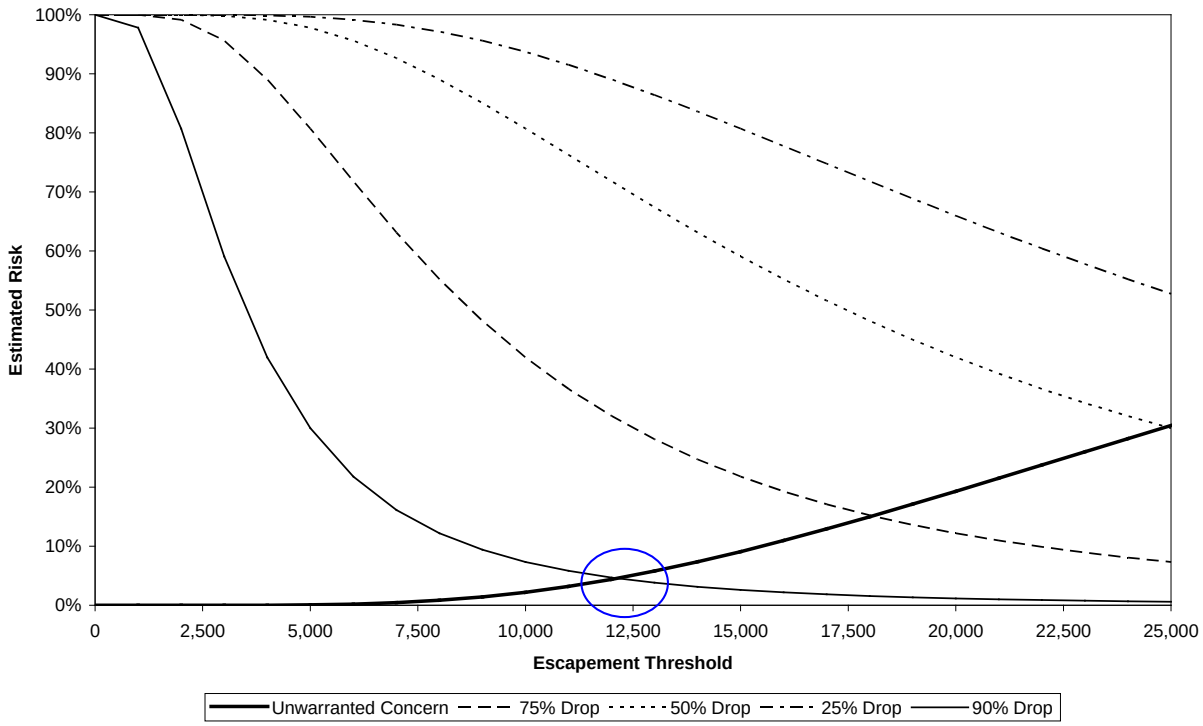

Figure 5. Estimated risk of three or more consecutive years of observed escapements below the lower bound SEG due to random chance (unwarranted concern) and risk of missing a real drop of 75-90% in the average observed escapement for Kulukak River sockeye salmon. A lower bound SEG of approximately 12,000 fish (circled) balances these two risks at a low level (< 10% risk).

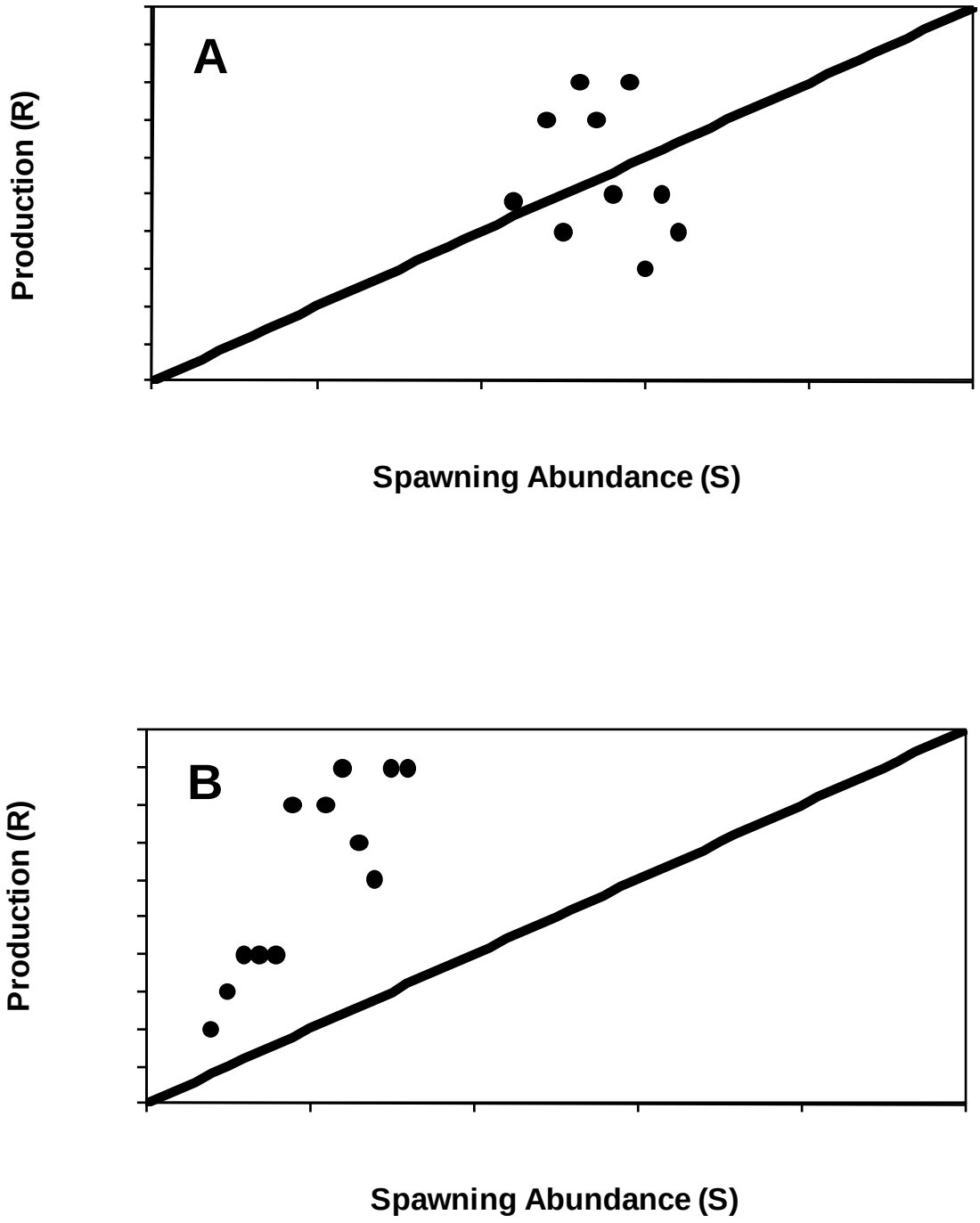

Figure 6. Schematic of observed production data (points) in relation to the replacement line (dark diagonal line) in the situation of low (A) or high (B) harvest rates.

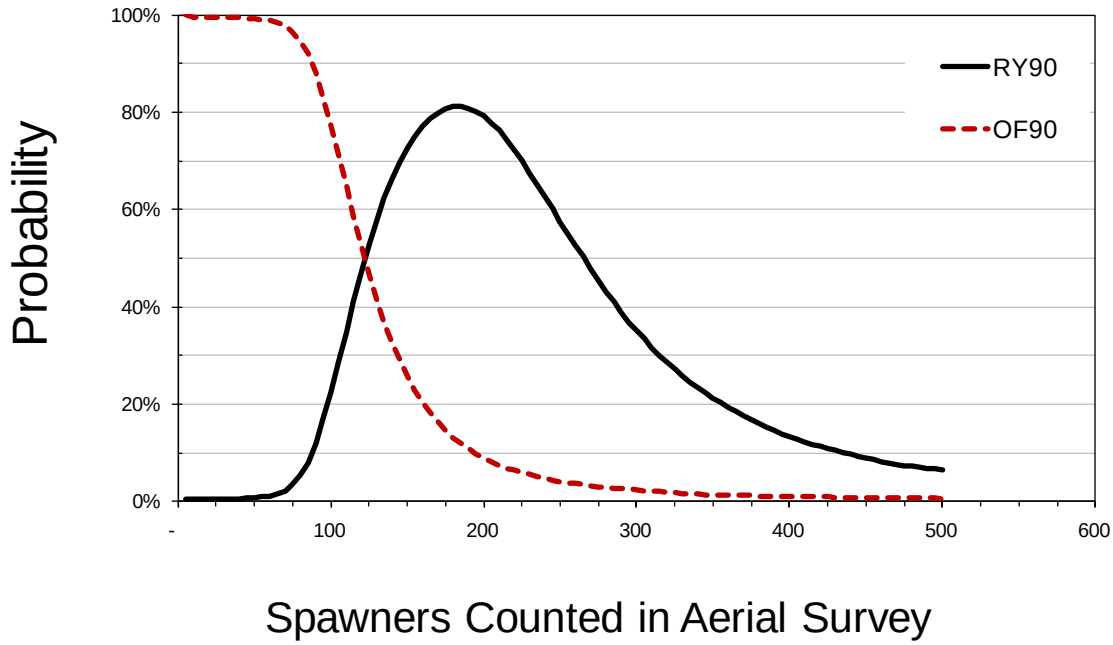

Figure 7. Schematic of probability profiles for yields of 90% or more of MSY (RY90 – solid line) or for yields less than 90% of *MSY* (OF90 – dotted line) over a range of escapements considered for development of an escapement goal.

Table 1. Percentile approach to estimate Sustainable Escapement Goals (SEGs) from observed escapements (adapted from Bue and Hasbrouck (Unpublished)).

Contrast[a] and harvest rate	**SEG Range (or Lower Bound)**
Low (< 4)	15th percentile to maximum
Medium (4 - 8)	15th percentile to 85th percentile
High (> 8) and at most low harvest rate	15th percentile to 75th percentile
High (> 8) and at least moderate harvest rate	25th percentile to 75th percentile

[a] Maximum observed escapement divided by minimum observed escapement.

9.2 Appendix 2: Fishery Impact Statement Appendix Tables

Table 1. Southeast Alaska commercial troll salmon harvest by species, 1990-2010.

Year	Comm. Troll Coho Salmon Harvest	Comm. Troll Chinook Salmon Harvest	Comm. Troll Other Salmon Species Harvest	Comm. Troll All Salmon Species Total Harvest
1990	1,832,604	287,939	843,447	2,963,990
1991	1,719,060	264,106	464,828	2,447,994
1992	1,929,899	183,759	780,762	2,894,420
1993	2,395,711	226,866	1,453,026	4,075,603
1994	3,466,782	186,331	1,289,709	4,942,822
1995	1,750,221	138,117	1,018,991	2,907,329
1996	1,906,740	141,452	1,230,117	3,278,309
1997	1,170,460	246,409	896,780	2,313,649
1998	1,636,707	192,066	384,994	2,213,767
1999	2,272,619	146,219	621,067	3,039,905
2000	1,124,854	158,717	669,975	1,953,546
2001	1,843,997	153,280	735,762	2,733,039
2002	1,310,060	325,208	205,418	1,840,686
2003	1,220,782	330,692	450,376	2,001,850
2004	1,915,007	354,664	223,395	2,493,066
2005	2,036,104	338,442	287,983	2,662,529
2006	1,361,267	282,307	210,137	1,853,711
2007	1,376,753	268,147	296,601	1,941,501
2008	1,273,710	151,906	89,694	1,515,310
2009	1,590,259	175,644	232,202	1,998,105
2010	1,342,212	195,492	386,555	1,924,259
1990-2010 Avg.	1,736,943	226,084	608,182	2,571,209
2006-2010 Avg.	1,388,840	214,699	243,038	1,846,577

Note: Chinook salmon statistics include hatchery terminal area harvests. Harvests for all species include Annette Island harvests. Data is by troll season, October 1-September 30.
Source: Skannes, Hagerman, and Shaul, 2011.

Table 2. Southeast Alaska commercial hand troll and power troll harvest of Chinook and coho salmon, 1990-2010.

Year	Comm. Hand Troll Coho Salmon Harvest	Comm. Hand Troll Chinook Salmon Harvest	Hand Troll Permits Fished	Comm. Power Troll Coho Salmon Harvest	Comm. Power Troll Chinook Salmon Harvest	Power Troll Permits Fished
1990	273,359	39,179	700	1,559,034	247,921	840
1991	238,456	39,987	703	1,479,862	223,104	852
1992	249,487	25,548	646	1,679,526	157,806	842
1993	315,521	23,887	603	2,079,984	202,674	841
1994	435,947	14,873	561	3,025,660	171,294	808
1995	145,094	13,412	461	1,605,030	124,703	819
1996	201,376	11,581	414	1,708,420	129,827	739
1997	104,527	14,850	387	1,065,935	231,569	744
1998	119,576	9,014	305	1,516,903	183,052	733
1999	180,072	6,010	339	2,092,502	139,890	722
2000	67,499	8,678	316	1,057,660	150,098	714
2001	111,059	9,811	307	1,734,095	143,408	703
2002	77,811	11,460	254	1,237,205	313,875	666
2003	80,882	13,510	266	1,139,901	317,172	641
2004	108,624	18,864	325	1,806,383	335,800	692
2005	143,095	16,847	353	1,892,688	321,595	718
2006	74,412	16,366	371	1,285,844	265,941	741
2007	91,499	18,258	376	1,285,238	249,889	744
2008	82,722	15,280	376	1,190,988	136,626	747
2009	104,062	13,638	367	1,486,197	162,006	748
2010	88,949	13,030	332	1,253,263	182,462	731
1990-2010 Avg.	156,859	16,861	417	1,580,110	209,082	752
2006-2010 Avg.	88,329	15,314	364	1,300,306	199,385	742

Note: Chinook salmon catch statistics include hatchery terminal area catches. Harvests for all species include Annette Island Reserve harvests.

Source: Skannes, Hagerman, and Shaul, 2011.

Table 3. Southeast Alaska commercial troll Chinook salmon harvest by fishery, 1990-2010.

Year	Winter Troll Fishery Chinook Salmon Harvest	Spring Troll Fishery Chinook Salmon Harvest	General Summer Troll Fishery Chinook Salmon Harvest
1990	33,130	7,068	247,741
1991	42,639	19,847	201,620
1992	71,831	15,347	96,581
1993	62,722	18,679	145,565
1994	56,368	11,369	118,594
1995	17,868	23,083	97,166
1996	9,401	47,379	84,672
1997	20,957	42,722	182,730
1998	32,818	20,508	138,740
1999	30,977	20,718	94,524
2000	36,055	28,956	93,706
2001	22,586	35,331	95,363
2002	29,389	43,650	252,169
2003	50,854	39,292	240,546
2004	52,886	56,796	244,982
2005	50,470	60,701	227,271
2006	48,922	37,936	195,449
2007	46,872	49,789	171,486
2008	21,824	41,132	88,950
2009	24,889	32,859	117,896
2010	42,536	29,737	123,219
1990-2010 Avg.	38,381	32,519	155,189
2006-2010 Avg.	37,009	38,291	139,400

Note: Data is by troll season, October 1-September 30. Catch statistics for the Spring Fishery do not include Annette Island harvest. These numbers are accounted for in calculation of the Summber Fishery harvest. Catch statistics include terminal area catches.

Source: Skannes, Hagerman, and Shaul, 2011.

Table 4. Upper Cook Inlet commercial salmon harvest by species, 1990-2010.

Year	UCI Comm. Chinook Salmon Harvest	UCI Comm. Coho Salmon Harvest	UCI Comm. Sockeye Salmon Harvest	UCI Comm. Pink and Chum Salmon Harvest	UCI Total Comm. Salmon Harvest
1990	16,105	501,643	3,604,259	954,557	5,076,564
1991	13,542	426,487	2,178,331	294,886	2,913,246
1992	17,171	468,930	9,108,353	970,164	10,564,618
1993	18,871	306,882	4,755,329	223,704	5,304,786
1994	19,962	583,793	3,565,586	826,611	4,995,952
1995	17,893	446,954	2,951,827	662,997	4,079,671
1996	14,306	321,668	3,888,922	399,412	4,624,308
1997	13,292	152,404	4,176,738	173,969	4,516,403
1998	8,124	160,660	1,219,242	646,914	2,034,940
1999	14,383	125,908	2,680,510	190,715	3,011,516
2000	7,350	236,871	1,322,482	273,551	1,840,254
2001	9,295	113,311	1,826,833	157,053	2,106,492
2002	12,714	246,281	2,773,118	684,909	3,717,022
2003	18,490	101,756	3,476,159	169,556	3,765,961
2004	26,922	311,056	4,926,220	504,103	5,768,301
2005	28,171	224,657	5,238,168	118,159	5,609,155
2006	18,029	177,853	2,192,730	468,144	2,856,756
2007	17,625	177,339	3,316,779	224,260	3,736,003
2008	13,333	171,869	2,380,135	219,683	2,785,020
2009	8,750	153,210	2,045,794	297,132	2,504,886
2010	9,901	207,256	2,828,367	521,342	3,566,866
1990-2010 Avg.	15,439	267,466	3,355,042	427,706	4,065,653
2006-2010 Avg.	13,528	177,505	2,552,761	346,112	3,089,906

Source: Shields, 2010.

Table 5. UCI Central district commercial salmon harvest by species, 1990-2010.

Year	Central District Chinook Salmon Comm. Harvest (all gear)	Central District Coho Salmon Comm. Harvest (all gear)	Central District Sockeye Salmon Comm. Harvest (all gear)	Central District Pink Salmon Comm. Harvest (all gear)	Central District Chum Salmon Comm. Harvest (all gear)	Central District Total Comm. Salmon Harvest (all gear)
1990	6,523	361,137	3,507,861	559,490	315,413	4,750,424
1991	6,683	294,185	2,062,130	9,510	240,830	2,613,338
1992	12,617	377,797	9,038,875	672,056	249,002	10,350,347
1993	15,564	200,588	4,608,696	90,466	97,369	5,012,683
1994	16,769	439,729	3,445,444	494,253	262,848	4,659,043
1995	13,763	357,654	2,842,729	121,862	485,755	3,821,763
1996	12,438	243,563	3,784,794	222,237	144,730	4,407,762
1997	12,159	115,035	4,079,283	66,664	95,155	4,368,296
1998	5,577	126,301	1,158,592	539,705	94,630	1,924,805
1999	11,571	94,462	2,621,395	15,581	170,552	2,913,561
2000	5,043	165,396	1,278,651	126,237	122,785	1,698,112
2001	7,484	67,383	1,775,985	68,204	82,292	2,001,348
2002	10,819	195,989	2,740,018	440,736	233,048	3,620,610
2003	16,820	77,741	3,427,672	47,225	116,284	3,685,742
2004	24,996	266,237	4,899,076	355,922	144,016	5,690,247
2005	24,798	193,798	5,211,753	47,596	69,013	5,546,958
2006	13,768	157,485	2,180,100	402,482	63,553	2,817,388
2007	13,807	155,808	3,299,312	143,493	76,632	3,689,052
2008	9,350	129,692	2,353,905	165,844	48,686	2,707,477
2009	7,119	115,581	2,005,142	207,767	79,731	2,415,340
2010	8,151	169,241	2,788,190	288,929	224,967	3,479,478
1990-2010 Avg.	12,182	204,991	3,290,933	242,203	162,728	3,913,037
2006-2010 Avg.	10,439	145,561	2,525,330	241,703	98,714	3,021,747

Source: Shields, 2010.

Table 6. UCI Central district salmon harvest by species, 2010.

Gear	Central District Chinook Salmon Comm. Harvest	Central District Coho Salmon Comm. Harvest	Central District Sockeye Salmon Comm. Harvest	Central District Pink Salmon Comm. Harvest	Central District Chum Salmon Comm. Harvest	Central District Total Comm. Salmon Harvest
Drift Gillnet	539	110,277	1,587,682	164,006	216,985	2,079,489
Set Gillnet	7,612	59,396	1,200,508	124,923	7,982	1,400,421

Source: Shields, 2010.

Table 7. Total commercial salmon harvest by species in the Copper River and Bering River districts (PWS), 1990-2009.

	Copper River District					Bering River District				
Year	**Comm. Chinook Salmon Harvest**	**Comm. Coho Salmon Harvest**	**Comm. Sockeye Salmon Harvest**	**Comm. Chum and Pink Salmon Harvest**	**Total Comm. Salmon Harvest**	**Comm. Chinook Salmon Harvest**	**Comm. Coho Salmon Harvest**	**Comm. Sockeye Salmon Harvest**	**Comm. Chum and Pink Salmon Harvest**	**Total Comm. Salmon Harvest**
1990	21,702	246,797	844,778	9,141	1,122,418	14	42,952	8,332	3	51,301
1991	34,787	385,086	1,206,811	21,466	1,648,150	28	110,951	19,181	199	130,359
1992	39,810	291,627	970,938	7,471	1,309,846	21	125,616	19,721	5	145,363
1993	29,727	281,469	1,398,234	22,581	1,732,011	130	115,833	33,951	104	150,018
1994	47,061	677,633	1,152,220	31,134	1,908,048	121	259,003	27,926	97	287,147
1995	65,675	542,658	1,271,822	75,909	1,956,064	44	282,045	21,585	255	303,929
1996	55,646	193,042	2,356,365	31,905	2,636,958	111	93,763	37,712	30	131,616
1997	51,273	18,656	2,955,431	10,948	3,036,308	23	97	9,651	2	9,773
1998	68,827	108,232	1,341,692	25,851	1,544,602	70	12,284	8,439	7	20,800
1999	62,337	153,061	1,682,559	35,526	1,933,483	42	9,852	13,697	300	23,891
2000	31,259	304,944	880,334	15,167	1,231,704	5	56,329	1,279	-	57,613
2001	39,524	251,473	1,323,577	12,176	1,626,750	76	2,715	5,450	-	8,241
2002	38,734	504,223	1,248,503	35,304	1,826,764	14	108,522	235	-	108,771
2003	47,721	363,489	1,188,052	23,044	1,622,306	151	59,481	18,266	33	77,931
2004	38,191	467,859	1,048,004	8,561	1,562,615	87	95,595	13,165	23	108,870
2005	34,624	263,465	1,331,664	38,502	1,668,255	277	43,030	77,464	9,341	130,112
2006	30,278	318,285	1,496,754	48,047	1,893,364	238	56,713	36,867	93	93,911
2007	39,095	117,182	1,901,773	90,372	2,148,422	88	9,305	16,470	7	25,870
2008	11,437	202,621	320,815	1,170,954	1,705,827	42	40,380	1,175	9	41,606
2009	9,457	207,776	896,621	25,388	1,139,242	15	45,522	4,157	6	49,700
1990-2009 Avg.	39,858	294,979	1,340,847	86,972	1,762,657	80	78,499	18,736	526	99,041
2005-2009 Avg.	24,978	221,866	1,189,525	274,653	1,711,022	132	38,990	27,227	1,891	73,039

Source: Botz et al., 2010.

Table 8. Total commercial salmon harvest by species for Prince William Sound (excluding the Copper River and Bering River districts), 1990-2009.

Year	Comm. Chinook Salmon Harvest	Comm. Coho Salmon Harvest	Comm. Sockeye Salmon Harvest	Comm. Chum and Pink Salmon Harvest	Total Comm. Salmon Harvest
1990	447	234,525	58,497	45,123,317	45,416,786
1991	445	145,311	507,815	37,466,217	38,119,788
1992	1,475	202,311	780,932	8,964,016	9,948,734
1993	2,148	48,310	418,948	6,934,777	7,404,183
1994	1,376	121,518	334,183	37,913,283	38,370,360
1995	1,364	140,314	230,057	16,747,612	17,119,347
1996	700	172,488	606,525	28,114,526	28,894,239
1997	1,186	64,360	1,197,776	28,052,803	29,316,125
1998	2,013	74,105	365,591	29,931,168	30,372,877
1999	1,055	81,841	339,037	47,957,085	48,379,018
2000	1,133	353,013	548,790	44,034,121	44,937,057
2001	861	239,947	932,070	38,334,142	39,507,020
2002	958	37,586	1,013,396	25,289,118	26,341,058
2003	256	98,947	1,519,598	55,756,215	57,375,016
2004	864	56,430	831,356	25,524,817	26,413,467
2005	1,217	230,180	579,643	61,845,532	62,656,572
2006	1,118	388,722	990,880	23,855,476	25,236,196
2007	873	202,153	1,310,694	66,953,206	68,466,926
2008	962	307,837	979,077	47,427,012	48,714,888
2009	404	46,580	1,011,990	21,777,218	22,836,192
1990-2009 Avg.	1,043	162,324	727,843	34,900,083	35,791,292
2005-2009 Avg.	915	235,094	974,457	44,371,689	45,582,155

Source: Botz et al., 2010.

Table 9. Total commercial salmon harvest by species for the South Alaska Peninsula, 1990-2010.

Year	South AK Peninsula Comm.Chinook Salmon Harvest (all gear)	South AK Peninsula Comm. Coho Salmon Harvest (all gear)	South AK Peninsula Comm. Sockeye Salmon Harvest	South AK Peninsula Comm. Chum and Pink Salmon Harvest (all gear)	South AK Peninsula Total All Salmon Species Comm. Harvest (all gear)
1990	16,497	305,510	2,385,560	4,095,962	6,803,529
1991	7,510	313,223	2,304,531	12,170,369	14,795,633
1992	7,933	414,948	3,438,875	11,069,994	14,931,750
1993	14,083	215,256	3,682,604	10,971,530	14,883,473
1994	9,474	251,686	2,091,009	11,322,613	13,674,782
1995	17,078	260,686	2,996,353	18,017,660	21,291,777
1996	5,071	278,191	1,528,587	2,962,296	4,774,145
1997	7,163	112,432	2,258,189	2,910,180	5,287,964
1998	4,796	154,170	2,170,803	8,752,207	11,081,976
1999	4,815	192,485	2,948,267	9,260,309	12,405,876
2000	5,104	257,146	1,984,576	4,604,861	6,851,687
2001	2,302	210,899	607,756	4,934,043	5,755,000
2002	6,399	202,717	1,035,232	2,989,406	4,233,754
2003	2,712	131,097	1,054,208	4,895,579	6,083,596
2004	7,050	235,600	2,199,944	7,455,939	9,898,533
2005	4,487	143,617	2,337,097	10,155,657	12,640,858
2006	5,400	164,962	1,835,218	5,437,073	7,442,653
2007	5,312	150,955	2,438,672	7,979,117	10,574,056
2008	4,378	227,550	2,249,144	13,538,106	16,019,178
2009	5,875	248,563	1,724,516	9,605,672	11,584,626
2010	7,863	164,824	1,284,882	1,630,354	3,087,923
1990-2010 Avg.	7,205	222,787	2,121,715	7,845,663	10,195,370
2006-2010 Avg.	5,766	191,371	1,906,486	7,638,064	9,741,687

Source: Poetter, Keyse, and Bernard, 2010.

Table 10. Total commercial salmon harvest by species for the Unimak and Shumagin Islands (South Alaska Peninsula) June salmon fisheries, 1990-2010.

Year	South AK Peninsula June Comm. Chinook Salmon Harvest (all gear)	South AK Peninsula June Comm. Coho Salmon Harvest (all gear)	South AK Peninsula June Comm. Sockeye Salmon Harvest (all gear)	South AK Peninsula June Comm. Chum and Pink Salmon Harvest (all gear)	South AK Peninsula June Total All Salmon Species Comm. Harvest (all gear)
1990	10,332	1	1,344,529	1,033,592	2,388,454
1991	4,473	12	1,548,930	1,391,842	2,945,257
1992	3,760	4	2,457,856	1,068,293	3,529,913
1993	9,466	1,233	2,973,744	613,383	3,597,826
1994	7,590	1,579	1,461,263	3,074,679	4,545,111
1995	14,747	6,042	2,105,321	716,068	2,842,178
1996	2,845	13,219	1,028,970	737,504	1,782,538
1997	5,811	560	1,628,181	928,262	2,562,814
1998	2,696	476	1,288,725	719,959	2,011,856
1999	3,051	2	1,375,399	275,845	1,654,297
2000	2,849	304	1,251,228	599,386	1,853,767
2001	345	2	150,632	87,601	238,580
2002	2,443	4	591,106	455,068	1,048,621
2003	1,323	153	453,147	500,338	954,961
2004	4,423	621	1,348,073	842,225	2,195,342
2005	3,055	1,919	1,004,395	2,082,789	3,092,158
2006	4,497	2,629	932,291	1,632,146	2,571,563
2007	4,636	1,633	1,589,840	565,067	2,161,176
2008	2,957	178	1,713,575	2,382,200	4,098,910
2009	3,836	203	1,167,918	2,945,330	4,117,287
2010	3,118	27	818,865	604,135	1,426,145
1990-2010 Avg.	4,679	1,467	1,344,476	1,107,415	2,458,036
2006-2010 Avg.	3,809	934	1,244,498	1,625,776	2,875,016

Source: Poetter, Keyse, and Bernard, 2010.

Table 11. Total commercial salmon harvest by species for the South Alaska Peninsula Post-June (minus the Southeastern District Mainland fishery) salmon fisheries, 1990-2010.

Year	South AK Peninsula Post-June Comm. Chinook Salmon Harvest (all gear)	South AK Peninsula Post-June Comm. Coho Salmon Harvest (all gear)	South AK Peninsula Post-June Comm. Sockeye Salmon Harvest (all gear)	South AK Peninsula Post-June Comm. Chum and Pink Salmon Harvest (all gear)	South AK Peninsula Post-June Total All Salmon Species Comm. Harvest (all gear)
1990	5,480	288,728	875,237	2,972,098	4,141,543
1991	2,423	311,825	465,874	10,741,626	11,521,748
1992	4,003	414,809	765,575	9,965,133	11,149,520
1993	3,524	209,816	497,933	10,270,603	10,981,876
1994	1,642	24,966	408,089	8,455,225	8,889,922
1995	2,010	252,358	731,651	17,227,009	18,213,028
1996	1,914	263,654	215,721	2,118,551	2,599,840
1997	1,206	110,488	325,261	1,958,933	2,395,888
1998	1,793	150,735	764,947	7,897,289	8,814,764
1999	1,580	191,585	1,355,842	8,933,169	10,482,176
2000	2,081	249,874	530,913	3,921,038	4,703,906
2001	1,780	209,583	350,517	4,754,011	5,315,891
2002	3,411	197,323	290,657	2,372,221	2,863,612
2003	1,079	128,710	378,410	4,253,511	4,761,710
2004	2,238	230,443	641,326	6,550,270	7,424,277
2005	1,335	135,668	1,087,549	7,751,028	8,975,580
2006	886	164,186	840,225	3,716,540	4,721,837
2007	676	149,322	848,832	7,414,050	8,412,880
2008	1,019	177,550	356,456	8,387,323	8,922,348
2009	1,891	245,845	403,187	6,559,578	7,210,501
2010	3,848	161,698	287,491	930,993	1,384,030
1990-2010 Avg.	2,182	203,294	591,509	6,530,962	7,327,947
2006-2010 Avg.	1,664	179,720	547,238	5,401,697	6,130,319

Source: Poetter, Keyse, and Bernard, 2010.

Table 12. Commercial salmon harvest by species in the Southwestern and Unimak districts (South Alaska Peninsula), 2010.

Gear	Southwestern District					Unimak District				
	Chinook Salmon Harvest	Coho Salmon Harvest	Sockeye Salmon Harvest	Chum and Pink Salmon Harvest	Total All Salmon Species Harvest	Chinook Salmon Harvest	Coho Salmon Harvest	Sockeye Salmon Harvest	Chum and Pink Salmon Harvest	Total All Salmon Species Harvest
Seine	275	2,291	117,107	216,173	335,846	821	36,617	93,184	119,362	249,984
Drift Gillnet	408	10,365	181,085	51,568	243,426	524	187	117,862	43,811	162,384
Set Gillnet	61	677	52,361	9,799	72,898	2	-	1,675	221	1,898
Total	744	13,333	350,553	287,540	652,170	1,347	36,804	212,721	163,394	414,266

Source: Poetter, Keyse, and Bernard, 2010.