APPENDIX O

Programmatic Supplemental Environmental Impact Statement Biological Assessment

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Biological Assessment for the

Alaska Groundfish Fisheries Draft Programmatic

Supplemental Environmental Impact Statement

June 2004

Agency: National Marine Fisheries Service
Alaska Region Sustainable Fisheries Division

Activities Considered: Adoption of a preferred alternative in the Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLES

ACRONYMS AND ABBREVIATIONS

ABC	Acceptable Biological Catch
ADF&G	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
BiOp	Biological Opinion
BSAI	Bering Sea and Aleutian Islands
CDQ	Community Development Quota
CFR	Code of Federal Regulations
DOC	Department of Commerce
DPS	Distinct Population Segment
EBS	Eastern Bering Sea
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	evolutionary significant unit
EVOS	*Exxon Valdez* oil spill
FMP	Fishery Management Plan
ft	Feet/Foot
FR	Federal Register
FWS	Fish and Wildlife Service
GIS	Geographic Information System
GOA	Gulf of Alaska
HAPC	Habitat Area of Particular Concern
IFQ	Individual Fishing Quota
IR/IU	Increased Retention/Increased Utilization
ITS	Incidental Take Statement
IUNC	International Union for the Conservation of Nature
km	Kilometers
km^2	Square Kilometers
LLP	License Limitation Program
LOA	Length Overall
m	Meters
MPA	Marine Protected Area
MMPA	Marine Mammal Protection Act
mt	Metric Tons
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
nm	Nautical Miles
nm^2	Square Nautical Miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Marine Council
NPRB	North Pacific Research Board
OFL	Overfishing Level
OY	Optimum Yield
PA	Preferred Alternative
PBR	Potential Biological Removal
PSC	Prohibited Species Catch

ACRONYMS AND ABBREVIATIONS (continued)

RPA	Reasonable and Prudent Alternative
SEIS	Supplemental Environmental Impact Statement
SSLPM	Steller Sea Lion Protection Measures
TAC	Total Allowable Catch
U.S.	United States
U.S.C.	United States Congress
VIP	Vessel Incentive Program
VMS	Vessel Monitoring System

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Chapter 1 Purpose and Consultation History

This biological assessment is being prepared in conjunction with the Programmatic Supplemental Environmental Impact Statement (Programmatic SEIS) for the Fishery Management Plans (FMPs) for the groundfish fisheries of the Bering Sea and Aleutian Islands (BSAI) management area and groundfish fisheries of the Gulf of Alaska (GOA). The Programmatic SEIS serves as the central environmental document supporting these FMPs by providing a broad, comprehensive analysis of the general environmental consequences of fisheries management in the Exclusive Economic Zone (EEZ) off Alaska. Preparation of a programmatic analysis was necessary under the National Environmental Policy Act (NEPA) due to the cumulative significance of numerous amendments to the FMPs since the preparation of the original Programmatic Environmental Impact Statement (EIS) 25 years ago. Significant changes have occurred in the environment as well as within the fisheries themselves. NEPA requires preparation of an SEIS when significant changes have occurred to the Federal Action or the environment. The Programmatic SEIS provides a broad evaluation of the potential effects of alternative fishery management policies on the physical, biological, and socioeconomic components of the human environment.

While the Programmatic SEIS examines the effects of several fishery management alternatives, this biological assessment focuses on the fishery management policy that was selected as the preferred alternative (PA) and its potential effects on listed species. Section 7(a)(2) of the Endangered Species Act (ESA), 16 United States Congress (U.S.C.) ' 1531 et seq., requires that each federal agency shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a federal agency may affect a listed species, that agency (i.e., the "action" agency) is required to consult with either the National Marine Fisheries Service (NMFS or National Oceanic and Atmospheric Administration [NOAA] Fisheries) or the United States Fish and Wildlife Service (USFWS), depending on the listed species that may be affected. If a federal action may affect a listed species or designated critical habitat, formal consultation is required unless, the services concur in writing that the proposed action "is not likely to adversely affect" listed species or designated critical habitat (50 Code of Federal Regulations [CFR] ' 402.02, 50 CFR '402.14). Potential effects on listed species and their designated critical habitat are evaluated in this biological assessment to determine if the PA in the Programmatic SEIS would be expected to adversely affect listed species or designated critical habitat.

Previous consultations have concluded that the implementation and interpretation of the BSAI and GOA groundfish FMPs may adversely affect listed species and their designated critical habitat. As a result, formal consultations were conducted by NOAA Fisheries and the USFWS at the plan level (November 30, 2000 and September 2003, respectively) and at the project level (NMFS 2001, NMFS 2003, and USFWS 2003) with the completion of biological opinions (BiOps) and the issuance of incidental take statements (ITS). These BiOps considered the effects of BSAI and GOA groundfish fisheries based on the FMPs for BSAI and GOA groundfish and the effects of these fisheries as modified by FMP amendment 61, the Steller sea lion Protection Measures (SSLPM), and the seabird avoidance measures.

1.1 Formal Consultation Re-initiation Requirements

Despite recent consultations on the action described in the Programmatic SEIS (management of groundfish fisheries and the continued authorization of groundfish fishery activities pursuant to the FMPs for the groundfish of the BSAI and GOA), re-initiation of formal consultation is required if at least one of the following conditions apply [50 CFR '402.16]:

(a) The amount or extent of taking specified in the ITS is exceeded.

(b) New information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered.

(c) The identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the Bi-Ops.

(d) A new species is listed or critical habitat designated that may be affected by the identified action.

The PA was designed to meet the requirements of the ESA by retaining FMP protection measures previously implemented to ensure that the groundfish fisheries of the BSAI and GOA do not jeopardize the continued existence of listed species or destroy or adversely modify their designated critical habitat. Though these previously implemented measures have been retained in the PA, NOAA Fisheries must evaluate the PA as a whole to determine if formal section 7 consultation should be re-initiated. Modifications to the management policy implemented by the PA may have effects on listed species and/or their designated critical habitat to an extent that was not previously considered in recent BiOps. These modifications are evaluated in this biological assessment to determine if listed species and their designated critical habitat may be affected in a manner not previously considered. Identification of "new" effects that may adversely affect listed species or their designated critical habitat would trigger formal consultation.

1.2 Consultation History

NOAA Fisheries ESA-Listed Species

NOAA Fisheries has conducted multiple internal section 7 consultations on the BSAI and GOA groundfish fisheries. With respect to the action considered in this assessment, the most recent and relevant consultations are the November 30, 2000 BiOp evaluating the FMPs (FMP BiOp) and their implementing regulations for the BSAI and GOA fisheries, and the October 19, 2001 BiOp (2001 BiOp) and its June, 2003 supplement (Supplement) on the BSAI and GOA Pacific cod, pollock, and Atka mackerel fisheries specifically at the project level. Below is a description of each BiOp and the applicability to the proposed action considered in this document:

- November 30, 2000 BiOp evaluating FMPs on authorization of groundfish fisheries in the BSAI under the FMP for the BSAI groundfish, and the authorization of groundfish fisheries in the GOA under the FMP for groundfish of the GOA. The opinion was comprehensive in scope and considered the fisheries and the overall management framework established by the respective FMPs to determine whether that framework contained necessary measures to ensure the protection of listed species and their critical habitat. The BiOp determined that the BSAI and GOA groundfish fisheries, as implemented under the respective FMPs, jeopardized the continued existence of the western population of Steller sea lions and adversely modified its critical habitat. The BiOp provided an Reasonable and Prudent Alternative (RPA) which was partially implemented in 2001. Full implementation of the RPA was scheduled for 2002; however, the North Pacific Fishery Management Council (NPFMC) provided a substitute action intended to sufficiently remove jeopardy and adverse modification in a manner similar to the RPA, but with less economic impacts. That action was considered in the 2001 BiOp described below.

  The FMP BiOp remains as NOAA Fisheries' consultation at the plan level for the BSAI and GOA groundfish fisheries. Therefore, subsequent actions must be consistent with the conservation requirements described in that opinion. However, the specific conservation measures as described in the RPA were substituted for the action considered in the 2001 BiOp described below.

- October 19, 2001 BiOp on authorization of groundfish fisheries in the BSAI under the FMP for the BSAI groundfish as modified by amendment 61 and the Steller sea lion Protection Measures; and the authorization of groundfish fisheries in the GOA under the FMP for groundfish of the GOA as modified by amendments 61 and the Steller sea lion Protection Measures. Regulatory amendments to 50 CFR part 679 implemented Steller sea lion conservation measures for the pollock, Pacific cod, and Atka mackerel fisheries of the BSAI and GOA. These amendments provided alternative spatial and temporal fishing restrictions to ensure that the fisheries did not jeopardize the continued existence of Steller sea lions or destroy or adversely modify their critical habitat. Amendments 61/61 modified the FMPs by including final regulations to implement the American Fisheries Act (AFA) of 1998. The 2001 BiOp tiered off the FMP BiOp and analyzed the effects of implementing these FMP and regulatory amendments. The BiOp concluded that the BSAI and GOA FMPs, modified by amendments 61/61 and the Steller sea lion protection measures were not likely to jeopardize the continued existence of Steller sea lions or result in the destruction or adverse modification of their critical habitat. The 2001 BiOp was challenged in court and remanded to NOAA Fisheries.

- June 19, 2003 Supplement to the October 19, 2001 BiOp (Supplement). This Supplement to the 2001 BiOp was NOAA Fisheries response to the remand. This Supplement provided analyses and data that compared 1) the factual basis in previously available and new telemetry data for the relative weighting of the importance of Steller sea lion critical habitat zones, and 2) the 1999 "jeopardy" fishing pattern analyzed in the FMP BiOp to the fishery pattern under the revised Steller sea lion

Protection Measures. The Supplement analyzed harvest data from the 2002 pollock, Pacific cod, and Atka mackerel fisheries to determine if mitigation had been achieved. The Supplement concluded that the BSAI and GOA FMPs, modified by amendments 61/61 and the Steller sea lion Protection Measures were not likely to jeopardize the continued existence of Steller sea lions or result in the destruction or adverse modification of their critical habitat.

FWS' ESA Listed Species

The USFWS has also conducted multiple section 7 consultations on the BSAI and GOA groundfish fisheries. With respect to the action considered in this assessment, the most recent and relevant consultations are (a) the September 2003 Programmatic BiOp on the effects of the FMPs for the GOA and BSAI groundfish fisheries on the endangered short-tailed albatross (*Phoebastria albatrus*) and the threatened Steller's eider (*Polysticta stelleri*) (USFWS 2003) and (b) the September 2003 BiOp on the effects of the total-allowable catch (TAC)-setting process for the GOA and BSAI groundfish fisheries to the endangered short-tailed albatross and threatened Steller's eider (FWS 2003a).

- September 2003 Programmatic BiOp on the effects of the GOA and BSAI groundfish fishery FMPs on the endangered short-tailed albatross (*Phoebastria albatrus*) and threatened Alaska population of Steller's eider (*Polysticta stelleri*) (USFWS 2003). The opinion evaluated the impacts of the action, the management of the groundfish fisheries off Alaska and the authorization of groundfish fishing activities off Alaska pursuant to approved FMPs, on short-tailed albatross and Steller's eider. Proposed revisions to seabird avoidance measures were also analyzed in USFWS' Programmatic BiOp. The BiOp determined that the described action, including the proposed changes to the seabird avoidance measures, did not jeopardized the continued existence of the endangered short-tailed albatross or Steller's eider or destroy or adversely modify Steller's eider designated critical habitat. In its cover letter transmitting this Programmatic BiOp, the USFWS concurred with the NOAA Fisheries determination that the action is not likely to adversely affect the threatened spectacled eider (*Somateria fischeri*). Thus, this ESA-listed species was not a subject of the opinion.

- September 2003 BiOp on the effects of the TAC-setting process (TAC BiOp) for the GOA and BSAI groundfish fisheries to the endangered short-tailed albatross and threatened Steller's eider (USFWS 2003a). The establishment of harvest quotas for groundfish fishing activities authorized and/or managed by NOAA Fisheries in the GOA and BSAI were analyzed in this BiOp. This BiOp analyzed the BSAI and GOA longline and trawl fisheries with regard to the process of setting the annual TAC for these fisheries and determined that the proposed action was not likely to jeopardize the continued existence of the short-tailed albatross or Steller's eider or destroy or adversely modify Steller's eider designated critical habitat. This BiOp contained an ITS for short-tailed albatross. The ITS was accompanied by Reasonable and Prudent Measures, and non-discretionary terms and conditions which must be implemented for authorization of any incidental take in BSAI or GOA longline or trawl fisheries. Like the Programmatic BiOp, in its cover letter transmitting this TAC BiOp, the USFWS concurred with the NOAA Fisheries determination that the action is not likely to adversely affect the threatened spectacled eider (*Somateria fischeri*). Thus, this ESA-listed species was not a subject of the opinion.

- The TAC BiOp contains discretionary Conservation Recommendations for NOAA Fisheries to implement, to further enhance protection of endangered and threatened species. (USFWS 2003a).

- It is stated in the USFWS' Programmatic BiOp that proposed federal actions implemented under the BSAI and GOA FMPs that have effects similar in scope and nature to those addressed in the BiOp, and that can be implemented in a manner consistent with the established guidelines found therein, may be tiered to the Programmatic BiOp (USFWS 2003).

Chapter 2 Groundfish Fisheries: Description of the Action

The federal action analyzed in the Programmatic SEIS is the management of the groundfish fisheries and the continued authorization of groundfish fishery activities off Alaska, pursuant to the FMP for the groundfish fishery of the BSAI area and the FMP for the GOA groundfish fishery.

The Alaska groundfish fisheries are managed under FMPs (16 U.S.C. 1801 2(b)(4)) developed by the NPFMC pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The FMPs are the overall guiding and planning documents for management of the groundfish fisheries in all their aspects. They establish biological, economic, and social goals for management of the fisheries that are consistent with the MSA, ESA, and other laws, and contain specific management measures for achieving these goals. Included in the FMPs and their implementing regulations are conservation and management measures designed to minimize the impacts of the fisheries on listed species and their critical habitat.

The BSAI FMP was approved by the Secretary of Commerce on October 27, 1979 and implemented by regulations on December 31, 1981 (46 Federal Register [FR] 63295, corrected January 28, 1982, 47 FR 4083). The GOA FMP was approved by the Secretary of Commerce on February 24, 1978, and implemented by regulations published on November 14, 1978 (44 FR 52709). Since that time, the BSAI FMP and the GOA FMP have been amended at least 65 and 55 times, respectively.

In accordance with the NEPA, NPFMC, and NOAA Fisheries began preparing a Programmatic SEIS in October 1999. The Federal action analyzed in the Programmatic SEIS is the ongoing management of the groundfish fisheries in the EEZ off Alaska as authorized by the MSA and pursuant to NEPA and other applicable statutes and executive orders. The Programmatic SEIS analyzes four policy alternatives (including the current groundfish FMPs as amended) and a PA.

In order to comprehensively analyze the environmental impacts of the groundfish fisheries as managed under alternative FMPs, each alternative was designed to be commensurate in scope with the BSAI and GOA groundfish FMPs and is comprised of three elements 1) a management approach statement that describes the goals of, and rationale and assumptions behind the alternative; 2) a set of management objectives that complement and further refine the goals set forth in the management approach; and, 3) except for Alternative 1 (status quo), a pair of example FMP "bookends" that illustrate and frame the range of implementing management measures for that alternative. The management approach statement and objectives serve to define the direction NPFMC and NOAA Fisheries wish to follow in the management of the fisheries. The example FMP bookends serve two purposes: first, they provide an additional level of analytical detail that facilitates the comparison of the physical, biological, and socioeconomic effects of the alternatives and the status quo; second, they provide the public with an illustration of the types of management measures NPFMC and NOAA Fisheries envision they will use to achieve the goals of the alternative. Following this structure, the PA includes a policy statement accompanied by a set of management objectives and a set of example FMP bookends that illustrate a range of management actions that further the selected policy.

Adoption of the PA in the Programmatic SEIS by the Secretary of Commerce (Secretary) would result in the modification of the BSAI and GOA groundfish FMPs consistent with the PA. Initially, the goals and objectives sections of the BSAI and GOA groundfish FMPs would be modified to incorporate the goals and objectives of the PA. Although there would be no immediate changes to any other part of the FMPs or their implementing regulations, NPFMC and NOAA Fisheries would modify the current suite of management measures to better meet the FMPs' modified goals and objectives in the near future. The federal action analyzed in this biological assessment is the adoption of the PA by the Secretary of Commerce. The effects

analysis focuses on changes to the FMPs expected to result from adoption of the PA including potential effects on listed species and their designated critical habitat.

2.1 Action Area

The groundfish fisheries occur in the North Pacific Ocean and Bering Sea in the U.S. EEZ from 3 to 200 nautical miles (nm) offshore and between 50EN to 65°N (Figure 1.2-1). The subject waters, or the action area, are divided into two management areas; the BSAI and the GOA (Programmatic SEIS Section 1.2).

The BSAI groundfish fisheries effectively cover all of the Bering Sea under U.S. jurisdiction, extending southward to include the waters south of the Aleutian Islands west of 170°W to the border of the U.S. EEZ. The GOA FMP applies to the U.S. EEZ of the North Pacific Ocean, exclusive of the Bering Sea, between the eastern Aleutian Islands at 170°W and Dixon Entrance at 132°40'W The area of the EEZ off Alaska is more than 900,000 square miles, or larger than the combined EEZs of the east and west coasts of the U.S. Within the EEZ exists the largest continental shelf off the U.S. For purposes of the Programmatic SEIS, this shelf and slope was defined as the submarine shelf from shore to a depth of 1,000 meters (m). When defined in this way, 41.5 percent of the BSAI EEZ is comprised of waters overlying the continental shelf and slope. This is where most, if not all, the groundfish fishing occurs, and it is referred to in the Programmatic SEIS as the "fishable area" of the EEZ. Similarly, in the GOA, most fishing also occurs over the shelf and slope, although in contrast to the eastern Bering Sea, the shelf is much narrower and only comprises about 30 percent of the EEZ. The FMPs encompass those areas directly affected by fishing, and those areas that are likely affected indirectly by the removal of fish at nearby sites. The area affected by the groundfish fisheries necessarily includes adjacent State of Alaska and international waters, although the FMPs themselves do not extend into those areas.

2.2 The Current BSAI and GOA Groundfish FMPs

NPFMC's goals and objectives for managing the fisheries currently reflected in the BSAI and GOA FMPs are a mix of the specific goals and objectives outlined in the FMPs, which have not been updated since 1985, as well as the policies reflected in the specific management measures NPFMC has recommended and NOAA Fisheries approved over the years. In the programmatic SEIS the actual goals and objectives contained in the BSAI and GOA FMPs are described in FMP Alternative 1(a) (Programmatic SEIS Section 2.6.1). FMP 1(b) is provided in the Programmatic SEIS to more accurately reflect the policy objectives under which the groundfish fisheries are currently managed (Programmatic SEIS Section 2.6.2).

Presently, the BSAI and GOA fisheries are managed based upon the risk averse policy. The current policy, based on the best scientific information available, avoids irreversible or long-term adverse effects on fishery resources and the marine environment while at the same time providing for optimum yield (OY). The groundfish management program under the current policy is based on a conservative harvest strategy and assumes that fishing does result in some adverse impacts to the environment and that, as these impacts become known, mitigation measures will be developed and appropriate FMP amendments will be implemented. The following policy statement blends the stated policy within the GOA and BSAI FMPs with NPFMC'S and NOAA Fisheries' policy as reflected in the management measures that have been implemented over the years to manage the groundfish fisheries (FMP 1(b)):

2.2.1 Management Approach

Continue to work toward the goals of maintaining sustainable fisheries, protecting threatened and endangered species, and to protect, conserve, and restore living marine resource habitat through existing institutions and processes. Continue to manage the groundfish fisheries through the current risk averse conservation and management program that is based on a conservative harvest strategy. Under this management strategy, fishery impacts to the environment are mitigated as scientific evidence indicates that the fishery is adversely impacting the ecosystem. Management decisions will utilize the best scientific information available; the management process will be able to adapt to new information and respond to new environmental issues. Management will incorporate and apply ecosystem-based management principles; consider the impact of fishing on predator-prey, habitat, and other important ecological relationships; maintain the statute-mandated programs to reduce excess capacity and the race-for-fish; draw upon federal, state, and academic capabilities in carrying out research, administration, management, and enforcement; and consider the effects of fishing and encourage the development of practical measures that minimize bycatch and adverse effects to essential fishing habitat. This strategy is based on the assumption that fishing does produce some adverse impact on the environment and that, as these impacts become known, mitigation measures will be developed and FMP amendments implemented. Issues will be addressed as they ripen and are identified through NPFMC staff tasking and research priorities. NPFMC will continue to use the National Standards and other applicable laws as its guide in practicing adaptive management and responsible decision-making and will amend the FMPs consistently and accordingly. To meet the goal of this overall program, NPFMC and NOAA Fisheries seek to achieve the following management objectives:

<u>Prevent Overfishing</u>

1. Adopt conservative harvest levels for single-species fisheries and specify OY.

2. Continue to use existing OY cap for BSAI and GOA groundfish fisheries.

3. Provide for adaptive management by continuing to specify OY as a range.

Preserve Food Web

4. Incorporate ecosystem considerations into fishery management decisions.

5. Continue to protect the integrity of the food web through limits on harvest of forage species.

6. Develop a conceptual model of the food web.

Reduce and Avoid Bycatch

7. Continue current incidental catch and bycatch management program.

8. Continue to manage incidental catch and bycatch through seasonal distribution of TAC and geographical gear restrictions.

9. Continue to account for bycatch mortality in monitoring annual TACs.

10. Control the bycatch of prohibited species through prohibited species catch (PSC) limits.

11. Continue program to require full utilization of target species.

12. Continue to respond to evidence of population declines by closing areas and implementing gear and seasonal restrictions in affected areas.

Avoid Impacts to Seabirds and Marine Mammals

13. Continue to cooperate with USFWS to protect ESA-listed and other seabird species.

14. Maintain current protection measures in order to avoid jeopardy to ESA-listed Steller sea lions and adverse modification of their critical habitat.

Reduce and Avoid Impacts to Habitat

15. Respond to new scientific information regarding areas of critical habitat by closing those regions to all fishing (i.e., no-take marine reserves such as Sitka Pinnacles).

16. Evaluate the impacts of trawl gear on habitat through the stepwise implementation of a comprehensive research plan, to determine appropriate habitat protection measures.

17. Continue to evaluate candidate areas for marine protected areas.

Allocation Issues

18. Continue to reduce excess fishing capacity, overcapitalization and the adverse effects of the race for fish.

19. Provide economic and community stability by maintaining current allocation percentages to harvesting and processing sectors.

Increase Alaska Native Consultation

20. Continue to incorporate traditional knowledge in fishery management.

21. Continue current levels of Alaska Native participation and consultation in fishery management.

Data Quality, Monitoring and Enforcement

22. Continue the existing reporting requirements and Observer Program to provide catch estimates and biological information.

23. Continue on-going effort to improve community and regional economic impact assessments.

24. Increase the quality of monitoring data through improved technological means.

2.2.2 Current FMP Management Measures

The following describes the specific management measures contained in the FMPs and their implementing regulations that implement NPFMC's and NOAA Fisheries' current management goals and objectives.

Setting the Total Allowable Catch

In the current FMPs, the TAC is determined annually based on a conservative harvest strategy that calculates the overfishing level (OFL) and the acceptable biological catch (ABC) for each managed stock or stock complex. The current FMPs specify the OFL and maximum ABC (maxABC) by means of a six-tier system wherein the amount and quality of information available for a given stock or stock complex determine the formula that is used to define FOFL and max FABC (Tiers 1-5) or OFL and maxABC directly (Tier 6) (Appendix B). Most stocks are currently managed under Tier 3, where max FABC equals $F_{40\%}$ if biomass is above $F_{40\%}$ Precautionary adjustments are made, including decreasing FOFL and FABC linearly with biomass whenever biomass falls below a tier-specific reference level, but only Tier 1 stocks include an uncertainty variation in maxABC. The status of each stock in Tiers 1-3 is also examined annually with respect to the minimum stock size threshold (MSST), as defined in the National Standard Guidelines.

OY is specified in the current FMPs as a range that is aggregated across all stocks and does not vary with biomass. The current FMPs require the sum of the individual groundfish TACs to fall within the OY range. In the BSAI, the high end of the range, 2 million metric tons (mt), acts as a cap on the TACs, as the aggregated ABCs regularly exceed this limit. In practice, although it is not required in the current FMPs, TACs are never set higher than the corresponding ABCs. Taking into account the ecosystem considerations of the food web, the FMPs also prohibit directed fishing for forage species.

Spatial and Temporal Closures

Through amendments over the last 20 years, the current FMPs have built up a network of spatial/temporal closed areas, intended to protect resources of concern, as well as to minimize gear conflicts. In the BSAI, various areas around the Pribilof Islands and in Bristol Bay are closed year-round to trawling in order to protect red and blue king crab habitat, and a chinook and a chum salmon area are closed seasonally. Also in the BSAI, waters within 12 nm of the Walrus Islands are closed to groundfish fishing to minimize disturbance of walrus haulouts. In the BSAI and the GOA, Steller sea lion protection measures permanently close the area within 3 nm of rookeries to fishing, as a no-transit zone. Additionally, they impose trawl prohibitions within 10 to 20 nm of all rookeries and haulouts, and prohibit fishing in Seguam Pass. In the GOA, trawling is prohibited in southeast Alaska west of 140°W. Also, a 2.5 square nautical miles (nm^2) area

designated as the Sitka Pinnacles Marine Reserve in the GOA is closed to groundfish fishing to protect habitat for rockfish and lingcod (Programmatic SEIS Figure 4.2-1).

The current BSAI FMP prohibits directed fishing for pollock with non-pelagic trawl gear. There is no similar restriction on pollock trawling in the current GOA FMP. Directed fishing for sablefish with longline pot gear is prohibited in the GOA. Non-pelagic trawling is prohibited in the Bristol Bay Red King Crab Savings Area in the BSAI and in the Cook Inlet in the GOA. Additionally, various areas around Kodiak Island are closed to non-pelagic trawling either year-round or seasonally to protect crab stocks (Programmatic SEIS Figure 4.2-1; specific details on the FMP 1 map illustration are provided in Section 4.2.3 of the Programmatic SEIS).

Bycatch and Incidental Catch Restrictions

Groundfish fisheries in the BSAI and GOA are required to discard any incidental catch of halibut, salmon, crab, herring, or Steelhead trout, known collectively as prohibited species. The FMPs currently set PSC limits on many of these species, with penalties ranging from closure of a particular zone or of the whole management area to a directed fishery or fisheries for a specified season or for the remainder of the year. In the BSAI FMP, stairstep limits for trawl bycatch within specified zones are set for red king crab and *C. bairdi* crab. The catch limit varies based on stock abundance. The BSAI FMP also specifies an absolute trawl catch limit for chinook salmon and "other salmon" within specified zones. Once the apportioned PSC limit for a trawl fishery is reached within a zone, the fishery is prohibited from fishing within that zone. The BSAI FMP specifies a trawl catch limit for herring in the BSAI at one percent of annual biomass. Catch limits on *C. opilio* crab and halibut bycatch in the BSAI are established in regulation. The *C. opilio* catch limit applies to a specified zone and is based on an adjusted percentage of biomass that must fall within a certain range. The halibut catch limit is a BSAI-wide mt limit and is based on halibut mortality. In the GOA FMP, catch limits on halibut bycatch are authorized and set by the Council as part of the annual procedure for setting groundfish harvest levels. There are no other PSC limits set in the GOA.

Other bycatch reduction measures are required under the status quo FMP. The Increased Retention/Increased Utilization (IR/IU) program requires full retention, by vessels fishing for groundfish, of all pollock and Pacific cod fit for human consumption, as well as full utilization of the two species by inshore processors. A minimum utilization standard of 15 percent is set for all at-sea processors. NPFMC is also adopting a policy to require full retention of Demersal Shelf Rockfish by hook-and-line and jig vessels in the Southeast Outside District of the GOA. A Vessel Incentive Program (VIP) encourages bycatch reduction by setting bycatch reduction standards biannually. If a vessel fails to meet these standards, it can be penalized. Inseason bycatch management measures establish fishing seasons for bycatch management and give the NOAA Fisheries/Alaska Regional Administrator the authority to close areas with high bycatch.

Seabird Measures

"The Reasonable and Prudent Measures" adopted from the most recent USFWS BiOp on the short-tailed albatross stipulate the use of certain seabird avoidance measures and require that the take of more than four short-tailed albatross within 2 years trigger consultation with the USFWS and the potential closure of fisheries (USFWS 2003). To further reduce the possibility of the take of albatross impacting the fisheries, NPFMC in 2001 required all longline vessels to adopt more stringent seabird avoidance methods.

Allocations and Overcapacity

A License Limitation Program (LLP) for groundfish vessels over 32 feet (ft) length overall (LOA) (with certain jig gear exceptions) and a moratorium on entry into the groundfish fisheries is in place for the BSAI and the GOA. An IFQ program is in place for sablefish in the BSAI and GOA, which includes provisions for community purchase of quota share. In the BSAI, the directed fishery for pollock is organized into cooperatives as authorized under the AFA. A multispecies community development quota (CDQ) program apportions 7.5 to 10 percent of all BSAI groundfish quota to 65 eligible western Alaska communities.

Observer Coverage and Data Reporting Requirements

Under the current management regime, groundfish fishing effort is monitored through federal and state reporting requirements and through the use of the North Pacific Groundfish Observer Program. All vessels between 60 ft and 125 ft LOA are required by regulation to have an observer on board 30 percent of the time; for vessels over 125 ft LOA this increases to 100 percent. For AFA and CDQ catcher boats greater than 60 ft LOA, one observer must be on board at all times, and for catcher processors and motherships, two observers must be on board at all times. The program also has observers at inshore processing plants. An additional monitoring tool is the reporting requirements for BSAI and GOA vessels that submit daily or weekly logbooks including information on the composition of catch and the locations of the hauls. The Alaska Department of Fish and Games (ADF&G) also collects data from fish tickets at the point that catch is sold. Mandatory vessel monitoring systems (VMS) for all directed Atka mackerel, pollock, and Pacific cod fishing verify vessel location.

2.3 The Programmatic SEIS Preferred Alternative

As discussed earlier, approval of the PA by the Secretary of Commerce would result in a plan amendment to BSAI FMP Section 3.2 (*Goals for Management Plan*) and GOA FMP Section 2.1 (*Goal and Objectives for Management of Gulf Groundfish Fisheries*). There would be no immediate changes to any other part of the FMPs or their implementing regulations beyond the continuing authorization. Adoption of the PA would lead to a plan amendment that would replace the current BSAI and GOA policy statements with the new statement below:

2.3.1 Management Approach

The productivity of the North Pacific ecosystem is acknowledged to be among the highest in the world. For the past 25 years, NPFMC's management approach has incorporated forward-looking conservation measures that address differing levels of uncertainty. This management approach has, in recent years, been labeled the precautionary approach. NPFMC's precautionary approach is about applying 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. Recognizing that potential changes in productivity may be caused by fluctuations in natural oceanographic conditions, fisheries, and other, non-fishing activities, NPFMC intends to continue to take appropriate measures to insure the continued sustainability of the managed species. It will carry out this objective by considering reasonable, adaptive management measures as described in the MSA and in conformance with the national standards, the ESA, the NEPA and other applicable law.

As part of its policy, NPFMC intends to consider and adopt, as appropriate, measures that accelerate NPFMC's precautionary, adaptive management approach through community or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and where appropriate and practicable, increase habitat protection and bycatch constraints. All management measures will be based on the best scientific information available. Given this intent, the fishery management goal is to provide sound conservation of the living marine resources; provide socially and economically viable fisheries and fishing communities; minimize human-caused threats to protected species; maintain a healthy marine resource habitat; and incorporate ecosystem-based considerations into management decisions.

This management approach recognizes the need to balance many competing uses of marine resources and different social and economic goals for sustainable fishery management including protection of the long-term health of the resource and the optimization of yield. This policy will utilize and improve upon NPFMC's existing open and transparent process to involve the public in decision-making.

Adaptive management requires regular and periodic review. NPFMC will review objectives identified in this policy statement annually. NPFMC will also review, modify, eliminate or consider new issues as appropriate to best carry out the goals and objectives of this management policy.

To meet the goals of this overall management approach, NPFMC and NOAA Fisheries will use the Programmatic SEIS as a planning document. To help focus its consideration of potential management measures, it will use the following objectives as guideposts to be re-evaluated as amendments to the FMP are considered over the life of the Programmatic SEIS.

<u>Prevent Overfishing</u>

1. Adopt conservative harvest levels for multi-species and single species fisheries and specify OY.

2. Continue to use existing OY cap for BSAI (as stated in current law) and GOA groundfish fisheries.

3. Provide for adaptive management by continuing to specify OY as a range.

4. Initiate a scientific review of the adequacy of $F_{40\%}$ and adopt improvements as appropriate.

5. Continue to improve the management of species through species categories.

Promote Sustainable Fisheries and Communities

6. Promote conservation while providing for OY in terms of providing the greatest overall benefit to the nation with particular reference to food production, and sustainable opportunities for recreational, subsistence and commercial fishing participants and fishing communities.

7. Promote management measures that, while meeting conservation objectives, are also designed to avoid significant disruption of existing social and economic structures.

8. Promote fair and equitable allocation of identified available resources in a manner such that no particular sector, group or entity acquires an excessive share of the privileges.

9. Promote increased safety at sea.

Preserve Food Web

10. Develop indices of ecosystem health as targets for management.

11. Improve the procedure to adjust ABCs as necessary to account for uncertainty and ecosystem factors.

12. Continue to protect the integrity of the food web through limits on harvest of forage species.

13. Incorporate ecosystem-based considerations into fishery management decisions as appropriate.

Manage Incidental Catch and Reduce Bycatch and Waste

14. Continue and improve current incidental catch and bycatch management program.

15. Develop incentive programs for bycatch reduction including the development of mechanisms to facilitate the formation of bycatch pools, vessel bycatch allowances, or other bycatch incentive systems.

16. Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits as information becomes available.

17. Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce bycatch which includes economic discards.

18. Continue to manage incidental catch and bycatch through seasonal distribution of TAC and geographical gear restrictions.

19. Continue to account for bycatch mortality in TAC accounting and improve the accuracy of mortality assessments for target, PSC bycatch, and non-commercial species.

20. Control the bycatch of prohibited species through PSC limits or other appropriate measures.

21. Reduce waste to biologically and socially acceptable levels.

Avoid Impacts to Seabirds and Marine Mammals

22. Continue to cooperate with USFWS to protect ESA-listed species, and if appropriate and practicable, other seabird species.

22. Maintain or adjust current protection measures as appropriate to avoid jeopardy to ESA-listed Steller sea lions.

23. Encourage programs to review status of endangered or threatened marine mammal stocks and fishing interactions and develop fishery management measures as appropriate.

24. Continue to cooperate with NOAA Fisheries and USFWS to protect ESA-listed marine mammal species, and if appropriate and practicable, other marine mammal species.

Reduce and Avoid Impacts to Habitat

26. Review and evaluate efficacy of existing habitat protection measures for managed species.

27. Identify and designate essential fish habitat (EFH) and habitat area of particular concern (HAPC), pursuant to Magnuson-Stevens Act rules, and mitigate fishery impacts as necessary and practicable to continue productivity of managed species.

28. Develop a marine protected areas (MPA) policy in coordination with national and state policies.

29. Encourage development of a research program to identify regional baseline habitat information and mapping, subject to funding and staff availability.

30. Develop goals, objectives and criteria to evaluate the efficacy and suitable design of MPAs and no-take marine reserves as tools to maintain abundance, diversity, and productivity, and implement MPAs if and where appropriate.

Promote Equitable and Efficient Use of Fishery Resources

31. Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources.

32. Maintain LLP program and further decrease excess fishing capacity and overcapitalization by eliminating latent licenses and extending programs such as community or rights-based management to some or all groundfish fisheries.

33. Provide for adaptive management by periodically evaluating the effectiveness of rationalization programs and the allocation of access rights based on performance.

34. Develop management measures that, when practicable, consider the efficient use of fishery resources taking into account the interest of harvesters, processors, and communities.

Increase Alaska Native Consultation

35. Continue to incorporate local and traditional knowledge in fishery management.

36. Consider ways to enhance collection of local and traditional knowledge from communities, and incorporate such knowledge in fishery management where appropriate.

37. Increase Alaska Native participation and consultation in fishery management.

Improve Data Quality, Monitoring and Enforcement

38. Increase the utility of groundfish fishery observer data for the conservation and management of living marine resources.

39. Improve groundfish Observer Program, and consider ways to address the disproportionate costs associated with the current funding mechanism.

40. Improve community and regional economic impact costs and benefits through increased data reporting requirements.

41. Increase the quality of monitoring and enforcement data through improved technological means.

42. Encourage a coordinated, long-term ecosystem monitoring program to collect baseline information and compile existing information from a variety of ongoing research initiatives, subject to funding and staff availability.

43. Work with the North Pacific Research Board (NPRB) and other research entities to develop and prioritize research programs, and seek funding for appropriate research projects to inform NPFMC as it seeks to meet the goals and objectives of this management approach.

44. Promote enhanced enforceability.

45. Continue to cooperate and coordinate management and enforcement programs with the Alaska Board of Fish, Department of Fish and Game, and Fish and Wildlife Protection, the U.S. Coast Guard, NOAA Fisheries enforcement, International Pacific Halibut Commission (IPHC), federal agencies, and other organizations to meet conservation requirements; promote economically healthy and sustainable fisheries and fishing communities; and maximize efficiencies in management and enforcement programs through continued consultation, coordination, and cooperation.

2.3.2 Example Management Measures: The FMP Bookends

Although there would be no immediate changes to any other part of the FMPs or their implementing regulations, NPFMC and the NOAA Fisheries would amend the current suite of management measures to better meet the FMPs' modified goals and objectives in the near future. The PA represents a management approach that incorporates forward-looking conservation measures that address differing levels of uncertainty. As part of its policy, appropriate measures would be considered and adopted that accelerate the precautionary, adaptive management approach through community or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and, where appropriate and practicable, increased habitat protection and bycatch constraints.

To illustrate a range of potential actions and a range of environmental consequences associated with the policy statements, the PA contains an FMP framework. The FMP framework contains two example FMPs that represent the range, or "bookends," of management measures that would be employed in the future to meet the policy statements of the PA.

Example FMP Bookend PA.1

Example FMP PA.1 illustrates a conservative management approach that continues current risk-averse management practices, increases conservation-oriented constraints on the fisheries as appropriate, formalizes precautionary practices in the FMPs, and initiates scientific review of existing practices in order to assess and improve fishery management. Example FMP PA.1 is described in full in Table 4.2-2 of the Programmatic SEIS. Example FMP PA.1 builds on the existing conservative procedure for determining acceptable biological catch and annual quotas. The example FMP implements changes to the TAC-setting process following a comprehensive review. Precautionary practices such as setting TAC less than or equal to the ABC, and specifying MSSTs for Tiers 1-3 in accordance with National Standard Guidelines, would be formalized in the FMP. NPFMC and NOAA Fisheries would continue to use and improve harvest control rules to maintain a spawning stock biomass with the potential to produce sustained yields on a continuing basis, and to distribute allocations by area, season, and gear as appropriate. Efforts to develop ecosystem indicators to be used in TAC-setting, as per ecosystem management principles, would be continued. In order to balance the needs of social and economic stability with habitat protection and resource conservation, NPFMC would develop a MPA efficacy methodology, including the development of definitions, program goals, objectives and criteria for establishing MPAs. Additionally, existing habitat and bycatch area restrictions would be maintained. Measures are also retained to protect ESA-listed species. To minimize bycatch, a moderate reduction of PSC limits in the BSAI will be initiated, and PSC limits for crab, herring and salmon would be authorized in the GOA, including Salmon Savings Areas to be triggered by reaching PSC limits. Effective monitoring and timely reaction to change in the environment and the fisheries would be enhanced through improvements in the Observer Program and existing reporting requirements. Existing programs to address excess capacity and overcapitalization are maintained under this example FMP, with continued development of rights-based management to be undertaken as needed. In order to mitigate any adverse impacts of fisheries management decisions on fishing communities, and to comply with other national directives, formal procedures would be implemented to encourage increased participation of Alaska Natives in fishery management.

Example FMP Bookend PA.2

Example FMP PA.2 accelerates adaptive, precautionary management by increasing conservation measures that provide a buffer against uncertainty, instituting research and review of existing measures, and expanding data collection and monitoring programs. Example FMP PA.2 is described in full in Table 4.2-2 of the Programmatic SEIS. Example FMP PA.2 significantly accelerates precautionary management by incorporating an uncertainty correction into the estimation of ABC for all species. The current precautionary practice of setting TAC less than or equal to ABC would be formalized in the FMP. Example FMP PA.2 would also develop and implement criteria for using key ecosystem indicators in TAC-setting, and other precautionary practices. This could result in Tier 3 rockfish stocks, for example, being capped at $F_{60\%}$ rather than $F_{40\%}$. In implementing this bookend, criteria would be developed for specifying MSSTs for priority stocks in Tiers 4-6. The development of criteria to manage target and non-target species consistently, and for moving stocks from the other species and nonspecified species management categories, would begin with breaking sharks and skates out of the other species group for TAC-setting. Example FMP PA.2 also reexamines area restrictions in the BSAI and the GOA by reviewing the existing system of closure areas in the BSAI and the GOA (for closure areas under example FMP PA.1, see Figure 4.2-8 and Section 4.2.3 in the Programmatic SEIS), and evaluating them in conjunction with developing MPAs. The example FMP considers adopting MPAs, with a guideline of 0 to 20 percent of the EEZ (3 to 200 nm) to be closed as a MPA, of which no more than 5 percent should be completely closed to commercial fishing (designated No-Take Marine Reserve). The remainder of the closed area is designated as no-bottom-contact MPA. The objective of these measures is to provide greater protection to a full range of marine habitats within the 1,000 m bathymetric line (see Figure 4.2-9; specific details on the example FMP PA.2 map are provided in Section 4.2.3 of the Programmatic SEIS). This area would incorporate an Aleutian Islands management area to

protect coral and live bottom habitat, and also any modification to the 2002 Steller sea lion closures. The guideline aims to provide greater protection for a wide range of species, from Steller sea lions to slope rockfish to prohibited species, while at the same time respecting traditional fishing grounds and maintaining open area access for coastal communities. Additionally, the bookend would extend the existing bottom-trawl ban on pollock to the GOA. To increase precaution regarding bycatch, existing PSC limits would be reduced and set for all prohibited species in the GOA, and appropriate inseason closure areas would be identified in the GOA. The achievement of these bycatch reductions is expected to be realized through the comprehensive rationalization of all fisheries (except those already part of a cooperative or IFQ program), which reduces concentrated effort in the fisheries, or through bycatch incentive programs implemented in this example FMP. In accordance with ecosystem principles, NPFMC and NOAA Fisheries would seek to cooperate with the USFWS to develop fishing methods that reduce incidental take of all seabird species in the longline and trawl fleets. Formal procedures would also be implemented to increase consultation with and representation of Alaska Natives in fishery management. Increases in observer coverage and improvements to the observer data that is collected would enhance effective monitoring and timely reaction to change in the environment and the fisheries. Additionally, the bookend explores programs that would expand the type of economic data collected from industry.

Chapter 3 Status of Listed Species

NOAA Fisheries determined that the actions being considered in this biological assessment may affect the following species[1] and critical habitat that have been provided protection under the ESA of 1973 (16 U.S.C. 1531 *et seq*.):

This section presents a summary of the ESA listing status, the population status and trends, trophic interactions, internal and external effects, and the comparative baseline against which effects of the actions will be considered for these threatened and endangered species. For detailed information on the species biology, life history, and distribution, see chapter 3.8 of the Programmatic SEIS (NMFS 2004) and section 4 of the FMP BiOp (NMFS 2000).

Listed species	Scientific name	ESA status
Blue Whale	*Balaenoptera musculus*	Endangered
Bowhead Whale	*Balaena mysticetus*	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered
Humpback Whale	*Megaptera novaeangliae*	Endangered
Right Whale	*Balaena glacialis*	Endangered
Sei Whale	*Balaena glacialis*	Endangered
Sperm Whale	*Physeter macrocephalus*	Endangered
Steller sea lion (Western Population)	*Eumatopias jubatus*	Endangered
Steller sea lion (Eastern Population)	*Eumatopias jubatus*	Threatened
Chinook Salmon (Puget Sound)	*Oncorhynchus tshawytscha*	Threatened
Chinook Salmon (Lower Columbia River)	*Oncorhynchus tshawytscha*	Threatened
Chinook Salmon (Upper Columbia River)	*Oncorhynchus tshawytscha*	Threatened
Chinook Salmon (Snake River/Spring/Summer)	*Oncorhynchus tshawytscha*	Threatened
Chinook Salmon (Snake River Fall)	*Oncorhynchus tshawytscha*	Threatened
Sockeye Salmon (Snake River)	*Oncorhynchus nerka*	Endangered
Steelhead (Upper Columbia River)	*Oncorhynchus mykiss*	Threatened
Steelhead (Middle Columbia River)	*Oncorhynchus mykiss*	Threatened
Steelhead (Lower Columbia River)	*Oncorhynchus mykiss*	Threatened
Steelhead (Upper Willamette River)	*Oncorhynchus mykiss*	Threatened
Steelhead (Snake River Basin)	*Oncorhynchus mykiss*	Threatened
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered
Steller's Eider*	*Polysticta stelleri*	Threatened
Short-tailed Albatross*	*Phoebaotria albatrus*	Endangered
Spectacled Eider*	*Somateria fishcheri*	Threatened
Northern Sea Otter*	*Enhydra lutris*	Candidate
Designated Critical Habitat		
Steller sea lion		
Steller's Eider*		
Spectacled Eider*		

* The short-tailed albatross, spectacled eider, Steller's eider, and Northern sea otter are under the jurisdiction of the U.S. Fish and Wildlife Service.

[1] In its definition of species, the ESA of 1973, as amended, includes the traditional biological species concept of the biological sciences and any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature (16 USC 1532). NOAA Fisheries uses the term *evolutionarily significant unit* as synonymous with *distinct population segment* and lists Pacific salmon accordingly. For the purposes of section 7 consultations, these are all "species."

This section presents a summary of the ESA listing status, the population status and trends, trophic interactions, internal and external effects, and the comparative baseline against which effects of the actions will be considered for these threatened and endangered species. For detailed information on the species biology, life history, and distribution, see chapter 3.8 of the Programmatic SEIS (NMFS 2004) and section 4 of the FMP BiOp (NMFS 2000).

3.1 Blue Whale (Balaenoptera musculus)

3.1.1 Listing Status

Blue whales have been listed as endangered under the Endangered Species Act since 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act (MMPA) of 1972. The North Pacific stock is also listed as "low risk, conservation dependent" under the International Union for Conservation of Nature (IUCN) Red List of Threatened Animals (Baillie and Groombridge 1996). Critical habitat has not been designated for blue whales.

3.1.2 Population Status and Trends

Estimates of abundance in the North Pacific Ocean have ranged from 1,400 to 1,900 individuals (Nishiwaki 1966, Omura and Ohsumi 1974, Rice 1978, Tillman 1977), although these estimates are now considered outdated (Perry *et al.* 1999). More blue whales are thought to be distributed on the east side of the North Pacific than on the west side (Omura et al. 1955, Tomilin 1967). There are no reliable population estimates for blue whales in the south eastern Bering Sea (EBS) or the GOA. A minimum abundance estimate of 3,300 has been proposed for the North Pacific as a whole, including about 2,000 whales that breed in California waters (Wade and Gerrodette 1993, Forney *et al.* 2000).

3.1.3 Trophic Interactions

Blue whales are found both in coastal waters of the continental shelf and far offshore in pelagic environments. Blue whale distribution is likely governed largely by food requirements, as reported in two fine-scale studies of blue whale ecology offshore of southern California (Fiedler *et al.* 1998, Croll *et al.* 1998). Blue whales are almost exclusively euphausiid eaters, concentrating on *Thysanoessa inermis*, *T. longipes*, and *T. spinifera* in the Bering Sea (Tomilin 1957, Nemoto 1957, Klumov 1962, Nemoto and Kawamura 1977, Kawamura 1980). Blue whales occasionally consume copepods, pelagic gastropods, pelagic schooling squid, and fish such as sardines, capelin, and sand lance (Mizue 1951, Klumov 1962). A blue whale of average size, 77-80 ft (23.5-24.5 m) long and weighing 60-70 tons (54-64 mt), eats about 2-2.5 tons (1.8-2.3 mt) of food per day (Klumov 1962). Estimates of total prey consumption are not available for this species.

3.1.4 Past/Present Internal Effects and Management Actions

Direct Mortality from Harvest and Other Intentional Take

At least 9,500 blue whales were taken by commercial whalers from 1910 to 1965 in the North Pacific (Carretta *et al.* 2001). Blue whales were hunted by the Japanese along the south side of the Aleutian chain from 1952-1965 (Forney and Brownell 1996). Catches averaged 80 whales per year until 1961, after which annual catches included 67, 404, 119, and 121 whales (Forney and Brownell 1996). The International Whaling Commission (IWC) banned the hunt of blue whales in 1966, although it is likely that Soviet whaling continued and that Soviet catch reports under-represented the true harvest (Yablokov 1994).

Direct Mortality from Incidental Take in External Fisheries

The potential for human-caused mortality (from ship strikes and interactions with fisheries) exists, but few incidents have been reported and none have occurred in Alaskan waters (Forney *et al.* 2000).

Direct Mortality from Incidental Take by MSA Groundfish Fisheries

No blue whales have been reported taken in the groundfish fisheries since the Observer Program was initiated in 1989.

3.1.5 Comparative Baseline

Blue whales are an endangered species, but the number of whales that actually live in waters affected by the BSAI and GOA groundfish fisheries is unknown. Their diet does not overlap with species taken by the groundfish fisheries. There are no data that indicate that blue whales interact with the groundfish fishery fleet on a regular basis.

3.2 Bowhead Whale (*Balaena mysticetus*)

3.2.1 Listing Status

In 1964, the IWC began to regulate commercial whaling worldwide, which benefitted bowhead whales. Bowhead whales were listed as endangered in 1970 under the U.S. ESA. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the MMPA of 1972. Critical habitat has not been designated in the action area, although NOAA Fisheries is currently evaluating a petition to designate the U.S. Beaufort Sea as critical habitat for the bowhead whale.

3.2.2 Population Status and Trends

The western Arctic stock originally numbered about 18,000 whales and was reduced to about 3,000 after commercial whaling ended in the early 1900s (Woodby and Botkin 1993, Breiwick *et al.* 1984). Since 1978, counts of bowheads have been conducted from the sea ice north of Point Barrow during spring migration and have been corrected for whales missed for various reasons. Recent improvements in acoustical sampling have improved the detection and reliability of estimates (Angliss *et al*. 2001). From 1978 to 1993, the western Arctic stock increased from approximately 5,000 to 8,000 whales, a mean rate of 3.1 percent per year (Raftery *et al*. 1995).

3.2.3 Trophic Interactions

Prey species identified from bowhead whale stomach contents have included crustacean zooplankton, particularly euphausiids and copepods, ranging in length from 3 to 30 mm, and epibenthic organisms, mostly mysids and gammarid amphipods. Benthic species were relatively rare in bowhead stomach contents (Lowry 1993). Studies of stable isotope ratios in bowhead baleen suggest that the Bering and Chukchi Seas are the preferred feeding habitats, rather than the Beaufort Sea (Lee and Schell 1999).

3.2.4 Past/Present Human Effects and Management Actions

Direct Mortality from Harvest and Other Intentional Take

Bowheads have been a favored whale for hunting for at least 2,000 years because they produce large quantities of oil, baleen, meat, and muktuk (skin with blubber). They are also slow, non-aggressive, and float when they are killed. Bowheads are the most important subsistence animal, both culturally and nutritionally, for most northwestern Alaska Inupiaq and Yupik people. Alaska Eskimo whalers use handheld weapons and skin boats propelled by paddles to pursue bowheads during the spring hunt and motor-driven boats during the fall (Carroll 1994). The IWC has authorized Alaska Natives to strike up to 67 bowheads per year since 1978 but actual strikes have been less than the quota. The calculated potential biological removal (PBR) for this stock is 77 animals per year (Angliss *et al*. 2001).

Commercial whaling severely impacted bowhead whale populations, including the western Arctic stock. Between 1848 and 1919, it is estimated that over 20,000 bowheads were harvested from pelagic and shore-based whaling operations in the Bering Sea (Woodby and Botkin 1993). In 1908, the baleen market collapsed, and by 1921, the last bowhead whale was taken at sea. (Bockstoce and Burns 1993).

Direct Mortality from Incidental Take in External Fisheries

Commercial fishing occurs in the Bering Sea and elsewhere within the range of this stock. Evidence of interactions between bowhead whales and fishing gear is rare, although bowhead whales have been reported with ropes caught in their baleen and with scarring caused by rope entanglement (Philo *et al*. 1993, NMML unpubl. data). There are no Observer Program records of bowhead whale mortality incidental to commercial fisheries in Alaska (Hill and DeMaster 1999), although a young bowhead whale was apparently entrapped and killed in a fishing net in Japan (Nishiwaki and Kasuya 1970). Bowhead whales are also struck and injured by ships, although these incidents do not appear to be common (George *et al.* 1994). Man-made noise in the marine environment is increasing with industrialization of the Alaskan arctic, and may affect bowhead whales. Despite many years of study, the seriousness of those effects on bowhead whales is unknown [for summaries of these studies, see Richardson *et al*. (1995) and Burns *et al*. (1993)].

3.2.5 Comparative Baseline

Bowhead whales are an endangered species due to population declines resulting from commercial whaling in the 1800s and early 1900s. Bowhead populations in the action area have been increasing since commercial whaling for this species ceased in 1921. Diets of bowheads do not overlap with species taken by the groundfish fisheries. There have been no reported interactions with the groundfish fisheries and evidence of interactions between bowhead whales and fishing gear is rare. Despite many years of study, however, the seriousness of human effects on bowheads, other than intentional takes, is unknown.

3.3 Fin Whale (*Balenoptera physalus*)

3.3.1 Listing Status

In the North Pacific, the IWC began management of commercial whaling for fin whales in 1969; fin whales were fully protected from commercial whaling in 1976 (Allen 1980). Fin whales were listed as endangered under the ESA. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the MMPA of 1972. Fin whales are listed as endangered on the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996). Critical habitat has not been designated for fin whales.

3.3.2 Population Status and Trends

Prior to exploitation by whaling vessels, the North Pacific population consisted of an estimated 42,000 to 45,000 fin whales (Ohsumi and Wada 1974). Between 1914 and 1975, over 26,040 fin whales were harvested throughout the North Pacific (Braham 1991, as cited in Perry *et al*. 1999). Catches in the North Pacific and Bering Sea ranged from 1,000 to 1,500 fin whales annually during the 1950s and 1960s. However, not all Soviet catches were reported (Yablokov 1994, as cited in Ferrero *et al*. 2000). In the early 1970s, the entire North Pacific population had been reduced to between 13,620 and 18,630 fin whales (Ohsumi and Wada 1974). During the early 1970s, 8,520 to 10,970 fin whales were surveyed in the eastern half of the North Pacific (Braham 1991). If these historic estimates are statistically reliable, the population size of fin whales has not increased significantly over the past 20 years despite an international ban on whaling in the North Pacific.

The current status and trend of the fin whale population in the North Pacific is largely unknown. Based on the available information, it is feasible that the North Pacific population as a whole has failed to increase significantly over the past 20 years, despite an international ban on whaling in the North Pacific. The only contrary evidence comes from investigators conducting seabird surveys around the Pribilof Islands in 1975-1978 and 1987-1989. These investigators observed more fin whales in the second survey and suggested they were more abundant in the survey area (Baretta and Hunt 1994). Moore *et al*. (2000) conducted surveys for whales in the central Bering Sea in 1999 and tentatively estimated the fin whale population was about 4,951 animals (95 percent C.I.: 2,833-8,653).

3.3.3 Trophic Interactions

Fin whales in the North Pacific feed on euphasusiids, calanoid copepods, and schooling fish such as herring, pollock, Atka mackerel, and capelin (Calkins 1986; Nemoto 1957, 1970; Kawamura 1982). The total estimated annual food consumption by the EBS population is 57,500 mt, of which 9,200 mt (16 percent) is fish (Perez and McAlister 1993).

3.3.4 Past/Present Human Effects and Management Actions

Direct Mortality from Harvest and Other Intentional Take

As noted above, commercial whaling about 100 years ago had a major impact on fin whale populations, including the northeast Pacific stock. Commercial whaling continued into modern times with 1,000 to 1,500 fin whales taken annually from the mid-1950s to the mid 1960s. Thereafter, catches declined sharply and ended altogether in 1976 when commercial whaling was outlawed (Angliss *et al*. 2001). There are no reports of subsistence takes of fin whales from either Alaska or Russia. Since population estimates are unreliable, no value for PBR has been calculated.

Direct Mortality from Incidental Take by MSA Groundfish Fisheries

Prior to 1999, no fin whale mortalities were recorded by observers in the BSAI and GOA groundfish trawl, longline, and pot fisheries (Hill and DeMaster 1999). However, in 1999, one fin whale was killed incidental to the BSAI trawl fishery, resulting in an extrapolated take of three whales from this fishery in 1999 (Angliss *et al*. 2001). From this one recorded take, the average incidental take of fin whales is estimated to be 0.6 whales per year between 1995 and 1999. Other than the whale taken incidental to the 1999 BSAI trawl fishery, there are no records of fin whale entanglement in fishing gear.

3.3.5 Comparative Baseline

Fin whales are an endangered species due to the reduction in the population from commercial whaling prior to 1976. There are no reliable population estimates or trend information for the northeast Pacific stock. They are not hunted for subsistence purposes. Fin whale diet overlaps with species taken by the groundfish fisheries to a small extent, but the available data indicate a very low level of interaction with the groundfish fishery fleet.

3.4 Humpback Whale (*Megaptera novaeangliae*)

3.4.1 Listing Status

The IWC first protected humpback whales in the North Pacific in 1965. Humpback whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the MMPA of 1972. Critical habitat has not been designated for the species.

3.4.2 Population Status and Trends

The North Pacific population of humpbacks has been estimated at 15,000 animals before commercial whaling began in the late 1800s. By the time whaling was prohibited in 1966, there may have been only 1000 animals left (Rice 1978). The central North Pacific stock was estimated to be 1,400 animals between 1980 and 1983 (Baker and Herman 1987). Large confidence bounds surround this estimate due to the opportunistic nature of the survey methodology and the small sample size. A more recent abundance estimate was based on data collected by nine independent research groups who conducted photo-identification studies in the three wintering areas (Mexico, Hawaii, and Japan). Using photographs from 1991 to 1993, abundance estimates for the western North Pacific stock and the central North Pacific stock were calculated to be 394 (Catcher Vessel = 0.084) and 4,005 (Catcher Vessel = 0.095), respectively (Angliss *et al*. 2001; Calambokidis *et al*. in press). There is no trend information for the western North Pacific stock. The central North Pacific stock appears to be increasing, although the rate of increase is unknown due to the uncertainty of the earlier estimate (Baker and Herman 1987, Hill and DeMaster 1999).

3.4.3 Trophic Interactions

Humpback whales exhibit a high degree of site fidelity to their feeding areas (Baker *et al*. 1986, Clapham and Mayo 1987). There is very little interchange between feeding areas (Baker *et al*. 1986, Calambokidis *et al*. 1996, 2000, 2001, Waite *et al*. 1999, Urban *et al*. 2000). Prey in the North Pacific and Bering Sea include small schooling fishes, euphausiids, and other large zooplankton (Nemoto 1959, Bryant *et al*. 1981, Dolphin and McSweeney 1983). Euphausiid prey include *Thysanoessa inermis, T. longipes, T. spinifera* and to a lesser extent *T. raschii* (Kawamura 1980, Tomilin 1957). Fish preference include Atka mackerel, pollock, herring, anchovy, eulachon, capelin, saffron cod, sand lance, Arctic cod, rockfish, and salmon species (Nemoto 1959, Tomilin 1957, Kawamura 1980). Atka mackerel ranging in size from 5.9 to 11.7 inches (15 to 30 cm) were considered the preferred prey of humpback whales in the Aleutian Islands west of Attu Island and south of Amchitka Island (Nemoto 1959). Distribution of whales in the inland waters of southeast Alaska appears to be determined primarily by distribution of herring and euphausiids which are their main prey.

3.4.4 Past/Present Human Effects and Management Actions

Direct Mortality from Harvest and Other Intentional Take

Intensive commercial whaling is estimated to have taken more than 28,000 humpbacks from the North Pacific during the 1900s (Rice 1978). Commercial whaling takes are likely underestimated as it is largely held that Soviet catches were under-reported (Yablokov 1994).

The present calculated PBR for the western North Pacific stock of humpbacks is less than one animal per year while PBR for the central North Pacific stock is 7.4 animals per year (Angliss *et al*. 2001).

Direct Mortality from Incidental Take in External Fisheries

Six humpbacks were recorded to have been taken as "bycatch" in Japanese and Korean fisheries between 1995 and 1999 (Brownell *et al*. 2000). During this period, two strandings were reported that were attributed to fishing gear entanglement. Samples of whale meat sold in Japanese and Korean markets also indicate that humpbacks are being sold. Although there are questions regarding the nature of these mortalities, the data indicate a minimum incidental take of 1.1 to 2.4 humpbacks per year from the western North Pacific stock (Angliss *et al*. 2001).

A small proportion of Hawaiian fisheries has also been monitored by independent observers. One humpback was observed entangled in longline gear in 1991 and is presumed to have died. Another humpback was taken in Hawaiian longline gear in 1993. In southeast Alaska, purse seine and drift gillnet salmon fisheries have reported incidental takes of humpbacks in 1989, 1994, and 1996. In addition, over 25 humpbacks were found stranded or swimming with entangled fishing gear in Hawaii and Alaska between 1994 and 1999. Some of the whales were freed, and appeared relatively uninjured, but others are considered to have died. All fishery-related takes in Alaska and Hawaii, excluding the federal groundfish fisheries, are estimated to average 3.1 whales per year. These mortality rates from both Hawaii and Alaska are considered to be minimums based on the small number of observers and the unreliability of self-reported data (Angliss *et al*. 2001).

Direct Mortality from Incidental Take by MSA Groundfish Fisheries

NOAA Fisheries observers monitored incidental take in the 1990-1999 BSAI and GOA groundfish trawl, longline, and pot fisheries. One humpback whale mortality was observed in the BSAI trawl fishery in 1998 and one in 1999, resulting in an extrapolated average mortality of 0.4 humpbacks per year during this period. It is not known whether these incidental takes derived from the western or central stocks so the takes are counted against the PBRs for both stocks (Angliss *et al*. 2001).

Direct Mortality from Ship Strikes

Ship strikes and interactions with vessels unrelated to fishing have also accounted for humpback mortality. In the central North Pacific stock, four ship strikes were recorded between 1995 and 1999 for an average of 0.8 humpback mortalities per year (Angliss *et al*. 2001).

Indirect Effects from Disturbance

Coincident to fishing activity, as well as vessel transit, is the routine use of various sonar devices. The sounds produced by these devices may be audible to baleen whales and suggest disturbance sources. Wintering humpback whales have been observed reacting to sonar pulses by moving away (Maybaum 1990, 1993), although few other reactions have been documented. There is concern that noise generated by vessels as well as for research (such as the U.S. Navy's Low Frequency Active sonar program and NOAA's Acoustic Thermometry of Ocean Climate program) may be impacting humpback whales throughout their range. Research on this issue is underway (Angliss *et al*. 2001). Humpbacks are also subject to a growing whale-watching industry in both Hawaii and Alaska. Regulations concerning minimum approach distances and operation guidelines for whale-watching vessels have been established, but there is still concern that the whales may abandon preferred habitats to avoid persistent whale-watching activity (Angliss *et al*. 2001). This issue is attracting attention in certain popular visitor areas such as Glacier Bay National Park in Alaska.

3.4.5 Comparative Baseline

Humpback whales are listed as an endangered species under the ESA due to the reduction in the population from commercial whaling in the 1900s. Recent population estimates for the western and central North Pacific stocks are 394 and 4,005 respectively. Trends for the western stock are unknown. The central stock is thought to be increasing but at an unknown rate. Diets of humpback whales do not generally overlap with species taken by the groundfish fisheries. There have been numerous cases of incidental take related to commercial fisheries in the past ten years, including two observed mortalities from BSAI groundfish trawls since 1998.

3.5 Northern Right Whale (*Eubalaena jabonica*)

3.5.1 Listing Status

Since 1949, the northern right whale has been protected from commercial whaling by the IWC. Right whales (both *E. glacialis* and *E. australis*) are listed as endangered under the ESA. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. NOAA Fisheries designated critical habitat for the North Atlantic population of right whales on June 3, 1994 (59 FR 28793). Critical habitat has not been designated for right whales in the North Pacific Ocean. NOAA Fisheries was petitioned to designate a large percentage of the EBS as critical habitat for the northern right whale in 2002. NOAA Fisheries determined that the petition was not warranted and is evaluating a smaller portion of the area petitioned to determine the primary constituent elements and their distribution that make the area critical for the recovery and survival of right whales in the wild.

3.5.2 Population Status and Trends

The population dynamics of right whales are unknown. The recovery plan for this species suggests that its pre-exploitation abundance was higher than 11,000, based on a known harvest of over 11,000 by U.S. whalers with additional numbers struck and lost (Brownell *et al*. 1986). Current population estimates range from a low of 100-200 (Braham and Rice 1984) to a high of 220-500 (Berzin and Yablokov 1978 [in Berzin and Vladimirov 1981]), but Hill and DeMaster (1998) argue that is it is not possible to produce a reliable estimate of population size or trends for the right whale in the North Pacific. No population projections are available.

3.5.3 Trophic Interactions

Right whales in the North Pacific are known to prey on a variety of zooplankton species including *Calanus marshallae, Euphausia pacifica, Metridia* spp., and copepods of the genus *Neocalanus* (Omura 1986). Zooplankton sampled near right whales seen in the EBS in July 1997 included *Calanus marshallae*, *Pseudocalanus newmani*, and *Acartia longiremis* (Tynan 1999).

Several researchers have suggested that the recovery of right whales in the northern hemisphere has been slowed by other whales that compete with right whales for food. Mitchell (1975) analyzed trophic interactions among baleen whales in the western north Atlantic and noted that the foraging grounds of right whales overlapped with the foraging grounds of sei whales and both preferentially feed on copepods. Mitchell (1975) argued that the right whale population in the north Atlantic had been depleted by several centuries of whaling before steam-driven boats allowed whalers to hunt sei whales; from this, he hypothesized that the decline of the right whale population made more food available to sei whales and helped their population to grow. He then suggested that the larger sei whale population competes with the smaller right whale population and slows or prevents its recovery.

3.5.4 Past/Present Human Effects and Management Actions

Direct Mortality from Harvest and Other Intentional Take

Right whales are large, slow-swimming, tend to congregate in coastal areas, and have a thick layer of blubber which enables them to float when killed. These attributes made them a preferred species for whaling, and their population was decimated by the late 1800s. Between 1835 and 1909, over 15,000 right whales were estimated to be taken by U.S. registered whaling vessels; most of these whales were taken before 1875 (Angliss *et al*. 2001). Since 1931, the northern right whale has been protected from commercial whaling internationally, first under the League of Nations Convention and since 1949 by the IWC. However, reports

from Russia indicate that Soviet whalers continued to harvest northern right whales illegally until 1971 (Zemsky *et al*. 1995, Tormosov *et al*. 1998).

Direct Mortality from Incidental Take in External Fisheries

Two right whale deaths reportedly occurred in the Russian gillnet fishery, one in 1983 and one in 1989 (NMFS 1991, Kornev 1994). No incidental takes of right whales have been reported in other North Pacific fisheries (Ferrero *et al*. 2000, Angliss *et al*. 2001). Ship strikes and entanglement in fishing gear are important sources of mortality in the Atlantic stock of northern right whales, but the rare occurrence of right whales in the Pacific has made it impossible to assess the susceptibility of the North Pacific stock to vessel strikes (Angliss *et al*. 2001).

NOAA Fisheries observers monitored incidental take of right whales in BSAI and GOA groundfish trawl, longline, and pot fisheries from 1990 to 1997 and did not observe any mortalities or injuries (Hill and DeMaster 1999). Any mortality incidental to commercial fisheries would be considered significant (Angliss *et al.* 2001).

3.5.5 Comparative Baseline

Northern right whales are listed as an endangered species under the ESA due to the large reductions in their populations from commercial whaling in the 1800s and early 1900s. Population trends and current status are unknown though the population is believed to be very small based on the infrequency of sightings. Diets of right whales do not overlap with species taken by the groundfish fisheries and the available data indicate a very low level of interaction with the groundfish fishery fleet. No incidental take from the groundfish fisheries has been reported.

3.6. Sei Whale (*Balaenoptera borealis*)

3.6.1 Listing Status

In the North Pacific, the IWC began management of commercial taking of sei whales in 1970, and fin whales were given full protection in 1976 (Allen 1980). Sei whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the MMPA of 1972. They are listed as endangered under the IUCN Red List of Threatened Animals (Baillie and Groombridge 1996). Critical habitat has not been designated for sei whales.

3.6.2 Population Status and Trends

Sei whale abundance prior to commercial whaling in the North Pacific has been estimated at 42,000 sei whales (Tillman 1977). Japanese and Soviet catches of sei whales in the North Pacific and Bering Sea increased from 260 whales in 1962 to over 4,500 in 1968 and 1969, after which the sei whale population declined rapidly (Mizroch *et al*. 1984). When commercial whaling for sei whales ended in 1974, the population of sei whales in the North Pacific had been reduced to between 7,260 and 12,620 animals (Tillman 1977).

Current abundance or trends are not known for stocks in the North Pacific. In California waters, only one confirmed and five possible sei whale sightings were recorded during 1991, 1992, and 1993 aerial and ship surveys (Carretta and Forney 1993, Mangels and Gerrodette 1994). No sightings were confirmed off Washington and Oregon during recent aerial surveys.

3.6.3 Trophic Interactions

In the northern North Pacific, sei whales feed primarily on copepods (*Calanus cristatus*, *C. plumchrus, and C. pacificus*), euphausiids (*Thysanoessa inermis* and *T. longipes*), small schooling fish such as saury and squid (Kawamura 1973, Nemoto 1959, Nemoto and Kawamura 1977). Sei whales use both engulfing and skimming feeding strategies, depending on the type of prey (Nemoto 1959 and 1970, Perry *et al*. 1999b).

3.6.4 Past/Present Human Effects and Management Actions

Direct Mortality from Harvest and Other Intentional Take

Between 1946 and 1987, an estimated 61,500 sei whales were harvested throughout the North Pacific (Carretta et al. 2001). Evidence indicates that Soviet whalers may have over-reported catches of about 3,500 sei whales, presumably to hide illegal catches of other protected species (Doroshenko 2000). Commercial whaling was prohibited in U.S. waters in 1972 by the MMPA, and sei whales were given full protection from hunting by the IWC in 1976.

Direct Mortality from Incidental Take in External Fisheries

Human-caused mortalities (i.e., incidental to commercial fishing operations or from ship strikes) have not been reported in the North Pacific (Perry *et al*. 1999b).

Direct Mortality from Incidental Take by MSA Groundfish Fisheries

From 1990 through 1997, NOAA Fisheries observers monitored incidental take in BSAI and GOA groundfish trawl, longline, and pot fisheries; no mortalities or serious injuries of sei whales were observed (Hill and DeMaster 1999).

3.6.5 Comparative Baseline

Sei whales are listed as an endangered species under the ESA due to large population reductions from commercial whaling in the mid-1900s. Population trends and current status are unknown. Diets of sei whales do not overlap with species taken by the groundfish fisheries and the available data indicate a very low level of interaction with the groundfish fishery fleet. No incidental take from the groundfish fisheries has been reported.

3.7 Sperm Whale (*Physeter macrocephalus*)

3.7.1 Listing Status

Sperm whales have been protected from commercial harvest by the IWC since 1981, although the Japanese continued to harvest sperm whales in the North Pacific until 1988 (Reeves and Whitehead 1997). Sperm whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. Critical habitat has not been designated for sperm whales.

3.7.2 Population Status and Trends

Current estimates for population abundance, status, and trends for the Alaska stock of sperm whales are not available (Hill and DeMaster 1999). Approximately 258,000 sperm whales in the North Pacific were harvested by commercial whalers between 1947 and 1987 (Hill and DeMaster 1999). In particular, the Bering Sea population of sperm whales (consisting mostly of males) was severely depleted (Perry *et al*. 1999). Catches in the North Pacific continued to climb until 1968, when 16,357 sperm whales were harvested. Catches declined after 1968 through limits imposed by the IWC.

3.7.3 Trophic Interactions

Sperm whales feed primarily on mesopelagic squid, but also consume octopus, other invertebrates, and fish (Tomilin 1967, Berzin 1971). The importance of fish increases in the sperm whale diet near the continental shelf break and along the Aleutian Islands (Okutani and Nemoto 1964). Sperm whale diet in the Bering Sea is comprised of 70 to 90 percent squid and 10 to 30 percent fish (Kawakami 1980). Fish eaten in the North Pacific include salmon, lantern fishes, lancetfish, Pacific cod, pollock, saffron cod, rockfishes, sablefish, Atka mackerel, sculpins, lumpsuckers, lamprey, skates, and rattails (Tomilin 1967, Kawakami 1980, Rice 1986). Food consumption rates were calculated to be 3 percent of their total body weight per day in smaller sperm whales (mostly females and juvenile males) that weighed less than 15 tons (13.6 mt) (Lockyer 1976). Larger males weighing more may eat 3.5 percent of their total body weight per day. This number also increases sharply for pregnant and lactating females. Assuming a summer population of 15,000 adult male sperm whales in the EBS and Aleutian Islands area, the total estimated annual food consumption by the EBS population of sperm whales is 98,138 mt, of which approximately 18 percent (17,664 mt) is fish (Perez and McAlister 1993).

3.7.4 Past/Present Human Effects and Management Actions

Direct Mortality from Harvest and Other Intentional Take

Approximately 258,000 sperm whales in the North Pacific were harvested by commercial whalers between 1947 and 1987 (Perry *et al*. 1999a). However, this number may be negatively biased by as much as 60 percent due to under-reporting by Soviet whalers (Brownell *et al*. 1998). In particular, the Bering Sea population of sperm whales (consisting mostly of males) was severely depleted (Perry *et al*. 1999a). Catches in the North Pacific continued to climb until 1968, when 16,357 sperm whales were harvested, after which catches declined, in part through limits imposed by the IWC (Rice 1989). Sperm whales have been protected from commercial harvest by the IWC since 1985, although the Japanese continued to harvest sperm whales in the western North Pacific until 1988 after filing a formal objection with the IWC (Rice 1989, Reeves and Whitehead 1997). Sperm whales have not been reported to be taken by subsistence hunters (Rice 1989).

Direct Mortality from Incidental Take by MSA Groundfish Fisheries

NOAA Fisheries observers monitored incidental take of marine mammals from 1990 to 1999 in BSAI and GOA groundfish trawl, longline, and pot fisheries. Sperm whale interactions with longline fisheries operating in the GOA are known to occur and may be increasing in frequency. In 1996, NOAA Fisheries received reports from observers on commercial fishing vessels that sperm whales were preying on sablefish caught on commercial longline gear in the GOA. Three entanglements have been reported in the GOA longline fishery: one in 1997, 1999, and 2000. In two cases (1997 and 2000), the whales were released without serious injury; though it should be noted that though the whale entangled in 1999 was alive when released, the extent of injuries to the whale is not known (Angliss *et al*. 2001). Several observer reports have noted efforts by fishermen to deter sperm whales from their lines, including yelling at the whales and throwing "seal bombs" in the water. A pilot project using fishery observers in 1997 and 1998 was initiated to determine the extent of the interactions between sperm whales and the commercial longline fishery in Alaska (Hill *et al*. 1999).

Indirect Effects through Changes in Prey Availability

Sperm whale diets overlap with groundfish fishery harvests more than any other species of toothed whales. In addition to consuming primarily medium- to large-sized squids, sperm whales consume fish and have been observed feeding off longline gear targeting sablefish and halibut in the GOA. The interactions with commercial longline gear do not appear to have an adverse impact on sperm whales. Much to the contrary, the whales appear to have become more attracted to these vessels in recent years (Angliss *et al*. 2001).

3.7.5 Comparative Baseline

Sperm whales are divided into several stocks in U.S. waters, including the North Pacific stock that regularly inhabits Alaskan waters. Population estimates of sperm whales are considered unreliable. Sperm whales are listed as endangered under the ESA. No incidental take of sperm whales has been observed or reported in commercial fisheries, including the MSA groundfish fisheries, although there have been reports of fishermen trying to deter sperm whales from their longline catches in the GOA.

3.8 Steller sea lion (*Eumetopias jubatus*)

3.8.1 Listing Status

On 26 November 1990, the Steller sea lion was listed as threatened under the ESA. In 1997; the species was split into two separate stocks on the basis of demographic and genetic dissimilarities (Bickham *et al*. 1996, Loughlin 1997); the status of the western stock was changed to endangered; and the status of the eastern stock was left unchanged (62 FR 30772).

3.8.2 Population Status and Trends

Since the October 2001 BiOp, NOAA Fisheries has conducted numerous Steller sea lion population surveys. The 2002 non-pup count for the western distinct population segment (DPS) of Steller sea lions indicated an increase, the first increase seen in the population since the decline began in the late 1970s. Although this is certainly a positive event, it must be considered with caution. This is discussed further below.

Assessments of Steller sea lion population dynamics are based largely on (a) aerial counts of non-pups (juveniles and adults) on rookeries and haulouts, and (b) counts of pups on rookeries in late June and early July. Both kinds of counts are indices of abundance, as they do not necessarily include every site where animals haul out, and they do not include animals that are in the water at the time of the counts. Population size can be estimated by standardizing the indices (e.g., with respect to date, sites counted, and counting method), by making certain assumptions regarding the ratio of animals present versus absent from a given site at the time of the count, and by correcting for the portion of sites counted. Population estimates from the 1950s and 1960s (e.g., Kenyon and Rice 1961; see also Trites and Larkin 1992, 1996) are used with caution because counting methods and dates were not standardized, and the results contain inconsistencies that indicate the possibility of considerable measurement error at some sites in some years. Efforts to standardize methods began in the 1970s (Braham *et al*. 1980); as a result, counts conducted since the late 1970s are the most reliable index of population status and trends.

Non-pup Surveys and Trends

Aerial surveys conducted from 1953 through 1960 resulted in combined counts of 170,000 to 180,000 Steller sea lions in what we now define as the western DPS in Alaska (Mathisen, 1959; Kenyon and Rice, 1961). Surveys during 1974 to 1980 suggested an equivocal increase to about 185,000, based on maximal counts at sites over the same area, as summarized by Loughlin *et al*. (1984). It was concurrent with the advent of more systematic aerial surveys that population declines were first observed. Braham *et al*. (1980) documented declines of at least 50 percent from 1957 to 1977 in the eastern Aleutian Islands, the heart of what now is the western DPS. Merrick *et al*. (1987) estimated a population decline of about 50 percent from the late 1950s to 1985 over a much larger geographical area, the central Gulf of Alaska through the central Aleutian Islands, although this still included a patchwork of regional counts and surveys. The population in the Gulf of Alaska and Aleutian Islands declined by about 50 percent again from 1985 to 1989, or an overall decline of about 70 percent from 1960 to 1989 (Loughlin *et al*.1992).

The population decline for the western DPS in Alaska has been apparent in all regions, although not at the same rate. The decline was first observed in the eastern Aleutian Islands (Braham *et al*.1980). During subsequent years the decline spread into adjacent regions in the Aleutian Islands and Gulf of Alaska (Merrick *et al*.1987). In the eastern Aleutian Islands, the rate of decline lessened and by 1989 or 1990 the population there appeared to stabilize. From 1975 to 2000 there was a steady rate of decline of 6 percent per year or greater, with an additional drop of about 8.7 percent per year during the late 1980s when the population from the Kenai Peninsula to Kiska Island in the central Aleutian Islands declined at about 15.6 percent per year (York *et al*.1996). Other regions have demonstrated short periods of stability within a general declining trend.

With the exception of the differentiation between the eastern and western DPSs, however, these regional boundaries are not based on ecological or other biological parameters, and differences in regional trends should be interpreted with caution.

From 2000 to 2002, the non-pup population of the western DPS increased by an estimated 5.5 percent. This was the first region-wide increase observed during more than two decades of surveys. Despite this increase, however, the 2002 count was still down 5 percent from 1998 and 34 percent from 1991. The average, long-term trend was a decline estimated to be 4.2 percent per year from 1991 to 2002. Trends were similar in the Kenai-to-Kiska subarea (four regions from the central Gulf of Alaska through the central Aleutian Islands), another geographical region used as a population index. Counts at the 70 Kenai-to-Kiska trend sites increased by 4.8 percent from 2000 to 2002 but decreased by 26 percent from 1991 to 2002. The long-term trend across the Kenai-to-Kiska region was a decline of 3.1 percent per year from 1991 to 2002 (Sease and Gudmondson, 2002).

Although numbers of non-pups increased in five of the six western-stock sub-regions from 2000 to 2002, these changes involved only a few hundred animals. The region that continued to decline was the western Aleutian Islands, where numbers decreased by 24 percent from 2000 to 2002 following a 44 percent decline from 1998 to 2000. The overall decline in the western Aleutian Islands was 75 percent from 1991 to 2002 (Sease and Gudmondson, 2002).

Little information exists for the sea lion counts in the Pribilof Islands (EBS). Counts at Dalnoi Point ranged from 7 animals in March 2001 to a high count of 200 animals in February 2002. Other areas around St. George also were used by sea lions including Murre Rock and Tolstoi Point.

Counts of Steller sea lions in Russian territories (part of the western DPS but to the west of the action area for the BSAI and GOA groundfish fisheries) have also declined and are currently estimated to be about one-third of historic (i.e., 1960s) levels (NMFS 1992). Counts conducted in 1989, 1994, and 1999 indicate that the recent trends in counts in Russia may vary considerably by area (V. Burkanov, personal communication). Counts have increased in the northern part of the Sea of Okhotsk and at Sakhalin Island, but decreased at Kamchatka, Bering Island, and the northern half of the Kuril Islands. Whether these changes were due to births and deaths, or immigration and emigration (i.e., a shift in distribution), is unknown. The data suggest that the number of pups born may have increased over the last ten years at 2.7 percent annually. The sum of the counts conducted in 1989, 1994, and 1999 has increased over the last ten years, but counts at repeated sites have decreased, indicating that trends in Russia cannot yet be described with confidence. Nonetheless, relative to the 1960s, counts in Russia are depressed to a degree similar to that observed for the western population in the U.S.

Pup Surveys and Trends

Pup counts introduce disturbance to the rookeries and are logistically difficult to conduct. Consequently, complete pup counts are attempted only every four years, with counts at selected rookeries during intervening years. The composite 2001/2002 pup count for the western DPS, which included counts from 24 rookeries in 2002 and seven in 2001, showed continuing decline in pup production. For the Kenai-to-Kiska index area, the area with the longest series of region-wide counts, pup numbers were down 7.8 percent from 1998, 24.5 percent from 1994, and 42.4 percent from 1990/1991. Pup counts increased in one region (western Gulf of Alaska: +5.5 percent) from 1998 to 2002, but declined in the five other regions. The western Aleutian Islands experienced the largest decline (39 percent) from 1998 to 2002 (Sease and Gudmondson, 2002).

3.8.3 Trophic Interactions

In the BSAI and GOA, the Steller sea lion diet consists of a variety of schooling fishes (e.g., pollock, Atka mackerel, Pacific cod, flatfish, sculpin, capelin, Pacific sand lance, rockfish, Pacific herring, and salmon), as well as cephalopods, such as octopus and squid (Calkins and Goodwin 1988, Lowry *et al*. 1982, Merrick and Calkins 1995, Perez 1990). An analysis of 1990 through 1998 trends in prey consumption across the western stock showed pollock and Atka mackerel as the two dominant prey species, followed by Pacific salmon and Pacific cod (Sinclair and Zeppelin 2002). Other primary prey species consistently occurring in Steller sea lion scats at frequencies greater than 5 percent include arrowtooth flounder, Pacific herring, Pacific sand lance, Irish lord, squid, and octopus (Sinclair and Zeppelin 2002). Steller sea lion prey varies in adult body size. Pollock and Atka mackerel, for instance, range in body length from approximately 10 to 70 cm. (Zeppelin *et al*. in press). The most recent diet study of the western stock (Sinclair and Zeppelin 2002) indicates that prey remains in scat are primarily from late stage juvenile to adult size fish. Seasonal and regional patterns in prey consumption by western stock Steller sea lions indicate that they target prey which are densely schooled in spawning aggregations nearshore, over or near the continental shelf, or along oceanographic boundaries (Sinclair and Zeppelin 2002).

Merrick *et al*. (1997) documented Steller sea lion consumption from scat samples throughout their range and identified seven prey categories in the GOA: 66.5 percent are gadids (pollock, Pacific cod, Pacific hake, and unidentified gadids), 20.3 percent are Pacific salmon, 6.1 percent are small schooling fish, 3.9 percent are flatfish, 2.9 percent are squid or octopus, and 0.3 percent are Atka mackerel. Merrick and Calkins (1996) determined 70 percent of the stomachs collected from animals in the GOA during the 1970s and 1980s also contained gadids.

Recent analyses of fecal samples collected on Steller sea lion haulouts and rookeries suggest that Atka mackerel is particularly important for Steller sea lions in the central and western Aleutian Islands. Over 70 percent of the animals' summer diet in this area is Atka mackerel. Pollock represents over 60 percent of the diet in the central GOA, 29 percent in the western GOA and eastern Aleutian Islands, and over 35 percent in parts of the central Aleutian Islands (Merrick and Calkins 1995). Small pollock (less than 20 cm) appear to be more commonly eaten by juvenile sea lions than older animals (Merrick and Calkins 1995). Pollock are also a major prey species in southeast Alaska where the population has showed an increase over the last ten years (Winship and Trites, 2003).

The most recent analysis of Steller sea lion diet compares trends in prey species consumption among seasons and areas with different rates of sea lion decline (Sinclair and Zeppelin 2002, Winship and Trites 2003). Regions of diet similarity closely correspond to the Steller sea lion metapopulations defined by York *et al*. (1996), suggesting that diet differences and population trends of Steller sea lions are linked. Overall, where population trends are most positive, diet diversity is highest but more supporting data are needed to draw firm conclusions. Recent data from more intensive sampling at rookeries and haulouts suggest sea lions have a much more diverse diet than previously thought (Wynne, unpublished). Regional diet patterns generally reflect regional foraging strategies learned at or near the natal rookery site, with sea lions concentrating on seasonally dense prey patches characteristic of that area (Sinclair and Zeppelin 2002).

Steller sea lion foraging distribution is inferred from at-sea sightings or observations of presumed foraging behavior (Fiscus and Baines 1966, Kajimura and Loughlin 1988, NOAA Fisheries unpublished data from the Platform-of-Opportunity Program), records of incidental take in fisheries (Perez and Loughlin 1991), and satellite telemetry studies (Merrick *et al.* 1994, Merrick and Loughlin 1997). Three foraging areas were designated as critical habitat for Steller sea lions based on observations and incidental takes in the vicinity of Seguam Pass, the southeastern Bering Sea, and Shelikof Strait (Loughlin and Nelson 1986, Perez and Loughlin 1991). The value of a given area for foraging sea lions depends not only on the nutritive quality of the prey available but also on the energetic effort required to obtain that prey. Foraging efficiency, as a

function of net energy gain, thus depends in part on how far sea lions must travel, how deep they must dive, and how much time they must spend to catch prey. These parameters have been and continue to be studied with satellite telemetry techniques. Telemetry studies suggest that foraging distributions vary by individual, size or age, season, site, and reproductive status (Merrick and Loughlin 1997, Loughlin *et al*. 2003).

Foraging patterns of adult females differ during summer months when females are with pups versus winter periods when considerable individual variation has been observed. Trip duration (the period between haulouts) for females with young pups in summer is approximately 18 to 25 hours. Trip length averages 17 kilometers (km), and they dive approximately 4.7 hours per day. In winter, females may still have a dependent pup, but mean trip duration increases to about 200 hours. During winter, mean trip length is about 130 km, and dives total about 5.3 hours per day (Merrick and Loughlin 1997). In winter, yearling sea lions' foraging trips average 30 km in distance and 15 hours in duration, with less effort devoted to diving than adult females (mean of 1.9 hours per day). Estimated home ranges are 320 square kilometers (km^2) for adult females in summer, about 47,600 km^2 (with large variation) for adult females in winter, and 9,200 km^2 for yearlings in winter (Merrick and Loughlin 1997). Recent studies have included the movement patterns of juveniles (6 months to 2 years) whose survival rate is considered an important component in the Steller sea lion decline (Loughlin *et al*. 2003).

Compared to other pinnipeds, Steller sea lions tend to make relatively shallow dives, with few dives recorded to depths greater than 250 m. Maximum depths recorded for individual adult females in summer range from 100 to 250 m; maximum depth in winter is greater than 250 m. The maximum depth measured for yearlings is 288 m. (Loughlin *et al*. 2003, Merrick and Loughlin 1997, Swain and Calkins 1997). Sea lion pups' dives are briefer in duration and shallower than yearlings' (Loughlin *et al*. 2003).

3.8.4 Past/Present Human Effects and Management Actions

Refer to Section 3.8 of the Programmatic SEIS, Sections 5, 6, and 7 of the FMP BiOp and the 2001 BiOp and its supplement for extensive information on past and present human effects and management actions that have been taken to protect Steller sea lions.

3.8.5 Comparative Baseline

Steller sea lions are listed under the ESA and were split into two distinct population segments; the endangered western population and the threatened eastern population. The cause of the original decline of Steller sea lions and the factors responsible for the gradual, continued decline of the western population is unknown. BSAI and GOA groundfish fisheries have been determined to have adverse effects (both direct and indirect) on the threatened eastern population of Steller sea lions and the endangered western population of Steller sea lions. Extensive management measures have been implemented to ensure that the BSAI and GOA groundfish fisheries do not jeopardize the continued existence of Steller sea lions in the wild or destroy or adversely modify their designated critical habitat. These protection measures have been retained in the PA in the Programmatic SEIS.

3.9 Chinook Salmon (*Oncorhynchus tshawytscha*)

3.9.1 Listing Status

Six evolutionary significant units (ESUs) of chinook salmon known to occur in the action area have been listed under the ESA. Puget Sound chinook salmon, Lower Columbia River chinook salmon, Upper Columbia River chinook salmon and Willamette River chinook salmon were listed as threatened in 1999. Critical habitat has not been designated for these four ESUs.

The Snake River spring/summer ESU and the Snake River fall ESU of chinook salmon were listed as endangered under the ESA in 1992. Critical habitat for these salmon was designated in 1993. Critical habitat for both of these ESUs encompasses the waters, waterway bottoms, and adjacent riparian zones of specified lakes and river reaches in the Columbia River that are or were accessible to listed Snake River salmon (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams) and is well beyond the area that is likely to be directly or indirectly affected by the proposed action.

3.9.2 Population Status and Trends

For current status information on West Pacific Coast and Columbia River Basin salmon stocks, refer to the Northwest Region Final Programmatic EIS for Pacific Salmon Fisheries Management off the Coasts of southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin, Chapter 3 - Affected Environment, Section 3.4 and 3.5 (NMFS 2003b).

3.9.3 Trophic Interactions

Chinook salmon feed on small fish (particularly herring), pelagic amphipods, and crab megalopa, with fish being the largest single contributor to their diet (Healey 1991).

3.9.4 Past/Present Human Effects and Management Actions

The following direct and indirect effect indicators were identified as potentially having population level effects on Pacific salmon:

- Catch/bycatch of salmon (direct effect).
- Spatial/temporal concentration of salmon bycatch (indirect effect).
- Bycatch of prey species (indirect effect).
- Salmon mariculture (indirect effect).
- Climatic influences (indirect effect).
- Oil pollution (indirect effect).

The past/present events determined to be applicable to the Pacific salmon past effects analysis include the following:

- Past/Present External Events
  – Alaska State Directed Salmon Fisheries
  – Subsistence Fisheries
  – Foreign Fisheries (pre-MSA in U.S. EEZ)
  – Foreign Fisheries (outside U.S. EEZ)
  – Salmon Mariculture (Canada)
  – Climatic Shifts
  – Exxon Valdez Oil Spill (EVOS)

- Past/Present Internal Events
  – Pollock Trawl Fisheries

- Past/Present Management Actions
  – ADF&G Management
  – Foreign Fisheries Management
  – Industry Self-Imposed Management
  – FMP Groundfish Fisheries Management

Chapter 3.5 of the Programmatic SEIS provides a detailed discussion of the external effects on chinook salmon populations listed above. This section will focus on the internal effects of the Alaska groundfish fisheries on threatened and endangered chinook salmon ESUs.

Effects on Spawning Habitat

Groundfish fisheries take place at sea, not in the freshwater spawning habitat occupied by spawning aggregations of anadromous Pacific salmon. While other human activities may affect spawning salmon and their habitat, federal groundfish fisheries do not. The quality of salmon spawning habitat is influenced by land management practices (e.g., logging, mining, and oil and gas developments) and climatic events (e.g., flooding that scours streams). Several agencies, entities, and groups exert control over watersheds used by spawning salmon. No relationships between the groundfish fisheries and salmon spawning habitat that could have the potential to cause population level effects have been identified.

Mortality: Bycatch in MSA Groundfish Fisheries

Although all groundfish fisheries in the BSAI and the GOA are prohibited from retaining any salmon they catch (except for the prohibited species donation program), they do encounter them as bycatch. Most salmon bycatch is taken by vessels using pelagic trawl gear targeting pollock. Chinook salmon seem most vulnerable to trawl gear, accounting for 36 to 44 percent of total numbers of salmon bycatch. Programmatic SEIS figures 3.5-9 and 3.5-10 show Chinook and other salmon bycatch trends by area and gear type from 1998-2001.

Chinook salmon bycatch appears to be concentrated somewhat relative to the overall distribution of pollock fishing (Programmatic SEIS Figure 3.5-11). Although some amount of chinook salmon bycatch occurs throughout the year, it was found to be higher in September and October (pollock B season during 1997 to 1999). Chinook salmon bycatch in the Bering Sea is likely composed mainly of western Alaska and Canadian Yukon stocks (Healey 1991).

Regulations implemented under the BSAI FMP amendment process successfully reduced the foreign fisheries bycatch of salmon. The foreign fisheries salmon bycatch reductions were offset by increased salmon bycatch in the growing joint venture (JV) operations and domestic groundfish fisheries. New salmon bycatch limits were issued to address the JV and domestic increased bycatch levels. Beginning in 2004, trawling is prohibited in the chinook Salmon Savings Areas upon attainment of a bycatch limit of 29,000 chinook

salmon in the BSAI under FMP Amendment 21b.

Salmon are prohibited species in any groundfish fishery; however, chinook salmon only accrue against the PSC limit when caught with trawl gear from January 15 to April 15. Accrued CDQ trawl salmon PSC limit must be retained and delivered to a shoreside processor, where they are sorted by species, counted, and reported to NOAA Fisheries by the shoreside processor on a CDQ delivery report. Although observer data are not used directly to estimate salmon PSC limit, they are used to verify the species reported on the CDQ delivery report.

Mortality: Bycatch of Salmon Prey Species in MSA Groundfish Fisheries

Bycatch of Pacific salmon prey species, such as sand lance, capelin and euphausiids (i.e. forage fish), in the BSAI and GOA groundfish fisheries tends to be minimal, remaining under 75 mt in the BSAI and 130 mt in the GOA in recent years and would likely have no effect on prey availability to Pacific salmon (see Section 3.4.2 of the Programmatic SEIS).

Spatial/Temporal Concentration of Bycatch

The spatial/temporal concentration of bycatch could result in the over-harvesting of a distinct genetic component of a stock. Current spatial/temporal concentration of salmon bycatch in the BSAI seems to be relative to the distribution of the pollock fishery.

Spatial/temporal salmon bycatch is also controlled by non-regulatory means. Many measures have been adopted by the trawl and longline fleet to control and reduce bycatch of Pacific halibut, crab, and salmon. A geographic information system (GIS) application has been used by the BSAI trawl and longline fleet to identify hotspots by using bycatch rates reported by individual vessels (Gauvin *et al.* 1995; Smoker 1994). Bycatch rate information from individual vessels is received at a central location, aggregated daily, and then quickly relayed back to the entire fleet.

3.9.5 Comparative Baseline

Six listed chinook salmon ESUs occur in the action area. Individuals from these ESUs are susceptible to being taken directly in BSAI and GOA groundfish fisheries in the form of bycatch. Regulatory measures are in place in the BSAI groundfish trawl fisheries that cap the amount of total salmon bycatch that can be taken. These limits were set to be conservative such that the probability of affecting one stock or ESU to a degree that population level effects would be expected on any stock or ESU is very low.

3.10 Snake River Sockeye Salmon (*Oncorhynchus nerka*)

3.10.1 Listing Status

Snake River sockeye salmon were listed as endangered under the ESA in 1991. Critical habitat for these salmon was designated in 1993. This critical habitat encompasses the waters, waterway bottoms, and adjacent riparian zones of specified lakes and river reaches in the Columbia River that are or were accessible to listed Snake River salmon (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams) and is well beyond the area that is likely to be affected by the proposed action.

3.10.2 Population Status and Trends

Historically, the largest numbers of Snake River sockeye salmon returned to headwaters of the Payette River, where 75,000 were taken in one year by a single fishing operation on Big Payette Lake (Bevan *et al*. 1994). During the early 1880s, returns of Snake River sockeye salmon to the headwaters of the Grande Ronde River in Oregon were estimated between 24,000 and 30,000 at a minimum. During the 1950s and 1960s, adult returns to Redfish Lake numbered more than 4,000 fish. By 1985, the number of adults arriving at Redfish Lake, Idaho, had fallen below 20 animals. Between 1990 and 1998, only 16 wild Snake River sockeye salmon returned to Redfish Lake or the nearby Sawtooth Hatchery (including one in 1998 and none in 1999).

Since 1991, all returning adults Snake River sockeye salmon have been spawned in a hatchery to prevent the species' extinction. The first adults produced by this program (from the 1991 returns) were released into Redfish Lake to spawn in 1993 and their progeny were expected to outmigrate in the spring of 1995. Sixteen sockeye were observed at Lower Granite Dam in 1999, seven of which return to the Sawtooth Hatchery weir. By August 8, 2000, 149 four-year-old sockeye adults had made the 900-mile journey from the ocean to Redfish Lake or Sawtooth Hatchery. Most are products of either sockeye adults produced in the hatchery program and released to spawn in 1996 or year-old smolts released near the hatchery or in Redfish Creek. All are progeny of eight, lone returning "wild" sockeye salmon that had been taken into the program as broodstock in 1993.

Given the extremely low sockeye salmon population size, this species' likelihood of surviving in the wild remains fairly low. Snake River sockeye will remain below the threshold escapement level of 150 fish (which applies only to naturally-produced spawners) until natural production is sufficiently re-established. This species' likelihood of recovering in the wild (which only applies to spawners at least two generations removed from captive broodstock) is even less certain.

3.10.3 Trophic Interactions

Sockeye are known to feed on euphausiids, amphipods, and small fish (lantern fish and juvenile cod in central North Pacific Ocean; in the EBS larval caplin, sand lance, and herring; sand lance, herring, pollock and capelin in the GOA) (Burgner 1991).

3.10.4 Past/Present Human Effects and Management Actions

Chapter 3.5 of the Programmatic SEIS provides a detailed discussion of the external effects on sockeye salmon populations. A consultation history on the effects of BSAI and GOA groundfish fisheries on Pacific salmon is provided in the FMP BiOp (NMFS 2000). The effects discussion found in section 6.6.5 of the FMP BiOp (NMFS 2000) is incorporated here by reference. That discussion concluded that the interactions between the BSAI and GOA groundfish fisheries and listed Pacific salmon species do not appear to be significant.

3.10.5 Comparative Baseline

As explained in section 3.4.2 of the Programmatic SEIS, NOAA Fisheries does not anticipate that the proposed fisheries will take any Snake River sockeye salmon (NMFS 1999).

3.11 Steelhead (Oncorhynchus mykiss)

NOAA Fisheries' 2000 FMP BiOp stated, "NOAA Fisheries does not anticipate that the proposed fisheries will take any steelhead ESUs" (NMFS 2000). This discussion in the FMP BiOp is incorporated by reference (NMFS 2000).

3.12 Leatherback Sea Turtle (*Dermochelys coriacea)*

3.12.1 Listing Status

The leatherback was listed as endangered on June 2, 1970 and a recovery plan was issued in 1998. Leatherback turtles are included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, which effectively bans trade. Critical habitat has not been designated for leatherback turtles in the U.S. Pacific, largely because nesting is not known to occur in U.S. territory and important foraging areas have not been identified.

3.12.2 Population Status and Trends

Globally, leatherback turtle populations have been decimated worldwide. The global leatherback turtle population was estimated to number approximately 115,000 adult females in 1980 (Pritchard 1982), but only 34,500 in 1995 (Spotila *et al.* 1996). The decline can be attributed to many factors including fisheries as well as intense exploitation of the eggs (Ross 1982). On some beaches nearly 100 percent of the eggs laid have been harvested. Adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries (Spotila *et al.* 1996).

The Pacific population appears to be in a critical state of decline. The East Pacific leatherback population was estimated to be over 91,000 adults in 1980 (Spotila *et al.* 1996), but is now estimated to number less than 3,000 total adult and subadult animals (Spotila *et al.* 2000). Leatherback turtles have experienced major declines at all major Pacific basin rookeries. At Mexiquillo, Michoacan, Mexico, Sarti *et al.* (1996) reported an average annual decline in nesting of about 23 percent between 1984 and 1996. The total number of females nesting on the Pacific coast of Mexico during the 1995-1996 season was estimated at fewer than 1,000. Less than 700 females are estimated for Central America (Spotila *et al.* 2000). In the western Pacific, the decline is equally severe. Current nestings at Terengganu, Malaysia represent 1 percent of the levels recorded in the 1950s (Chan and Liew 1996).

The status of the Atlantic population is less clear. In 1996, it was reported to be stable, at best (Spotila *et al.* 1996), but numbers in the Western Atlantic at that writing were reported to be on the order of 18,800 nesting females. According to Spotila (pers.comm.), the Western Atlantic population currently numbers about 15,000 nesting females, whereas current estimates for the Caribbean (4,000) and the Eastern Atlantic (i.e. off Africa, numbering approximately 4,700) have remained consistent with numbers reported by Spotila *et al.* in 1996. Between 1989 and 1995, marked leatherback returns to the nesting beach at St. Croix averaged only 48.5 percent, but that the overall nesting population grew (McDonald *et al.* 1993). This is in contrast to a Pacific nesting beach at Playa Grande, Costa Rica, where only 11.9 percent of turtles tagged in 1993 to 1994 and 19.0 percent of turtles tagged in 1994 to 1995 returned to nest over the next five years. Characterizations of this population suggest that it has a very low likelihood of survival and recovery in the wild under current conditions.

Spotila *et al.* (1996) describe a hypothetical life table model based on estimated ages of sexual maturity at both ends of the species' natural range (5 and 15 years). The model concluded that leatherbacks maturing in 5 years would exhibit much greater population fluctuations in response to external factors than would turtles that mature in 15 years. Furthermore, the simulations indicated that leatherbacks could maintain a stable population only if both juvenile and adult survivorship remained high, and that if other life history stages (i.e. egg, hatchling, and juvenile) remained static.

3.12.3 Trophic Interactions

Leatherback turtles feed predominately on jellyfish and other large planktonic species (siphonophores and salpae) in temperate and boreal latitudes (NMFS and USFWS 1998). There is little information available on their diet in subarctic waters. To a large extent, the oceanic distribution of leatherback turtles may reflect the distribution and abundance of their planktonic prey. Adult leatherbacks do not have many natural predators although killer whales are known to eat adult leatherbacks off the coast of Mexico (Sarti et al. 1996). Nestling and juvenile turtles fall prey to a host of bird, mammal, and fish species throughout their range, especially coastal and pelagic sharks.

3.12.4 Past/Present Human Effects and Management Actions

Direct Mortality: Harvest and Other Intentional Take

Nesting on open, sandy beaches, leatherback turtles are susceptible to a number of human activities including beachfront development that results in habitat loss. In some areas, adults are taken for meat and oil. The poaching of eggs from nests continues in many areas including the U.S. Virgin Islands and Puerto Rico. On some beaches, nearly 100 percent of the eggs laid have been harvested. Many of these eggs end up on the black market for sale as aphrodisiacs. The setting of "large mesh nets suitable for turtling" is common in the waters off Puerto Rico. Although the practice was outlawed in 1984, it still continues illegally. The nets are intended for hawksbills and green turtles, but leatherbacks occasionally become entangled (NMFS and USFWS 1998).

Direct and Indirect Effects of External Fisheries

Leatherback turtles have been strongly impacted by commercial fisheries. The primary threats are entanglement in fishing gear (e.g., driftnets, longlines, lobster pots, weirs), boat collisions, contamination by oil spills, and ingestion of marine debris (Eckert 1996, Spotila et al. 1996, NMFS and USFWS 1998). Although some driftnet fisheries, particularly shrimp trawlers, are required to use Turtle Exclusion Devices, leatherbacks are too big for most commercially available devices and are drowned in nets even if they are equipped with Turtle Exclusion Devices. A conservative estimate of annual leatherback fishery-related mortality (from longlines, trawls, and gillnets) in the Pacific during the 1990s was 1,500 animals (Spotila *et al.* 2000). This mortality rate is estimated to represent about a 23 percent mortality rate (or 33 percent if most mortality was focused on the east Pacific population). Based on recent modeling efforts, the leatherback turtle population cannot withstand more than a one percent human-related mortality level, which translates to 150 nesting females (Spotila *et al*. 1996; Spotila, personal communication). The model simulations indicated that leatherbacks could maintain a stable population only if both juvenile and adult survivorship remained high, and that if other life history stages (i.e., egg, hatchling, and juvenile) remained static. Characterizations of this population suggest that it has a very low likelihood of survival and recovery in the wild under current conditions.

Direct and Indirect Effects of the BSAI/GOA Groundfish Fisheries

In the FMP BiOp (NMFS 2000), NOAA Fisheries noted that the GOA groundfish FMP area is at the extreme edge of the leatherback turtle's historic range. They occur generally as stranded animals along the coastlines of southeast Alaska and are not considered to be frequent visitors to the GOA fishing grounds or found in the BSAI FMP area at all. According to NOAA Fisheries, there have been no direct takes of leatherbacks in the commercial fisheries in the BSAI and GOA. NOAA Fisheries has no information to assess the potential competition or cascade effects of the fisheries on the trophic level of leatherbacks, either positively or negatively. There is no fishery that is targeting the prey of this species. NOAA Fisheries concluded that the direct and indirect effects of commercial fisheries in the BSAI and GOA on leatherback turtles are negligible

and not likely to jeopardize its survival or recovery (NMFS 2000).

3.12.5 Comparative Baseline

Leatherback turtle populations are in serious decline around the world, largely due to many human-related sources of mortality. All of them must be addressed if this species is to recover from the brink of extinction (NMFS and USFWS 1998). Although some commercial fisheries have played a major role in the decline of this species, NOAA Fisheries has concluded that the BSAI and GOA groundfish fisheries have negligible effects, if any, on the species (NMFS 2000).

3.13 Short-tailed Albatross

3.13.1 Listing Status

The short-tailed albatross was originally designated as endangered under the Endangered Species Conservation Act of 1969 on the list of foreign-listed species. In 1973, when the ESA replaced the 1969 Act, the short-tailed albatross was included as a foreign species but not as a native species, thus the listing noted it as endangered, except in the United States. The USFWS corrected this administrative error by extending the species endangered status to include its range within the United States. The proposed and final rules contain detailed information on the species' life history, demographics, and population status. Despite the listing oversight, the short-tailed albatross has been protected in the EEZ since its 1970 listing.

3.13.2 Population Status and Trends

At the beginning of the 20th century, the species' numbers declined to near extinction, primarily as a result of hunting at the breeding colonies in Japan. Albatross were killed for their feathers and various other body parts. The feathers were used for writing quills; their bodies were processed into fertilizer; their fat was rendered; and their eggs were collected for food (USFWS 2003).

Currently, breeding-age population estimates come primarily from egg counts and breeding bird observations. The most recent estimates indicate there are 267 nesting pairs (or 534 breeding adults) present on Torishima (USFWS 2003), and about 100 breeding adults on Minami-kojima (USFWS 2003). A total worldwide estimate for breeding birds at the end of the 2002-03 breeding season is therefore 634. It has been noted that an average of approximately 20 percent of breeding adults may not return to breed each year. It is reasonable, therefore, to estimate that approximately 126 additional breeding-age birds may not be observed on the breeding grounds. The worldwide estimate of breeding-age birds is therefore 760 (USFWS 2003).

Estimates of immature birds are more difficult to calculate because these individuals do not congregate between fledging and returning to breed at approximately 6 years of age. An estimate can be calculated by totaling the number of known fledged chicks in the last 6 years, and the average post-fledging juvenile survival rate (USFWS 2003). As noted in the USFWS' Programmatic FMP BiOp, some 926 chicks were fledged from the Tsubamesaki colony on Torishima from 1997 through 2003. Given an average post-fledging juvenile survival rate of 94 percent, there are now an estimated 870 birds in the immature population from Torishima Island. Researchers (USFWS 2003) estimate the population at Minami-kojima to be approximately 200 birds. Subtracting the estimated number of breeding adults on Minami-kojima from this total number results in an estimated immature population of 100 individuals. Combining the estimated number of immature birds from Torishima Island and the estimated number of immature birds from Minami-kojima yields a worldwide immature population estimate of 970 individuals. This would indicate a current total world population of approximately 1,730 short-tailed albatross individuals, at the end of the 2003 breeding season. No numerical estimates of uncertainty are available for this figure.

Observed population growth rates are determined by annual increases in adults observed, eggs laid, and chicks fledged on Torishima Island. The population at Torishima is growing at a rate between 6.5 percent and 8.0 percent (USFWS 2003).

3.13.3 Trophic Interactions

Albatross seize small fish (e.g., larval and juvenile pollock and sablefish), squid, and zooplankton from the surface of the water or just below it. Short-tailed albatross forage along the edge of the continental shelf and on the outer shelf where upwelling brings their prey to the surface. They may forage at night as well as in daylight (Sherberne 1993). Since they range widely over the ocean and are opportunistic feeders, their diet

varies with local availability. Albatross are attracted to fishery wastes released from fishing vessels and processors and are thus vulnerable to being caught in fishing gear, especially on baited hooks in the longline fisheries.

3.13.4 Past/Present Human Effects and Management Actions

This section describes past and present human effects on short-tailed albatross and management actions that have been taken to reduce the effect of anthropogenic effects related to the groundfish fisheries. A complete discussion of the past/present human effects and management actions are presented in Section 3.7.4 of the Programmatic SEIS.

Direct Mortality from Incidental Take in External Fisheries

In general, seabirds are vulnerable to becoming entangled in derelict fishing gear. The magnitude of the impact on short-tailed albatross is unknown. It has been reported that three to four birds per year on Torishima come ashore entangled in derelict fishing gear, some of which die as a result. There is no additional information on the potential effects of fisheries near Torishima on the species. Lost or abandoned fishing gear could be a threat to the species throughout its range and is not restricted to the breeding colony around Torishima.

The issue that has received the most attention is the incidental take of short-tailed albatross on the baited hooks of longline fisheries throughout their range. Although short-tailed albatross are likely taken in several international fisheries, there is no quantitative information available on the numbers of birds taken. This situation is the result of several factors: relatively few fishermen can identify rare species of seabirds (especially subadult plumages), there is no international reporting center, and very few fishing vessels have trained observers on board to monitor seabird incidental take. The lack of reliable data is problematic for effective mitigation management in external fisheries.

The Pacific halibut fishery, managed by the International Pacific Halibut Commission (IPHC) and regulated by NOAA Fisheries, sets millions of hooks each year but does not have an observer program. Under the authority of the ESA, the USFWS has required NOAA Fisheries to investigate all options for monitoring the incidental take of short-tailed albatross in the Pacific halibut fishery in waters off Alaska and to institute appropriate changes to the fishery as a result of its investigation. NOAA Fisheries has contracted with the IPHC to carry out this research and make recommendations for management actions. The IPHC is evaluating the use of video as a monitoring tool, with cost comparison to deploying observers.

Direct Mortality from Incidental Take on Groundfish Longlines

Seven short-tailed albatross were reported to have been taken incidental to Alaska fisheries since 1983 (Programmatic SEIS Table3.7-11), six from vessels using hook-and-line gear. For most seabird species, NOAA Fisheries uses sampling statistics to extrapolate the numbers of seabirds incidentally caught in the entire fishery from the portion of the fleet covered by the Observer Program. However, since they are so scarce, it is difficult to use sampling statistics to estimate short-tailed albatross abundance with any certainty. Until 1995, no short-tailed albatross had even been documented in an observer sample. At the February 1999 NPFMC meeting, the Science and Statistical Committee stated in its minutes that " . . . Because incidental catch is so small, estimation of the total take of short-tailed albatross is problematic. Uncertainty exists on how the known take of albatross should be expanded to the unobserved portion of the fishery." In NOAA Fisheries' analysis of the 1993-2001 observer data, only three of the albatross taken were identified as short-tailed albatross and all were from the BSAI region. Of the albatross taken, not all were identified. Analysis of 1993-2001 data resulted in an estimated average of one short-tailed albatross being taken annually in the BSAI groundfish longline fishery and zero short-tailed albatross taken annually in the GOA longline fishery.

The incidental take threshold, as established by the USFWS, is based on the actual reported takes of short-tailed albatross and not on extrapolated takes.

The uncertainty in estimating actual numbers of short-tailed albatross taken, combined with their endangered species status, places a great deal of importance on avoiding seabird bycatch in general, and particularly in longline fisheries. Fishermen have an interest in reducing or eliminating the accessibility of their bait to seabirds since any hook that has caught a seabird or had its bait stolen is not available to catch fish. However, no single technique can be applied to all fishing vessels and gear types and whatever technique is used has to meet basic safety standards and not hinder the deployment or retrieval of fishing gear. In conjunction with the USFWS, NOAA Fisheries recommended a series of seabird protection measures to NPFMC. In 1997, NPFMC reviewed these measures and requested that NOAA Fisheries enact regulations requiring longliners to use at least one of several different options to avoid incidental seabird takes. Within a range of criteria, fishermen were allowed to experiment with different techniques to determine the best deterrence methods for their gear (see PSEIS Section 3.7.1). NOAA Fisheries then began to measure the effectiveness of various seabird avoidance measures through changes in the Observer Program which required observers to gather data on the techniques used and their effectiveness in avoiding seabird take. Data collection was expanded in 1999 and 2000 to incorporate more detailed information about the frequency of measures used during a fishing trip and specific characteristics of different avoidance measures.

The seabird avoidance measures implemented in 1997 did not prevent additional takes of short-tailed albatross. Two short-tailed albatross were taken in late September 1998 in the BSAI Pacific cod fishery and both vessels that hooked these birds were using the required seabird avoidance devices. However, the regulations do not include performance standards and, even though they were technically in compliance, reports from observers on these vessels indicated that the avoidance gear was set in a very ineffective configuration. There was a great deal of concern within the fishing industry at that point because they were close to reaching the incidental take threshold of four birds within a two-year period established by the USFWS. Exceeding this threshold would have required an immediate ESA Section 7 consultation with the USFWS to review the seabird protection measures. One possible, yet remote, outcome was that the fishery would have to close until new measures were in place, regardless of the economic impact. This concern prompted the longline industry to petition NPFMC to revise the existing seabird protection measures for the longline fisheries in the BSAI and GOA. At its April 1999 meeting, NPFMC recommended revising the existing regulations to make the most effective techniques mandatory. They also recommended that NOAA Fisheries undertake a comprehensive scientific study to test the effectiveness of these different techniques. The Washington Sea Grant Program conducted this study in 1999 and 2000 in the IFQ halibut and sablefish fishery and in the BSAI Pacific cod freezer-longliner fishery, with funding by NOAA Fisheries and the USFWS and substantial support from the Observer Program and the longline industry. This research was carried out with the active cooperation and participation of the fishing industry to make sure that the techniques developed would meet with safety and "fishability" requirements.

The final report from the Washington Sea Grant study (Melvin *et al.* 2001) indicates that use of paired streamer lines (with specified parameters) effectively eliminated all bycatch of Laysan albatross and northern fulmar without impacting catch rates of target species. While the study participants took special precautions when short-tailed albatross were sighted and none of these birds were caught during the study, the dramatic reduction of incidental take of similar-feeding species with the use of paired streamer lines indicates that the risk of incidental take to the endangered species would be greatly reduced if this avoidance measure was widely adopted. The use of single streamer lines was almost as effective as the paired streamer lines for overall seabird bycatch avoidance but Laysan albatross were caught five times as frequently with single versus paired streamer lines. The study concluded that the risk of hooking albatrosses, including short-tailed albatross, remains when only single streamer lines are used. Based on the results of their research (Melvin *et al.* 2001), the Washington Sea Grant Program, the USFWS, and NOAA Fisheries jointly recommended changes to the existing seabird avoidance, regulations required in the groundfish and halibut hook-and-line

fisheries off Alaska. At its October and December 2001 meetings, NPFMC reviewed these recommendations, made some changes, and requested that NOAA Fisheries implement the necessary regulations. (See Programmatic SEIS Section 3.7.1) The longline fleet has been very proactive in adopting these techniques and most vessels may have been in compliance in advance of finalization of the new regulations.

Direct Mortality from Vessel Strikes

Many trawl vessels deploy a cable ("third wire") from the vessel to the trawl net monitoring device (sonar transducers). There are 16 records of birds striking the "third wire" in the Observer Notes Database. These incidents involved 79 birds, mainly fulmars and Laysan albatross, with approximately 90 percent mortality (NMFS 2002, Ecosystems Considerations for 2003 report). However, these cables are not typically monitored by groundfish observers and any birds killed by such collisions would not be likely to make their way into the trawl net and would therefore not be recorded in observers' haul samples. The distribution and extent of seabird mortalities or injuries by species is therefore unknown. NOAA Fisheries' Alaska Fishery Science Center is currently pursuing the possibility of using video technology to evaluate this issue. At present, NOAA Fisheries and the USFWS are trying to determine if vessel strikes pose a threat to short-tailed albatross. Solutions may be as simple as hanging streamers from the third wire (NMFS 2004).

3.13.5 Comparative Baseline

Short-tailed albatross were nearly exterminated by commercial hunting about 100 years ago but are making a comeback. The population appears to be increasing at a near-maximum rate. The short-tailed albatross is an extremely rare species with an estimated population of only 1,600 to 1,700 birds and is listed as "endangered" under the ESA. The need to protect this species from all sources of human-induced mortality has driven a great deal of research and regulation of seabird-fisheries interactions in the BSAI and GOA. The institution of mandatory seabird protection measures for longliners in 1997 did not eliminate incidental take of this species but no incidental takes have been reported since September 1998. Recent scientific research indicates that new seabird avoidance techniques can greatly reduce the incidental take of species with feeding behavior similar to short-tailed albatross. Seabird avoidance regulations were implemented in 2003 for the groundfish longline fleet. The past/present effects on short-tailed albatross are summarized in the Programmatic SEIS in Table 3.7-12 (NMFS 2004).

3.14 Steller's Eider

3.14.1 Listing Status

Need Steller eider text

3.14.2 Population Status and Trends

There are two geographical populations of Steller's eiders, one that winters in the North Atlantic Ocean and one in the Pacific. Most of the Pacific population inhabits the maritime tundra of northeast Siberia (Solovieva 1997), and a smaller population nests in Alaska on the Yukon-Kuskokwim Delta (Flint and Herzog 1999) and the arctic coastal plain (USFWS 1999). The Pacific population winters primarily along the Alaska Peninsula, from the eastern Aleutian Islands to southern Cook Inlet, in shallow nearshore waters (Palmer 1976). In spring, large numbers concentrate in Bristol Bay before migration. Along open coastline, Steller's eiders usually remain within about 400 m (1/4 mile) of shore in water less than 10 m (30 ft) deep, but they can also be found in waters well offshore in shallow bays and lagoons or near reefs (USFWS 1997, USFWS 2000).

Estimating the Steller's eider breeding population in Alaska is problematic, due to the low counts and high variation in counts between years during systematic surveys. Hodges *et al*. (1996) note that the population size of eiders (*Polysticta stelleri* and *Somateria* spp.) on the Yukon-Kuskokwim Delta (not including the Arctic Coastal Plain) had declined by 90 percent since 1957. For the 1950s and early 1960s, the upper limit of the population, excluding the North Slope, had been estimated at 3,500 pairs (Kertell 1991). Kertell noted, however, that the population may have been smaller due to the potential restriction of nesting Steller's eiders to specific habitats. Kertell (1991) concluded that the Steller's eider had been extirpated from the Yukon-Kuskokwim Delta.

3.14.3 Trophic Interactions

Steller's eiders spend the majority of the year in shallow, near-shore marine waters where they feed by diving and dabbling for clams, polychaete worms, snails and amphipods (Petersen 1980, USFWS 1997). They are opportunistic feeders and will modify their diet according to what is available. A diet study of Steller's eiders conducted in Nelson Lagoon from April to October in 1977 and 1979 indicated that bivalves and amphipods were the primary food items, specifically blue mussels (*Mytilus edulis*), clams (*Macoma balthica*), and gammarid amphipods (Petersen 1981). In freshwater, they commonly feed on insect larvae.

3.14.4 Past/Present Human Effects and Management Actions

This section describes past and present human effects on Steller's eider and management actions that have been taken to reduce the effect of anthropogenic effects related to the groundfish fisheries. A complete discussion of the past/present human effects and management actions are presented in Section 3.7.10 of the Programmatic SEIS.

Direct Mortality from Incidental Take in Groundfish Fisheries

No Steller's eider takes have been recorded in the groundfish fisheries. Steller's eiders are not likely to be taken by the BSAI and GOA groundfish fisheries because they are not attracted to fishing vessels and prefer to forage in nearshore waters. The one area where there is regular overlap of the fishery and the eiders involves the yellowfin sole bottom trawl fishery in the northern portion of Kuskokwim Bay and this fishery only involved two vessels in 2001.

Indirect Effects through Changes in Prey Availability

There is no direct competition with Steller's eiders for species targeted by the groundfish fisheries, thus any potential impacts on Steller's eider prey availability would result from ecosystem-level mechanisms. Non-specific changes in the marine ecosystem have been cited as a possible cause of the Steller's eider decline, but whether those changes were brought about by natural or anthropogenic factors is not known (USFWS 1997). No studies have been made to determine if the yellowfin sole fishery in Kuskokwim Bay or any other area directly affects prey availability or habitat used by the eiders.

Indirect Effects through Contamination by Oil Spills and other Toxic Compounds

The concentration of Steller's eiders during molting and migration makes them particularly susceptible to localized oil spills in those situations. The USFWS has recommended several measures to minimize the chances of such spills occurring in eider critical habitat (USFWS 1999a).

3.14.5 Comparative Baseline

No reliable overall population estimates are available but there appear to be over 100,000 Steller's eiders nesting in Russia. Steller's eiders were listed as threatened under the ESA in 1997 due to major declines in their Alaska breeding populations. Although there appears to be no direct competition for prey and very little spatial/temporal overlap with the groundfish fisheries and marine waters used by Steller's eiders, the contribution of the fishery to changes in the marine environment has been cited as one of several possible reasons for the declining population. Specific evidence of adverse impacts from Alaska groundfish fisheries has not been demonstrated.

3.15 Steller Sea Lion Critical Habitat

NOAA Fisheries published a final rule to designate critical habitat for the threatened and endangered populations of Steller sea lions (August 27, 1993; 58 FR 45269). Section 3.2 in the 2001 BiOp (NMFS 2001) provides a thorough description of the areas designated as critical habitat for Steller sea lions and the features of these areas that make them essential for the conservation of the species. The FMP BiOp (NMFS 2000), the SEIS prepared for the Steller sea lion protection measures (NMFS 2001a), and the 2001 BiOp and its Supplement (NMFS 2001 and NMFS 2003), discuss the effects of the BSAI and GOA groundfish fisheries on Steller sea lion designated critical habitat. These discussions are incorporated here by reference.

Chapter 4 Effects of the action on listed species

NOAA Fisheries has examined the effects of authorizing the groundfish fisheries of the BSAI and GOA under the current FMPs on listed species and their designated critical habitat in several previous ESA section 7 consultations (see Section 1.2). Despite recent consultations on the groundfish fishery FMPs, re-initiation of formal consultation is required if (a) the amount or extent of taking specified in the incidental take statement is exceeded; (b) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; ©) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the BiOp; or (d) a new species is listed or critical habitat designated that may be affected by the identified action. In this section, NOAA Fisheries will evaluate whether any of the criteria for re-initiation of formal consultation are met.

Has the amount or extent of taking specified in the incidental take statement been exceeded?

Section 9 of the ESA and federal regulation pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the reasonable and prudent measures and terms and conditions of the ITS.

The FMP BiOp issued an ITS for taking of Steller sea lions and chinook salmon incidental to the BSAI and GOA groundfish fisheries. The ITS authorized the direct taking of 30 and 15 Steller sea lions incidental to BSAI and GOA fisheries, respectively. Indirect takings were described as being impossible to quantify but were opined to have been mitigated through the implementation of the RPA (which was later replaced by the SSLPM). Overall chinook salmon bycatch was limited to 55,000 salmon in the BSAI fisheries and 40,000 salmon in the GOA fisheries. These bycatch levels were determined to likely result in negligible impacts to listed salmon stocks even though stock origin could not be identified. Non-discretionary reasonable and prudent measures were prescribed to the agency and the authorizations were conditioned with monitoring requirements for the calculation of statistically robust incidental take estimates.

Incidental take of short-tailed albatross was not authorized in the USFWS' FMP BiOp (USFWS 2003) as it was determined that the USFWS could not anticipate all circumstances related to continued implementation of FMPs, including programmatic actions or individual actions that might be developed in the future, that may involve take of short-tailed albatross. Exemption of take of short-tailed albatross and Steller's eider was deferred to future federal actions that fall under the FMP umbrella. The USFWS completed a BiOp on the effects of the TAC-setting process for the GOA and BSAI groundfish fisheries on the endangered short-tailed albatross and threatened Steller's eider (USFWS 2003a), which contained an ITS for short-tailed albatross. This ITS authorized up to four short-tailed albatross over a two-year period in the BSAI and GOA longline fisheries. The ITS also authorized the take of up to two short-tailed albatross in BSAI/GOA trawl fisheries over the life of the BiOp.

The most recent data indicate that the number of incidental direct takes of Steller sea lions is well below the number authorized in the 2000 ITS. The Draft 2003 Marine Mammal Stock Assessment Report (SAR) at: http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars_draft.html) estimates the combined take of Steller sea lions incidental to BSAI and GOA groundfish fisheries as 11 animals in 2001 (Figure 4.1)(direct takes incidental to GOA trawl fisheries have not been included in this total, though the total direct take of Steller sea lions was zero animals in 1999 and 2000)(Angliss and Lodge 2003).

Table 4-1. Estimates of chinook salmon caught incidental to BSAI and GOA groundfish fisheries, 2001 through 2003. Annual salmon catches incidental to BSAI and GOA groundfish fisheries can be found at http://www.fakr.noaa.gov/sustainablefisheries/catchstats.htm.

Year	BSAI	GOA
2001	37,734	15140
2002	37,465	12290
2003	44,767	15435

The incidental take of short-tailed albatross in the longline and trawl fisheries has never exceeded the amount of take authorized in USFWS' TAC-Setting BiOp (USFWS 2003a). The best available information indicates that the total take of short-tailed albatross in the GOA and BSAI longline fisheries is two per year (USFWS 2003). NOAA Fisheries is required to re-initiate formal consultation with the USFWS in the event that the level of authorized incidental take is reached.

Based on this information, the extent of taking of Steller sea lions, chinook salmon, and short-tailed albatross authorized in the ITS in the FMP BiOp has not been exceeded. The PA is not expected to modify the management of the groundfish fisheries or fishing practices to cause increases in incidental take. Each change in the FMP or regulations will be further analyzed to determine the expected change in take.

Table 4-2. Summary of incidental mortality of Steller sea lions (western U. S. stock) due to commercial fisheries from 1996 through 2001 and calculation of the mean annual mortality rate. Mean annual mortality in brackets represents a minimum estimate from self-reported fisheries information. Data from 1997 to 2001 (or the most recent 5 years of available data) are used in the mortality calculation when more than 5 years of data are provided for a particular fishery. Modified from Angliss *et al.* (2003).

Fishery name	Years	Data type	Range of observer coverage	Observed mortality (in given years)	Estimated mortality (in given years)	Mean annual mortality
BSAI Groundfish Trawl	1997-2001	Observer	62 to 77%	6, 6, 8, 6, 7	10, 9, 9, 7, 11	9.6 (CV = 0.10)
Gulf of Alaska Groundfish Trawl	1996-2000	Observer	33 to 55%	0, 0, 1, 0, 0	0, 0, 3, 0, 0	0.6 (CV = 0.6)
GOA Groundfish Longline	1997-2001	Observer	11to 14%	0, 0, 0, 1, 0	0, 0, 0, 6, 0	1.2 (CV = 0.9)

Does new information reveal effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered?

In the 2000 FMP BiOp, NOAA Fisheries concluded that, based on the information available, the BSAI and GOA groundfish fisheries were not likely to have significant impacts or interactions with large cetaceans, Pacific salmon, or leatherback turtles (NMFS 2000). Informal section 7 ESA consultations on FMP amendments since the FMP BiOp have maintained that the BSAI and GOA groundfish fisheries are not likely to have significant impacts on listed whales, salmon, or turtles and formal consultations on subsequent FMP and regulatory amendments have been re-initiated for Steller sea lions only. To date, NOAA Fisheries possesses no new information that would change the conclusion of the 2000 FMP BiOp regarding effects of the action on listed whales, salmon or turtles.

Due to the continued decline of Steller sea lions and the uncertainty surrounding the cause of their decline, intensive research programs have focused and continue to focus on the biology, ecology, and population dynamics of Steller sea lions. Research efforts during most of the 1990s were guided by recommendations contained in the Steller Sea Lion Recovery Plan (NMFS 1992). Steller sea lion research funding for federal agencies during this period was <$1 million annually, of which over half was required for population monitoring surveys. During the late 1990s, Steller sea lion research activities were intensified as recent scientific findings, litigation, and new legislation focused increasing attention on the ongoing decline and concern over possible impacts by commercial fisheries in Alaskan waters. Due to this renewed attention, funding increased seven-fold between 2000 and 2001, with over 125 individual projects planned or implemented. A wide spectrum of research entities are engaged in these studies, including federal and state agencies, universities and non-governmental research organizations (Ferrero and Fritz 2002). The evolution of Steller sea lion research over the past two decades is described in a NOAA Technical Memorandum (Ferrero and Fritz 2002) which can be viewed at: http://www.afsc.noaa.gov/Stellers/NOAA-TM-AFSC-129.pdf. As a result of the intensive Steller sea lion research program, new information is continuously being made available.

NOAA Fisheries constantly monitors new information and research developments on Steller sea lions to assess, among other things, the impacts of the BSAI and GOA groundfish fisheries on Steller sea lions. Since the completion of the FMP BiOp, NOAA Fisheries completed a formal section 7 consultation on the effects of groundfish fisheries on Steller sea lions. Consultation was re-initiated due to changes to the proposed Federal action and new information on Steller sea lion foraging behavior (NMFS 2001). NOAA Fisheries prepared a supplement to the 2001 BiOp in June of 2003 which considered all new information available at that time. New information presented in that supplement included harvest data from the 2002 fisheries that were conducted with the Steller sea lion protection measures in place; spatial and temporal analyses of 2001 and 2002 pollock distributions (Barbeaux and Dorn 2003); 2002 fishery stock assessments (Dorn *et al*. 2002); new information on sea lion diving behavior and physiology (Burns *et al*. 2003; Loughlin *et al*. 2003); estimates of sea lion food requirements (Winship *et al*. 2002; Winship and Trites 2003); new sea lion telemetry data analyses; recent assessments of the hypotheses for the continued decline of Steller sea lions (Hennen 2003; National Research Council 2003; Trites and Donnelly 2003); updated information on Steller sea lion diets (Sinclair and Zepplin 2002; Trites *et al*. 2003); and updated information on Steller sea lion distribution and abundance (Sease and Gudmondson 2002; Sease and York *in press*). Since the completion of the Supplement, there is no new information available to NOAA Fisheries that reveals additional effects of the BSAI and GOA groundfish fisheries, conducted under the proposed action, that may affect Steller sea lions or their designated critical habitat in a manner or to an extent not previously considered.

Currently, the Steller Sea Lion Recovery Team is preparing a revised Recovery Plan which will incorporate all new information on Steller sea lions and information linked to the hypothesized causes for their continued decline. Formal consultation may be re-initiated at a future date based on the Recovery Team's assessment of the new information and their recommendations to NOAA Fisheries. Information about the Steller sea lion recovery team can be found on the internet at: http://www.fakr.noaa.gov/protectedresources/stellers/recovery_team.htm.

The USFWS' 2003 BiOps (USFWS 2003, USFWS 2003a) contain the most current information on the effects of the groundfish fisheries on the endangered short-tailed albatross and the threatened Steller's eider. NOAA Fisheries is committed to monitoring and researching the most effective sea bird avoidance measures to ensure that the most effective regulations aimed at reducing incidental take of listed seabirds are implemented.

Is the identified action modified in a manner that causes an effect to the listed species or critical habitat that was not considered in previous BiOps?

Background: NOAA Fisheries Managed Species

The FMP BiOp (NMFS 2000) considered the authorization of groundfish fisheries in the BSAI under the FMP for the groundfish of the BSAI and the authorization of groundfish fisheries in the GOA under the FMP for groundfish of the GOA. The opinion was comprehensive in scope and considered the fisheries and the overall management framework established by the respective FMPs to determine whether that framework contained necessary measures to ensure the protection of listed species and their critical habitat. This BiOp concluded that the interpretation and implementation of the FMPs were likely to jeopardize the continued existence of Steller sea lions and adversely modify their designated critical habitat. NOAA Fisheries implicated the following FMP components as contributing to the "jeopardy and adverse modification" determination: 1) the "global harvest control rule" (which allowed for significant variation below the $F_{40\%}$ target biomass level, such that, in essence a groundfish stock could be reduced to a level that only 2 percent of the unfished biomass remained); 2) disturbance resulting from fishing and other vessel traffic around Steller sea lion rookeries and haulouts; 3) the temporal concentration of fishing effort for pollock, Pacific cod, and Atka mackerel; and 4) the spatial concentration of fishing effort for pollock, Pacific cod, and Atka mackerel.

The objective of the Steller sea lion protection measures was to remedy the components of the regulations that were likely to jeopardize the continued existence of Steller sea lions and adversely modify their designated critical habitat. The Steller sea lion protection measures provided an alternative management strategy to the RPA in the FMP BiOp. These protection measures included a modified global harvest control rule; closure of all vessel transit around 37 rookeries and complete groundfish fishing closures around 39 rookeries to a distance of 3nm; fishery specific closures around rookeries and haulouts for all pollock, Pacific cod, and Atka mackerel fisheries; and fishery-specific seasons and catch apportionments for the pollock, Pacific cod, and Atka mackerel groundfish fisheries.

The Steller sea lion protection measures and the American Fisheries Act (amendments 61/61) resulted in substantial changes to the fisheries, which when coupled with new information on Steller sea lion foraging distributions, resulted in re-initiation of formal consultation (NMFS 2001; NMFS 2003). As stated above, the 2001 BiOp concluded that the interpretation and implementation of the groundfish FMPs as modified by these amendments, would not likely jeopardize the continued existence of Steller sea lions or adversely modify their designated critical habitat (NMFS 2001). The Supplement (NMFS 2003) included further background information and compared the 2002 fishery pattern with the Steller sea lion protection measures in place to the 1999 "pre-protection measure" fishery pattern. These analyses revealed that some measures were more effective at relieving spatial and temporal overlap with Steller sea lions than others. The overall conclusion was that the net effect of the protection measures resulted in a more conservative fishing pattern than the1999 fishing pattern; and was even more so when cast in light of the new telemetry data which suggests a highly disproportionate amount of sea lion foraging in the nearshore areas of critical habitat (NMFS 2001; NMFS 2003) and a large displacement of the fisheries to the critical habitat zones further offshore. The conclusions in the 2003 Supplement supported NOAA Fisheries' conclusions in the 2001 BiOp.

Background: USFWS Managed Species

In September of 2003, the USFWS completed a programmatic BiOp on the FMPs for the groundfish fisheries of the BSAI and GOA and a project-level BiOp on the TAC-setting process used to set harvest levels for these fisheries. Formal consultation was initiated for the endangered short-tailed albatross and the threatened Steller's eider as the groundfish fisheries may adversely affect these species.

Primary impacts of the fisheries on short-tailed albatross result from direct take in longline fisheries that occurs when the birds pursue baited hooks, become entangled, and drown. However, the incidence of short-tailed albatross takes in the longline fisheries is rare. Since 1993, there have been five reported takes of short-tailed albatrosses in Alaska's fisheries. Though not as likely, the potential exists for incidental take of short-tailed albatross in trawl fisheries. As stated in the Programmatic BiOp (USFWS 2003), the probability of short-tailed albatross collisions with trawl vessel gear in Alaskan waters cannot be assessed; however, given the available observer information and the observed at-sea locations of short-tailed albatross relative to trawling effort, the possibility of such encounters cannot be discounted.

Potential adverse impacts of the groundfish fisheries on Steller's eider are likely to result from contamination from oil spills. Potential impacts would result from both direct oil exposure to the birds and from petroleum being trapped in the sediment in which the eiders forage.

The BiOps (USFWS 2003, USFWS 2003a) concluded that implementation of the programmatic BSAI and GOA groundfish fisheries and the process of setting the TAC, is not likely to jeopardize the continued existence of endangered short-tailed albatrosses or threatened Steller's eiders or destroy or adversely modify their designated critical habitat.

Modifications to the Action: The Preferred Alternative

Given this background, NOAA Fisheries must evaluate whether the PA in the Programmatic SEIS would modify the FMPs in a manner that causes effects to listed species or to critical habitat that was not considered in previous BiOps. According to the description of the PA, Secretarial approval of the PA would result in a plan amendment to BSAI FMP Section 3.2 (Goals for Management Plan) and GOA FMP Section 2.1 (Goal and Objectives for Management of Gulf Groundfish Fisheries). There would be no immediate changes to any other part of the FMPs or their implementing regulations beyond the continuing authorization.

Since adoption of the original FMP for the GOA in 1979 and the BSAI in 1981, understanding of marine ecosystems and the schools of thought regarding how they should be managed have changed considerably. Greater emphasis has been placed on ecosystem management and the importance of preserving biological diversity, food webs, and community structure rather than on managing for sustainability on a single species basis. Management paradigms have shifted to be more responsive to new information and to incorporate cautionary measures when information is lacking or uncertainty is high.

The management approach and the objectives in the PA reflect a conservative precautionary approach to fisheries management and communicate a policy direction for the future. This management approach has, in recent years, been labeled the precautionary approach. As part of the PA, measures will be considered and adopted, as appropriate, which accelerate the precautionary adaptive management approach through community or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and, where appropriate and practicable, increased habitat protection and bycatch constraints. The objectives of this alternative are listed in Section 2.6.

Generally speaking, modifications to the policy statement and subsequent FMP management measures identified in the PA in the Programmatic SEIS improve upon status quo conditions for listed species and their designated critical habitat. For example, the original policy objectives for the BSAI and GOA FMPs make general mention of protecting the marine environment whereas the policy objectives in the PA state the conservation of protected species as explicit policy objectives. Examples of specific policy objectives that improve upon status quo with regard to the conservation of listed species include:

Prevent Overfishing

Objective 4. Initiate a scientific review of the adequacy of $F_{40\%}$ and adopt improvements as appropriate.

Preserve Food Web

Objective 10. Develop indices of ecosystem health as targets for management.

Objective 11. Improve the procedure to adjust ABCs as necessary to account for uncertainty and ecosystem factors.

Manage Incidental Catch and Reduce Bycatch and Waste

Objective 14. Continue and improve current incidental catch and bycatch management program.

Avoid Impacts to Seabirds and Marine Mammals

Objective 24. Encourage programs to review status of endangered or threatened marine mammal stocks and fishing interactions and develop fishery management measures as appropriate.

While they improve upon the status-quo FMP policy statements and objectives, the policy statements themselves lack specific management measures that can be used to evaluate the action for potential effects on listed species. NOAA Fisheries used the example FMP bookends, which are described in Section 4.2 of this document, to evaluate the potential effects of the PA on listed species.

The following table shows the FMP elements that would and would not be modified according to each bookend described for the preferred FMP framework and lists if the effects to listed species anticipated for each management measure a) have been previously considered in a formal consultation; b) have not been previously considered but are not likely to adversely affect listed species or their designated critical habitat; c) are insignificant; or d) unknown due the general description of the modified management measure. If the effects are unknown, the recommendation is to assess the action in the future when specifics are known.

Table 4-3. Example FMP "bookends" to show a potential range of management measures under the preferred alternative. This table compares potential changes to FMP measures under the example FMP bookends to the status quo FMP. Elements described as "unchanged" indicate that changes to that FMP component are not expected under the example FMP. This table shows whether components of the example FMPs would be expected to have effects on listed species, the nature of the effects, and if there are "new" adverse effects that have not been considered in previous BiOps. The following codes apply to reference previous BiOps in this table: [1] FMP BiOp (NMFS 2000); [2] Steller sea lion Protection Measures EIS and/or October 2001 BiOp (NMFS 2001); [3] Supplement to the October 2001 BiOp (NMFS 2003); [4] Programmatic FMP BiOp (USFWS 2003).

		Preferred Alternative (PA)		Effect	
		Fishery Management Plan (FMP) PA.1	**FMP PA.2**	**PA.1**	**PA.2**
TAC-setting process	Acceptable biological catch (ABC) & overfishing level (OFL)	Unchanged.	Unchanged.	Previously considered [1,4].	Previously considered [1,4].
	Total allowable catch (TAC)	Unchanged.	Set TAC =< ABC for all targets and "other spp." category.	Previously considered [1,4].	More precautionary than status quo, Not likely to adversely affect.
	Optimum yield (OY)	Unchanged.	Unchanged.	Previously considered [1].	Previously considered [1].
	B 20 Rule.	Unchanged.	Unchanged.	Previously considered [1, 2].	Previously considered [1, 2].
	Forage Fish	Unchanged.	Unchanged.	Previously considered [1].	Previously considered [1].
	Minimum stock size threshold (MSST)	• Continue to use and improve current harvest control rules to maintain a spawning stock biomass with the potential to produce sustained yields on a continuing basis.	• Initiate analysis of MSSTs for priority stocks based on the timeframe determined by additional availability of required resources taking into account Scientific and Statistical Committee (SSC) comments and concerns. • Improve collection of biological information necessary to determine spawning stock biomass estimates.	Previously considered [1,4]; Improvements to control rules not likely to adversely affect.	Not likely to adversely affect; Assess in future as action dictates.

Table 4-3 (cont.). Example FMP "bookends" to show a potential range of management measures under the preferred alternative.

		Preferred Alternative (PA)		Effect	
		Fishery Management Plan (FMP) PA.1	**FMP PA.2**	**PA.1**	**PA.2**
TAC-setting process (continued)	"Other species," Species complexes, unspecified species	Unchanged.	• Develop criteria for "splitting and lumping" of species in order to have a consistent approach over as wide a range as possible ("other species" rockfish, non-specified, etc.). • Consider breaking sharks and skates and additional groups out of "other species" group for TAC setting. • Develop criteria to bring a non-specified species into a managed category.	Insignificant/no effect.	Insignificant/no effect.
	ABC Tier System	• Conduct $F_{40\%}$ review and adopt appropriate measures as necessary.	• Develop, implement and update as necessary, procedures to account for uncertainty in estimating ABCs, species-specific production patterns, and ecosystem considerations. • Use F_{60} for rockfish as proxy for analysis.	Assess in future as action dictates; $F_{40\%}$ policy considered in FMP BiOp (BiOp) [1].	Assess in future as action dictates.
	Ecosystem Indicators	Unchanged.	• Develop and implement, as appropriate, criteria for using key ecosystem indicators in the TAC setting process. • Use F_{60} for rockfish as proxy for analysis.	Previously Considered [1,4].	Not likely to adversely affect.
	Target species closures	Unchanged.	Unchanged.	Previously considered [1,4].	Previously considered [1,4].
Spatial/ Temporal Management of TAC		• Target species TAC distributed spatially for some Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) species.	No change from PA.1.	Previously considered for major Steller sea lion (SSL) prey species [1, 2, 3].	Previously considered for major SSL prey species [1, 2, 3].

Table 4-3 (cont.). Example FMP "bookends" to show a potential range of management measures under the preferred alternative.

		Preferred Alternative (PA)		Effect	
		Fishery Management Plan (FMP) PA.1	**FMP PA.2**	**PA.1**	**PA.2**
Marine protected (MPAs) and essential fish habitat (EFH)	MPA Process	• Development and adoption of definitions of MPAs, marine reserves, marine fishery reserves, protected marine habitats, etc. • Develop MPA efficacy methodology including program goals, objectives, and criteria for establishing MPAs.	• Consider adopting 0-20 percent of BS, AI, GOA as MPAs and no-take marine reserves.	Not likely to adversely affect; Assess in future as action dictates.	Not likely to adversely affect; Assess in future as action dictates.
	Closures	• Maintain current closed/restricted areas such as Walrus Island closures, red king crab (RKC) Savings Area, Bogoslof, Pribilof Island closures, nearshore Bristol Bay closures, Kodiak Type I-III areas, eastern Gulf of Alaska (EGOA) trawl closures, closures for herring and salmon, Sikta Pinnacles, etc.	• Review all existing closures to see if these areas qualify for MPAs under established criteria. MPAs could include no-take reserves or have gear, fishery, or season-specific restrictions.	Previously considered [1,2].	Assess in future as action dictates.
	EFH and habitat area of particular concern (HAPC)	Unchanged.	• Identify and designate EFC and HAPC (same as PA.1). • Determine extent of adverse effects of fishing, if any. Implement mitigation measures if necessary. • Establish Aleutian Island management area to protect coral/live bottom habitats.	Previously Considered [1].	Not likely to adversely affect; Assess in future as action dictates.
SSL measures	Steller sea lion closures	Unchanged.	• Modify 2002 SSL closures and designation of critical habitat as appropriate scientific information becomes available.	Previously considered [2, 3, 4].	Assess in future as action dictates.
	Aleutian Islands	• Review cumulative impacts of opening new pollock fishery.	• Modify 2002 SSL closures and designation of critical habitat as appropriate scientific information becomes available.	Previously considered [1].	Assess in future as action dictates.

Table 4-3 (cont.). Example FMP "bookends" to show a potential range of management measures under the preferred alternative.

		Preferred Alternative (PA)		Effect	
		Fishery Management Plan (FMP) PA.1	**FMP PA.2**	**PA.1**	**PA.2**
Bycatch and incidental catch restrictions	Prohibited species and catch limits	• Some elements unmodified. • BSAI: Consider reducing prohibited species catch (PSC) limits for herring, crab, halibut, and salmon to the extent practicable. • GOA: Identify Salmon Savings Area and establish PSC limits to manage. • GOA: Establish PSC limits on salmon based on number of fish; establish PSC limits on crab and herring based on biomass or other fishery data. • For those PSC species where annual population estimates exist, explore a mortality rate-based approach to setting limits.	• BSAI: Reduce PSC limits for herring, crab, halibut and salmon to the extent practicable. • GOA: Establish PSC limits on salmon based on number of fish; establish PSC limits on crab and herring based on biomass or other fishery data. • GOA: Consider reducing all PSC by 0 - 10 percent. • BSAI/GOA: For those PSC species where annual population estimates exist, explore a mortality rate-based approach to setting limits.	Effects of various levels of bycatch considered in FMP BiOp [1].	Effects of various levels of bycatch considered in FMP BiOp [1].
	Improved retention/ improved utilization (IR/IU)	• IR/IU for Pollock and Pacific (P.) cod, BSAI - yellowfin and rocksole, GOA - shallow-water flatfish.	Extend to other species as appropriate.	Insignificant effects on listed species.	Insignificant effects on listed species.
	Bycatch restrictions	• Some elements unchanged. • Maintain coop managed >hot spot= closures to control bycatch.	• Incentive program for incidental catch and bycatch reduction, e.g., (a) Individual Bycatch Quota. (b) Harvest Priority (10 percent of TAC reserved to reward clean fishing). ©) bycatch reduction standards established. (d) Coop managed Harvest. Priority (0-10 percent TAC or PSC reserved to reward clean fishing).	Previously considered and/or insignificant [1].	Assess in future as action dictates though not likely to adversely affect.
	Vessel Incentive Program (VIP)	Unchanged.	• Repeal VIP.	Insignificant.	Insignificant.
Bycatch and incidental catch restrictions (cont.)	Closures	Unchanged.	• Evaluate effectiveness of existing closures • Develop appropriate inseason closure areas in GOA to address bycatch of halibut, salmon, and/or crab when PSC cap is reached for that species.	Previously considered [1].	Assess in future as action dictates.

Table 4-3 (cont.). Example FMP "bookends" to show a potential range of management measures under the preferred alternative.

		Preferred Alternative (PA)		Effect	
		Fishery Management Plan (FMP) PA.1	**FMP PA.2**	**PA.1**	**PA.2**
	Inseason bycatch measures	Unchanged.	• Repeal or modify maximum retainable amounts (MRAs) and establish a system of caps and quotas.	Previously considered and/or insignificant [1, 4].	Assess in future as action dictates.
Seabird measures	Incidental take	• Take of more than 4 short-tailed albatross within 2 years triggers consultation in groundfish longline fisheries.	• No change from PA.1.	Previously considered [4].	Previously considered [4].
	Seabird avoidance measures	• Longline: Maintain current seabird avoidance measures. Implement measures approved in 2001 when final rule is published. • Trawl: Evaluate interactions of endangered seabirds with trawl gear.	• Longline: Cooperate with United States Fish and Wildlife Service (USFWS) to develop scientifically based fishing methods that reduce incidental take for all seabird species . • Trawl: Evaluate avoidancemeasures for endangered seabirds and implement as necessary	Previously considered [4]; Not likely to adversely affect; Assess in future as action dictates.	Not likely to adversely affect; Assess in future as action dictates.
Gear restrictions and allocations	Closures	Unchanged.	• BSAI and GOA prohibition on pollock bottom trawl.	Previously considered [1].	BSAI ban previously considered [1]; Not likely to adversely affect; Assess in future as action dictates.
	Allocations	Unchanged.	• Evaluate pot fishing in GOA for sablefish.	Previously considered [1,2].	Not likely to adversely affect; Assess in future as action dictates.

Table 4-3 (cont.). Example FMP "bookends" to show a potential range of management measures under the preferred alternative.

		Preferred Alternative (PA)		Effect	
		Fishery Management Plan (FMP) PA.1	**FMP PA.2**	**PA.1**	**PA.2**
Overcapacity	Restricted access management	• Maintain existing restricted access programs (License Limitation Program [LLP] and moratorium, American Fisheries Act [AFA], individual fishing quota [IFQ] sablefish, etc.) • Continue development of rights-based management, on a fishery-by-fishery basis as needed including: (a) IFQs. (b) Coops. (I) community-based. (ii) sector-based. ©) Community development quotas (CDQs). (d) Other community-based programs (e.g., halibut community share program as applied to other species).	• Rationalize all fisheries (all GOA, BSAI non-pollock/ sablefish). • Ensure CDQ program maximizes benefits in rural communities.	Previously considered [1].	The FMP BiOp concluded that measures taken to end the "race for fish" were likely to be beneficial to species such as Steller sea lions. Thus, not likely to adversely affect, however; assess in future as action dictates.
Alaska Native issues	Traditional Knowledge	• Develop and implement procedures to incorporate traditional knowledge into fisheries management.	• Incorporate additional traditional knowledge from research.	Not likely to adversely affect.	Not likely to adversely affect.
	Advisory Panel (AP)/Council representative	• Increase consultation with Alaska Native and encourage increased participation.	• Increase consultation with and representation of Alaska Natives in fishery management.	Not likely to affect listed species.	Not likely to affect listed species.
Observer program	Coverage and monitoring	• Continue existing Observer coverage or modify based on data and compliance needs. • Modification should be scientifically based (e.g., random placement, flexibility, variable rate).	• Extend to 100 percent > 60=; CDQ & AFA to stay the same. • Expand/modify observer coverage based on scientific data and compliance needs (applies to all vessels: <60= and >= 60=). • Improve species identification for non-target species. • Develop uncertainty estimates for target species data.	Not likely to adversely affect; Assess in future as action dictates.	Not likely to adversely affect; Assess in future as action dictates.

Table 4-3 (cont.). Example FMP "bookends" to show a potential range of management measures under the preferred alternative.

		Preferred Alternative (PA)		Effect	
		Fishery Management Plan (FMP) PA.1	**FMP PA.2**	**PA.1**	**PA.2**
Observer program (cont.)	Fee structure	• Industry pays for observer deployment-related costs • Explore: (a) Federal contract funding (annual appropriation); use of contract hires vs Federal employees (b) Research Plan (e.g., fee-based) ©) TAC set aside	• Develop and implement alternate funding mechanisms: a) Federal funding. b) Research Plan.	No effect.	No effect.
Data and reporting requirements	Reporting requirements	Unchanged.	• Explore programs that collect and verify economic data through independent third party. • Collect mandatory economic data reporting by vessels and processors, i.e., earnings, expenditure and employment data. • Collect and verify aggregate economic data through independent third party.	Previously considered [1,4].	Not likely to adversely affect.
	Vessel monitoring system (VMS)	Unchanged.	• Modify VMS to incorporate new technology and system providers.	Previously considered [2].	Insignificant.

If the FMPs do not currently contain management measures consistent with the policy statement, the FMPs will ultimately be amended to contain the specific management measures that conform to the policy statement. Management measures adopted to conform to the policy statement and objectives in the PA are not likely to have any new adverse effects on listed species or their designated critical habitat. Actions taken to improve the information upon which the fisheries are managed is likely to result in more effective and efficient conservation of listed species. This is especially true when coupled with the objective of adaptive management that is designed to be responsive to new information.

The PA would only amend the policy goals and objectives at this time, thus, NOAA Fisheries cannot fully assess the potential effects of specific management measures that may be proposed at a future date and make a determination on the nature of the effects on listed species. NOAA Fisheries will continue to evaluate the potential effects of all proposed FMP amendments to determine if formal consultation re-initiation criteria have been triggered.

However, from the perspective of screening modifications to the current policy to determine if formal consultation should be re-initiated, it is NOAA Fisheries' assessment that the amendments to the FMP policy statement and objectives as proposed in the PA would not have adverse effects on listed species or their designated critical habitat that have not been considered in previous BiOps.

Has a new species been listed or critical habitat designated that may be affected by the identified action?

Additional species have not been listed nor critical habitat designated by NOAA Fisheries or the USFWS since the completion of the FMP BiOp (NMFS 2000, USFWS 2003), or the 2001 BiOp and its supplement (NMFS 2001, NMFS 2003).

Chapter 5 Scope of the Federal Action

In addition to ensuring that there are no new adverse effects on listed species or their designated critical habitat that have not been considered in previous BiOps, NOAA Fisheries must ensure that the scope of the actions analyzed in prior BiOps are coextensive with the scope of the action in the Programmatic SEIS. Greenpeace v. NOAA Fisheries, 80 F.Supp.2d 1137, 1144-45 (W.D. Wash. 2000).

The Programmatic SEIS was prepared to provide a comprehensive review of the FMPs and a broad analysis of the effects of the GOA and BSAI groundfish FMPs on the areas under their management. Preparation of a programmatic analysis was necessary under the NEPA due to the cumulative significance of numerous amendments to the FMPs since the preparation of the original programmatic EIS 25 years ago.

NOAA Fisheries Consultations

NOAA Fisheries' November 30, 2000 BiOp (FMP BiOp) was comprehensive in scope and considered BSAI and GOA groundfish fisheries and the overall management framework established by the respective FMPs. The effects analysis in that opinion was broad and examined a range of activities conducted pursuant to the FMPs including the manner in which TACs are set, the process that leads to the setting of these levels, and the amount of prey biomass taken from sea lion critical habitat. NOAA Fisheries' 2001 Biop and its supplement considered the effects of BSAI and GOA groundfish fisheries as modified by the SSLPM designed to relieve the jeopardy and adverse modification determination in the FMP BiOp for the western stock of Steller sea lions. The FMP BiOp considered the effects of the groundfish fisheries on all listed species under NOAA Fisheries' jurisdiction in the action area. When consultation was re-initiated for FMP amendments 61 and the SSLPM in 2001, The Office of Sustainable Fisheries determined that modifications to the federal action would not affect listed species, other than Steller sea lions, in a manner not previously considered. It was determined that the proposed action was likely to adversely affect Steller sea lions in a manner not previously considered in the FMP BiOp and formal consultation was re-initiated for this species due to new information on the foraging distribution of Steller sea lions and the significance of the modifications to specific aspects of the action. The effects of these modifications on Steller sea lions and their designated critical habitat were further evaluated in the Supplement.

FWS Consultations

The USFWS' Programmatic BiOp (USFWS 2003) reviewed the overarching goals, objectives, policy, and guidance for maximizing the compatibility of the groundfish fisheries in the BSAI and GOA with the biological requirements of the short-tailed albatross and the Steller's eider. Additionally, this BiOp provided a management direction and established guidelines under which future federal actions proposed under the programmatic BSAI and GOA FMPs could be implemented. The Programmatic BiOp (USFWS 2003) stated that federal actions implemented under the BSAI and GOA FMPs that have effects similar in scope and nature to those addressed in that BiOp, and that can be implemented in a manner consistent with the established guidelines found therein, could be tiered from that BiOp.

The scope of the action evaluated in the Programmatic SEIS aligns with the scope of the comprehensive FMP BiOp (NMFS 2000) and the Programmatic BiOp (USFWS 2003). The Programmatic SEIS contains specific protection measures for listed species that were not considered in the FMP BiOp, however, the SSLPM are within the scope of the FMP framework and were evaluated in the 2001 BiOp and its Supplement. Very few actions (FMP amendments or regulatory changes) have been implemented since these consultations, such that the FMPs under review have changed little. It is NOAA Fisheries' assessment that the scope of the effects analyses in previous formal consultations is coextensive in scope with the PA in the Programmatic SEIS.

Chapter 6 Conclusion

NOAA Fisheries Sustainable Fisheries Division and the Alaska Regional Administrator for NOAA Fisheries request concurrence from NOAA Fisheries Protected Resources Division and the U.S Fish and Wildlife Service, respectively, that none of the criteria for re-initiation of formal consultation have been met by the proposed action. NOAA Fisheries will continue to consult with the Protected Resources Division and the U.S. Fish and Wildlife Service under the ESA as changes to the FMPs are proposed in the future to determine their individual and incremental effect on listed species and to assess the need for formal consultation.

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