3.4 Threatened and Endangered Species

The ESA of 1973 as amended (16 United States Code [USC] 1531 et seq.), provides for the conservation of endangered and threatened species of fish, wildlife, and plants. The program is administered jointly by the NOAA Fisheries for most marine mammal species, marine and anadromous fish species, and marine plants species and by the USFWS for bird species, and terrestrial and freshwater wildlife and plant species.

The designation of an ESA-listed species is based on the biological health of that species. The status determination is either threatened or endangered. Threatened species are those likely to become endangered in the foreseeable future (16 USC 1532(20)). Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range (16 USC 1532(20)). Species can be listed as endangered without first being listed as threatened. The Secretary of Commerce, acting through NOAA Fisheries, is authorized to list marine and anadromous fish species, plants, and mammals (except for walrus and sea otter). The Secretary of the Interior, acting through the USFWS, is authorized to list walrus and sea otter, seabirds, terrestrial plants and wildlife, and freshwater fishes and plants.

In addition to listing species under the ESA, the critical habitat of a newly listed species must be designated concurrent with its listing to the "maximum extent prudent and determinable" (16 USC 1533(b)(1)(a)). The ESA defines critical habitat as those specific areas that are essential to the conservation of a listed species and that may be in need of special consideration. Federal agencies are prohibited from undertaking actions that destroy or adversely modify designated critical habitat. Some species, primarily the cetaceans, which were listed in 1969 under the Endangered Species Conservation Act and carried forward as endangered under the ESA, have not received critical habitat designations.

Federal agencies have an affirmative mandate to conserve listed species (Rohlf 1989). One assurance of this is federal actions, activities or authorizations (hereafter referred to as federal action) must be in compliance with the provisions of the ESA. Section 7 of the ESA provides a mechanism for consultation by the federal action agency with the appropriate expert agency, NOAA Fisheries or USFWS. Informal consultations, resulting in letters of concurrence, are conducted for federal actions that have no adverse affects on the listed species. Formal consultations, resulting in BiOps, are conducted for federal actions that may have an adverse affect on the listed species. Through the BiOps, a determination is made as to whether the proposed action poses jeopardy or no jeopardy of extinction to the listed species. If the determination is that the action proposed, or ongoing, will cause jeopardy, RPAs may be suggested that, if implemented, would modify the action to no longer pose the jeopardy of extinction to the listed species. The RPAs must be incorporated into the federal action if it is to proceed. A BiOp with the conclusion of no jeopardy may contain a series of management measures intended to further reduce negative impacts to the listed species. These management alternatives are advisory to the action agency (50 CFR 402.24(j)). If a likelihood exists of any taking occurring during promulgation of the action, an incidental take statement may be appended to a BiOp to provide for the amount of take that is expected to occur from normal promulgation of the action. An incidental take statement is not the equivalent of a permit to take. The term take under the ESA means "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct" (16 USC 1538(a)(1)(B)).

Twenty-five species occurring in the BSAI and/or GOA groundfish management areas are currently listed as endangered or threatened under the ESA (Table 3.4-1): seven great whales, one pinniped, 13 Pacific salmon, three birds, and one turtle.

In summary, species listed under the ESA are present within the management area. Some may be negatively affected by groundfish fishing, the subject of this Programmatic SEIS federal activity. NOAA Fisheries is the expert agency for ESA-listed marine mammals. The USFWS is the expert agency for ESA-listed seabirds. The proposed action, continuation of the federal groundfish fisheries in the 200-mile EEZ off Alaska, must be in compliance with the ESA.

The material presented in the subsections that follow further explains the ESA and ESA Section 7 consultations that have occurred prior to preparation of this Programmatic SEIS. Sections 3.4.1 and 3.4.2 describe certain listed species present in the management (e.g., action) area. All other ESA-listed species are described in their own independent sections (e.g., marine mammals, seabirds, etc.) in Chapters 3 and 4 of this document.

Section 7 Consultations

Because groundfish fisheries are federally regulated, any negative effects of the fisheries on ESA-listed species or critical habitat, and any takings that may occur are subject to ESA Section 7 consultation. NOAA Fisheries initiates the consultation with itself for marine mammals and anadromous fish and with the USFWS for birds. The resulting letters of concurrence and BiOps are issued to NOAA Fisheries. NPFMC may be invited to participate in the compilation, review, and analysis of data used in the consultations. The determination of whether the action "is likely to jeopardize the continued existence of" endangered or threatened species, or to result in the destruction or modification of critical habitat, however, is the responsibility of either NOAA Fisheries or USFWS. If the action is determined to result in jeopardy, the opinion includes reasonable and prudent measures that are necessary to alter the action to avoid jeopardy. If an incidental take of a listed species is expected to occur under normal promulgation of the action, an incidental take statement is appended to the BiOp.

For all ESA-listed species, Section 7 consultation must be reinitiated if the amount or extent of taking specified in the incidental take statement is exceeded; new information reveals effects of the action that may affect listed species in a way not previously considered; the action is subsequently modified in a manner that causes an effect to listed species that was not considered in the BiOp; or a new species is listed or critical habitat is designated that may be affected by the action.

Section 7 consultations have been done for all the listed species in Table 3.4-1— some individually and some as groups. Below are summaries of species that are not described in their own independent section (e.g., marine mammals, seabirds, etc.), and Section 7 consultations have been included in the descriptions.

3.4.1 Leatherback Turtle (*Dermochelys coriacea)*

Life History and Distribution

Leatherback turtles are the largest sea turtles in the world, reaching a shell length of 1.6 m and a mass of 700 kg. They reach sexual maturity at an estimated age of 13 to 14 years for females and live for more than 30 years (Zug and Parham 1996). Leatherbacks must surface to breathe air, but can stay submerged for 2 hours and dive to 1,000 m. Males do not leave the ocean, but females come ashore on open, sandy beaches to dig nests and lay eggs. Nestlings emerge from the sand at night and attempt to make their way to the sea. Very little is known about the distribution and natural history of these young turtles after they leave their natal beaches.

Leatherback turtles are widely distributed throughout the world's oceans (Ernst and Barbour 1989). In the Pacific Ocean, they range as far north as Alaska and as far south as Chile and New Zealand. In Alaska, leatherback turtles are found as far north as 60°34'N, 145°38'W (Copper River delta) and as far west as the Aleutian Islands (Hodge 1979, Stinson 1984). Leatherback turtles have also been found in the Bering Sea along the coast of Russia (Bannikov *et al.* 1971). The Pacific coast of Mexico is generally regarded as the most important breeding ground for nesting leatherback turtles in the world. No nesting is known to occur in U.S. waters of the Pacific. Nesting is widely reported from the western Pacific, including China, southeast Asia, Indonesia, and Australia.

Leatherback turtles undertake the longest migrations and exhibit the broadest thermal tolerances among sea turtles (NMFS and USFWS 1992). Leatherback turtles have been found in waters ranging from 7° to 27° C in temperature (Shoop and Kenney 1992). They are typically associated with continental shelf habitats and pelagic environments and are sighted regularly in offshore waters at depths greater than 328 ft.

Estimating the population size of this species is especially difficult because individuals are widely dispersed and males never come ashore. Population estimates are usually based on the number of females seen on nesting beaches. These counts are problematic because females frequently change beaches. In spite of the difficulty in censussing their numbers, it is clear that the population of leatherback turtles is declining significantly. 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 Pacific leatherback population appears to be in a critical state of decline. The eastern 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 (Sarti *et al.* 1996, Spotila *et al.* 2000). In the western Pacific, the decline is equally severe. Current nestings at Terengganu, Malaysia, represent one percent of the levels recorded in the 1950s (Chan and Liew 1996).

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.

Wildlife Management Responsibility

NOAA Fisheries and the USFWS share responsibilities at the federal level for the research, management, and recovery of Pacific sea turtle populations under U.S. jurisdiction. The leatherback turtle was listed as endangered under the ESA in June of 1970. NOAA Fisheries and USFWS have created a joint Pacific Sea Turtle Recovery team to develop a recovery plan for the species (NMFS and USFWS 1998). Under the requirements of the ESA, these agencies are responsible for issuing Section 7 consultations (BiOps) for federal actions that may impact the species, such as the BSAI and GOA groundfish FMPs.

Leatherback turtles are classified as Critically Endangered in the International Union for Conservation of Nature's (IUCN) *Red List of Threatened Species* (IUCN 2000), where taxa so classified are considered to be "facing an extremely high risk of extinction in the wild in the immediate future ." In October of 2000, the U.S. ratified the Inter-American Convention for the Protection and Conservation of Sea Turtles. This treaty is the first international agreement dedicated solely to raising standards for the protection of sea turtles.

Past/Present 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 (Eckert 1996). 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 these devices. Spotila *et al.* (2000) state that a conservative estimate of annual leatherback fishery-related mortality (from longlines, trawls, and gillnets) in the Pacific during the 1990s was 1,500 animals. They estimate that this represented about a 23 percent mortality rate (or 33 percent if 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 if both juvenile and adult survivorship remained high, and 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

NOAA Fisheries Protected Resources Division (PRD) issued a BiOp in November 2000 on the interaction of leatherback turtles and the BSAI and GOA groundfish fishery (NMFS 2000a). In that document, 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. No information is available to help NOAA Fisheries 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 concludes that the direct and indirect effects of commercial fisheries in the BSAI and GOA on leatherback turtles is negligible and not likely to jeopardize its survival or recovery.

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 2000a).

Status for Cumulative Effects Analysis

Leatherback turtles rarely enter the waters fished by the BSAI/GOA groundfish fisheries and do not appear to be affected in any direct or indirect manner by the fisheries. Since the groundfish fisheries do not contribute to the cumulative effects on the species, leatherback turtles will not be carried forward for analysis in Chapter 4.

3.4.2 Pacific Northwest Salmon

Five species of Pacific salmon, pink (*Oncorhynchus gorbuscha*), chum (*O. keta*), sockeye (*O. nerka*), coho (*O. kisutch*) and chinook salmon (*O. tshawytscha*), as well as steelhead trout (*O. mykiss*) occur in Alaska.

Refer to Section 3.5.2.2 for Pacific salmon life history and trophic interaction information. This section will explain the relationship between the BSAI and GOA groundfish fisheries and Pacific Northwest salmon. For a thorough description of Pacific Northwest salmon distribution, management and past/present effects within its habitat of origin, refer to the NOAA Fisheries Final Programmatic EIS for Pacific Salmon Fisheries Management off the Coasts of southeast Alaska, Washington, Oregon, and California and in the Columbia River Basin (NOAA Fisheries 2003).

Pacific Northwest Salmon Management

Pacific salmon off the Alaska coast are managed under a complex mixture of domestic and international bodies, treaties, regulations, and other agreements. Federal and state agencies cooperate in managing salmon fisheries. The Alaska Department of Fish & Game (ADF&G) manages salmon fisheries within jurisdictional waters where the majority of harvest occurs. Management in the EEZ is the responsibility of the NPFMC. Under Amendment 4 of the Federal Salmon FMP, regulation of the directed salmon fishery occurring in the EEZ off southeast Alaska is deferred to the State of Alaska (NPFMC 1990). Management of Alaska salmon fisheries is based primarily on regional stock groups of each species and on time and area harvesting by specific types of fishing gear. Over 25 different commercial salmon fisheries in Alaska are managed with a special limited-entry permit system that specifies when and what type of fishing gear can be used in each area. These fisheries, extending from Dixon Entrance in southeast Alaska to Norton Sound in the Bering Sea, are allowed to catch salmon in different fisheries, either with drift gillnets, set gillnets, beach seines, purse seines, hand troll, power troll, or fish wheel harvest gear. Sport fishing is limited to hook-and-line, while subsistence

fishermen may use gillnets, dip nets, or hook-and-line. Some subsistence harvesting of salmon is also regulated by special permits.

The southeast Alaska salmon fisheries have the largest impact on the Pacific Northwest salmon, relative to other Alaska salmon fisheries. Only southeastern Area A is open to commercial salmon fishing, although there are three minor fisheries in the Yakutat Area D. These salmon fisheries are regulated by ADF&G and adhere to the FMP for the Salmon Fisheries off the Coast of Alaska (NPFMC 1990), the MSA, the Pacific Salmon Treaty (see below), and the ESA when applicable, along with other federal laws. Sport fisheries also occur in southeast Alaska, and are managed by ADF&G. Anglers are required to obtain a fishing license, restrictions vary for each salmon species. ADF&G also monitors subsistence and personal use permits in southeast Alaska.

Salmon fisheries are managed to meet an escapement goal of a certain number of spawners for each river system. Meeting escapement goals is considered equivalent to maintaining healthy stocks. In general, spawners are counted on their way upstream, after their numbers have already been reduced by natural mortality at sea, bycatch at sea, and directed fisheries downstream.

International Management

Some fisheries, including the southeast Alaska chinook, coho, and sockeye fisheries, have harvest limits that are subject to negotiations between the U.S. and Canada under the Pacific Salmon Treaty. This treaty originally signed in 1983 also covers salmon that are intercepted in fisheries that are returning to Idaho, Oregon, and Washington. In recent years, the treaty process was stalled due to disagreements between the two countries on allocations for certain fisheries and species. In 1999, a new harvest agreement was signed. The new treaty specified new harvest limits for both countries. In recent years, the treaty process was stalled due to disagreements between the two countries on allocations for certain fisheries and species. The new agreement provides stability to the fisheries of both countries. The agreements are complex and require continuous coordination between both countries to be successful. The new treaty will expire, unless renewed, in 2008.

On a broader international scope, the management of salmon harvest in the high seas of the North Pacific Ocean from 1957 to 1992 was authorized by the International North Pacific Fisheries Commission (INPFC), and via bilateral and multilateral agreements and negotiations with Taiwan and the Republic of Korea (South Korea). In 1993, the North Pacific Anadromous Fish Commission (NPAFC) was formed to replace the International North Pacific Fisheries Commission. This four-country commission (Canada, Japan, the Russian Federation, and the U.S.) now provides a framework for international cooperation in salmon management and research in the North Pacific Ocean. The NPAFC Convention prohibits high seas salmon fishing and trafficking of illegally caught salmon. Coupled with United Nations General Assembly Resolution 46/215, which bans large-scale pelagic driftnet fishing in the world's oceans, harvesting of Pacific salmon on the high seas, except for illegal fishing, no longer occurs. This allows for effective management control to fully return to the salmon-producing nations.

NOAA Management

There are no GOA FMP amendments that directly address salmon bycatch. However, while PSC limits have not been established for salmon, the timing of seasonal openings for the pollock fisheries in the central and western GOA have been adjusted to avoid periods of high chinook and chum salmon bycatch.

Endangered Species Act

No stocks of Pacific salmon originating from freshwater habitat in Alaska are listed under the ESA. The ESA-listed species or evolutionary significant units (ESUs) that migrate into marine waters off Alaska, originate in freshwater habitat in Washington, Oregon, Idaho, and California. In the marine waters off Alaska, the ESA-listed salmon stocks are mixed with hundreds to thousands of other stocks originating from the Columbia and Willamette Rivers, British Columbia, Alaska, and Asia. The ESA-listed fish are not visually distinguishable from the other, unlisted, stocks. Minimal take of them in the salmon bycatch portion of the fisheries is assumed based on limited abundance, timing, and migration pattern information gleaned from recovery locations of coded-wire-tagged (CWT) surrogate stocks (closely related hatchery stocks that are tagged with CWT). For information on PSC limits and commercial salmon fishery catch limits set in Alaska waters by NOAA Fisheries and ADF&G, see Section 3.5.2.2.

Pacific Northwest Salmonid Past/Present Effects Analysis

A discussion of the direct/indirect effects, external human controlled and natural events, and internal groundfish fishery events screened for the past effects analysis is presented in Section 3.1.4 of this document.

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

- Catch/bycatch of Pacific Northwest salmon (direct effect).
- Reduced/increased recruitment due to hatchery programs (indirect effect).
- Reduced recruitment due to habitat degradation (indirect effect).
- Reduced/increased recruitment due to climate changes and regime shifts (indirect effect).

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

- Past/Present External Events:
  - State of Alaska directed salmon fisheries (commercial and sport fisheries)
  - Washington, Oregon, California Coast groundfish fisheries (NMFS 1999b)
  - Washington, Oregon and California state salmon fisheries (NMFS 1999b)
  - Alaska subsistence fisheries
  - Foreign fisheries (pre-MSA)
  - Hatchery programs (NMFS 1999b)
  - Habitat degradation (NMFS 1999b)
  - Hydro-development (NMFS 1999b)
  - Climate changes and regime shifts
- Past/Present Internal Events:
  - BSAI and GOA groundfish fisheries

- Past/Present Management Actions:
  - ADF&G management
  - Washington, Oregon, and California state management
  - International agreements
  - Endangered Species Act (Section 7 consultation)
  - Federal, state and local agencies associated with salmon habitat
  - Foreign fisheries management
  - Industry self-imposed management
  - FMP groundfish fisheries management

Washington, Oregon and California State salmon fisheries and groundfish fisheries and salmon hatchery programs have not been brought forward for past/present effects analysis. For a thorough description of these fisheries and their impacts on the salmon, see the November 1999 Endangered Species Act - Reinitiated Section 7 Consultation, BiOp (NMFS 1999b). According to the 1999 BiOp, open Pacific Ocean habitat was not considered a critical habitat to ESA-listed salmon species and special management considerations were not discussed further (58 CFR 68547).

The quality of salmon spawning habitat is influenced by land management practices (e.g., forestry practices, agricultural practices and urbanization) and climatic events (e.g., flooding that scours streams). Several agencies, entities, and groups exert control over watersheds used by spawning salmon. NOAA Fisheries designated critical habitat in 1993 (57 Federal Register [FR] 57051) for the Snake River sockeye, Snake River spring/summer chinook, and Snake River fall chinook salmon. The designations did not include any marine waters, and therefore, does not include any habitat where Alaska groundfish fisheries are promulgated. For a thorough analysis of habitat degradation and hydro-development impacts on Pacific Northwest salmon, see the November 1999 Endangered Species Act - Reinitiated Section 7 Consultation, BiOp (NMFS 1999b).

External Mortality: Catch/bycatch by State of Alaska Directed Salmon Fisheries

The commercial salmon fisheries in southeast Alaska began in the late 1870s, primarily targeting sockeye salmon. Pink salmon began to dominate in early 1900s and has continued to dominate into recent years. Salmon catch has increased since the mid-1970s with more diverse catches of salmon including pink, chum, coho and sockeye salmon. Catches of chinook salmon have been limited in recent years due to harvest limits imposed by the Pacific Salmon Treaty. Trawlers take a majority of the salmon catch in southeast; drift and set gillnet and purse seine fishermen only operate within state waters.

The list of ESA-listed salmon stocks as of 2002 is in Table 3.4-2. Those stocks that are likely to migrate into marine waters off Alaska are highlighted: they include six ESUs of chinook salmon, one ESU of chum salmon, and five ESUs of steelhead (i.e., Snake River fall chinook, Snake River spring/summer chinook, Puget Sound chinook, Upper Columbia River spring chinook, Upper Willamette River chinook, Upper Columbia River spring chinook, Columbia River chum, Upper Columbia River steelhead, Upper Willamette River steelhead, Middle Columbia River steelhead, Lower Columbia River steelhead, and Snake River basin steelhead).

Incidental take of listed salmon species likely to range into Alaskan waters in the southeast Alaskan fisheries are limited by the Pacific Salmon Treaty. Bycatch varies from year to year and is dependent upon abundance of salmon stock and established catch limits. The November 1999 BiOp (NMFS 1999b) determined southeast Alaskan fishery bycatch is not at a level that is likely to jeopardize any of the Pacific Northwest salmon

ESUs. However, ADF&G is still required to implement reasonable and prudent measures under the ESA as follows:

- Management objectives (pre-season and inseason) established for the southeast Alaska fisheries must be consistent with the provision established by the Pacific Salmon Treaty.

- ADF&G must monitor catch and implementation of management measures in the southeast Alaska fisheries.

- ADF&G with NOAA Fisheries Alaska Region and NPFMC chair must sample the southeast Alaska fishery catch to determine stock composition and gather biological information intended to determine fishery-related impacts on listed ESUs.

External Mortality: Alaska Subsistence Fisheries

Harvest of Pacific Northwest salmon by Alaskan and Pacific Northwest subsistence groups probably occurs, although their impacts on the ESA-listed salmon stocks is likely to be minimal.

External Mortality: BSAI and GOA Foreign Groundfish Fisheries (pre-MSA) Bycatch

Although it is impossible to determine the number of Pacific Northwest salmon taken by the BSAI and GOA foreign groundfish fisheries prior to the MSA, it is assumed that bycatch of salmon per region per year was substantially higher than what occurs currently.

Internal Mortality: BSAI and GOA Groundfish Fisheries (post-MSA) Bycatch

Pacific Northwest chinook salmon stocks may compose a larger proportion of GOA bycatch than they do of BSAI bycatch (personal communication with Kate Myers, NOAA Fisheries Auke Bay, 2003). While some Pacific Northwest stocks are listed as endangered or threatened under the ESA (Table 3.4-2), none of the catches observed in Alaska would exceed the incidental take limit of 40,000 fish accepted under ESA Section 7 consultation.

The effects of the BSAI and GOA groundfish fisheries on listed salmon were considered through informal consultations with NOAA Fisheries (February 20, 1992; April 21, 1993; June 7, 1993; and September 22, 1993) and by formal consultations (NMFS 1994, 1995a, and 1999a). Each consultation is summarized below, beginning with the informals and moving through the formals in order of issuance. Informal consultations were done on fishing years 1992 and 1993 (February 20, 1992 and April 21, 1993, respectively), and on BSAI Amendment 28 (June 7, 1993) and GOA Amendment 31 (September 22, 1993).

In the latter two informal consultation memorandums, NOAA Fisheries stated that it was essential that monitoring efforts be continued and that NOAA Fisheries continue to seek additional information regarding potential impacts to listed fish.

The 1994 BiOp was the first formal consultation considering whether continuation of the groundfish fisheries in the BSAI and GOA in 1994 and beyond was likely to jeopardize the continued existence of Snake River sockeye salmon, Snake River spring/summer chinook salmon, or Snake River fall chinook salmon. Assessment of impacts in the BiOp established approaches for evaluating the proposed actions. Using those

approaches, effects of the proposed action on the listed species were evaluated. Effects are expressed in terms of numerical catch assessment, base period analysis (1986 to 1990), cumulative effects analysis, and combined effects analysis. For purposes of the analysis, it was assumed that annual bycatch of chinook salmon in 1994 and for the foreseeable future would be 40,000 or fewer fish in each of the BSAI and GOA groundfish fisheries. Relative to the base period analysis question, the assumed maximum bycatch of 40,000 chinook salmon per region per year is substantially less than that which occurred in the foreign and JV fisheries in earlier years. No cumulative effects accruing to the listed species of activities occurring within the action areas are thought to exist (NMFS 1994).

In the BiOp, NOAA Fisheries "determined that it is highly unlikely that any Snake River sockeye salmon are taken in the groundfish fisheries." Based on that, "NOAA Fisheries concluded that the groundfish fisheries are not likely to adversely affect Snake River sockeye salmon and thus will not jeopardize their continued existence." For listed chinook salmon, "NOAA Fisheries concluded that the catch of Snake river spring/summer chinook salmon is unlikely to average more than one fish per year in each region, and that it is highly unlikely than any Snake River fall chinook salmon are taken in the BSAI groundfish fisheries." NOAA Fisheries concluded that the catch of Snake River fall chinook in the GOA groundfish fisheries "is unlikely to average more than five fish per year and may be substantially less." Based on available information, NOAA Fisheries concluded "the groundfish fisheries are not likely to jeopardize the continued existence of any of the ESA-listed salmon" (NMFS 1994). The 1994 BiOp contained four conservation recommendations:

- NPFMC and NOAA Fisheries, Alaska Region should monitor the bycatch of chinook salmon in the groundfish fisheries and take necessary actions to ensure that the bycatch is minimized to the extent possible and in any case does not exceed 40,000 chinook salmon per year in either the BSAI or GOA groundfish fisheries.

- NPFMC and NOAA Fisheries, Alaska Region should improve estimates of the region-of-origin and stock composition of the chinook salmon bycatch by increasing CWT sampling rates as part of the mandatory salmon retention program, collecting and analyzing scale samples, and employing additional stock identification techniques applicable to the problem.

- NPFMC and NOAA Fisheries, Alaska Region should use information collected during the observer monitoring program to identify times and areas of high salmon abundance that could be used to reduce salmon bycatch through regulatory action.

- NPFMC and NOAA Fisheries, Alaska Region should encourage development of incentive programs designed to reduce the bycatch of salmon in the BSAI and GOA groundfish fisheries.

The incidental take statement appended to the BiOp allowed for take of five Snake River fall chinook in the GOA, zero in the BSAI, one take of Snake River spring/summer chinook in the BSAI and GOA fisheries, and zero take of Snake River sockeye in either fishery, per year. As explained above, it is not technically possible to know if any have been taken. Compliance with the BiOp was stated in terms of limiting salmon bycatch per year to under 40,000 fish per year for chinook salmon, and 200 and 100 fish per year for sockeye salmon in the BSAI and GOA fisheries, respectively (NMFS 1994). Keeping salmon bycatch within these limits is presumed to reduce the probability of incidental catch of listed salmon to near-zero.

Three terms and conditions were to be implemented by NOAA Fisheries, Alaska Region to carry out the reasonable and prudent measures established under the incidental take statement.

- NOAA Fisheries, Alaska Region shall continue to implement the current observer program for the BSAI and GOA groundfish fisheries. Mothership processor vessels or shoreside processing facilities that process 1,000 mt per day or more must have a NOAA Fisheries certified observer on board the vessel or at the facility each day it receives or processes groundfish. Motherships or shoreside processing facilities that process 500 to 1,000 mt per day must have a NOAA Fisheries certified observer for at least 30 percent of the days it receives or processes fish. Catcher processor or catcher vessels 125 ft LOA or longer are required to have a groundfish observer onboard for 100 percent of their fishing days. Vessels from 60 to 124 ft LOA are required to have a groundfish observer aboard for 30 percent of their fishing days. Vessels under 50 ft LOA are not required to carry groundfish observers.

- NOAA Fisheries, Alaska Region shall monitor the year-to-date bycatch estimates of chinook salmon on a weekly basis. If it is anticipated inseason that the annual total bycatch of chinook salmon will exceed 40,000 fish in either the BSAI or GOA fisheries, NPFMC and NOAA Fisheries, Alaska Region should reinitiate consultation.

- NOAA Fisheries, Alaska Region shall estimate and report the bycatch of sockeye salmon annually as part of the post season analysis. If the annual bycatch of sockeye exceeds 200 fish in the BSAI or 100 fish in the GOA fishery, consultation shall be reinitiated (NMFS 1994).

A second BiOp was issued in 1995 (NMFS 1995a), to reflect new information pertinent to the assumption that the bycatch of chinook salmon in the BSAI and GOA would not exceed 40,000 fish per year in either region. The estimated bycatch of chinook in the BSAI area was 44,487 in 1994, and revised estimates for the number of chinook salmon taken in the years 1991-1993 were greater than 40,000 fish per year (in 1993, 46,014; 1992, 41,955; and 1991, 48,880), thus exceeding the terms of the incidental take statement. The purpose of the reinitiated consultation was to consider whether this new information affected the previous conclusion that the BSAI groundfish fisheries were not likely to jeopardize the continued existence of Snake River spring/summer or fall chinook salmon. Conclusions regarding impacts to sockeye salmon the BSAI and GOA groundfish fisheries and chinook salmon in the GOA were not reviewed because the new information did not pertain to those species or areas.

In the 1995 BiOp conclusions, NOAA Fisheries reiterated its previous conclusions that NPFMC regulated groundfish fisheries were not likely to adversely affect Snake River sockeye salmon and thus could not jeopardize their continued existence. Based on the available information, NOAA Fisheries also concluded that the groundfish fisheries were not likely to jeopardize the continued existence of Snake River spring/summer chinook salmon or Snake River fall chinook salmon (NMFS 1995a).

The first conservation recommendation contained in the January 19, 1994, BiOp was revised (as reproduced below). The remaining conservation recommendations (numbers 2 through 4) remain in effect.

1. NPFMC and NOAA Fisheries, Alaska Region should monitor the bycatch of chinook salmon in the groundfish fisheries and take necessary actions to ensure that the bycatch is minimized to the extent possible and in any case does not exceed 55,000 chinook per year in the BSAI fisheries or 40,000 chinook salmon per year in the GOA fisheries. (NMFS 1995a).

The second of the three terms and conditions to the incidental take statement was modified (as follows) to reflect the increase in the estimate of chinook bycatch in the BSAI.

2. NOAA Fisheries, Alaska Region shall monitor the year-to-date bycatch estimates of chinook salmon on a weekly basis. If it is anticipated inseason that the annual total bycatch of chinook salmon will exceed 55,000 fish in the BSAI fisheries or 40,000 fish in the GOA fisheries, NPFMC and NOAA Fisheries, Alaska Region should reinitiate consultation. (NMFS 1995a).

A third BiOp was issued on December 22, 1999 (NMFS 1999a). The reasons for reinitiation of consultation were the new (1997 and 1999) listings of a number of salmon ESUs under the ESA (Table 3.4- 2). NOAA reviewed the status of Snake River fall chinook, Snake River spring/summer chinook, Puget Sound chinook, Upper Columbia River spring chinook, Upper Willamette River chinook, Lower Columbia River chinook, Upper Columbia River steelhead, Upper Willamette River steelhead, Middle Columbia River steelhead, Lower Columbia River steelhead, and Snake River basin steelhead; the environmental baseline for the action area; the effects of the proposed fishery; and the cumulative effects. After the review, NOAA Fisheries determined that the BSAI and GOA groundfish fisheries subject to the BSAI FMP groundfish fishery and the GOA groundfish FMP, as proposed, was not likely to jeopardize their continued existence.

The incidental take statement appended to the BiOp allowed for take of 55,000 chinook salmon in the BSAI and 40,000 chinook salmon in the GOA. No take of Hood Canal summer run chum or Lower Columbia River chum was expected in BSAI or GOA groundfish fisheries. NOAA Fisheries does not anticipate that the proposed fisheries will take any coho from the southern Oregon/northern California coast or central California ESUs, any Snake River or Lake Ozette sockeye salmon, or any steelhead ESUs (NMFS 1999a).

Two reasonable and prudent measures were provided to minimize and reduce the anticipated level of incidental take associated with NPFMC-regulated groundfish fisheries:

1. NPFMC and NOAA Fisheries, Alaska Region shall ensure there is sufficient NOAA Fisheries-certified observer coverage such that the bycatch of chinook salmon and other salmon in the BSAI and GOA groundfish fisheries can be monitored on an in season basis.

2. NPFMC and NOAA Fisheries, Alaska Region shall monitor bycatch reports inseason to ensure that the bycatch of chinook salmon does not exceed 55,000 fish per year in the BSAI fisheries and 40,000 fish per year in the GOA fisheries (NMFS 1999a).

In order to be exempt from the prohibitions of Section 7 of the ESA, the specified agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

- NOAA Fisheries, Division of Sustainable Fisheries (Alaska Region) shall provide an annual report to the PRD (Alaska Region) that details the results of its monitoring of bycatch reports during each fishing season. These reports shall be submitted in writing within one month of the new fishing year (February 1) and will summarize all statistical information based on a January 1 through December 31 fishing year (NMFS 1999a).

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might result from the proposed action. If during the course of the

groundfish fishery this level of incidental take is exceeded, the additional level of take would represent new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided above.

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further its purposes by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to develop additional information, or to assist federal agencies in complying with their obligations under ESA Section 7(a)(1). NOAA Fisheries believes the following conservation recommendations are consistent with these obligations, and therefore should be implemented by NPFMC and NOAA Fisheries:

- NPFMC and NOAA Fisheries, Alaska Region should improve estimates of the region-of-origin and stock composition of the chinook salmon bycatch by increasing CWT sampling rates as part of the mandatory salmon retention program, collecting and analyzing scale samples, and employing additional stock identification techniques applicable to the problem.

- NPFMC and NOAA Fisheries, Alaska Region should use information collected during the observer monitoring program to identify times and areas of high salmon abundance that could be used to reduce salmon bycatch through regulatory action.

- NPFMC and NOAA Fisheries, Alaska Region should encourage development of incentive programs designed to reduce the bycatch of salmon in NPFMC groundfish fisheries (NMFS 1999a).

In order for NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NOAA Fisheries requested notification of the implementation of any conservation recommendations.

External Reduced Recruitment: Commercial Seal Harvesting and Commercial Whaling

Currently, the effects of rebounding seal and whale populations on salmon mortality, especially chinook salmon, are not well understood. Commercial whale and seal harvest were banned in 1972 with the passing of the Marine Mammal Protection Act (MMPA). Presently, foreign and subsistence whale harvests are monitored by the International Whaling Commission (IWC) (NMFS 1999b).

External Increased/Reduced Recruitment: Climate Changes and Regime Shifts

Various climate factors, including ENSO, have had different affects on the Pacific Northwest salmon populations. Included climate factors are severe flooding, droughts, and change in ocean productivity. In the Pacific Northwest, researchers have found that salmon may be responding to the Pacific Decadal Oscillation, a 20- to 30-year cycle of climate conditions and ocean productivity (Mantua *et al.* 1997). Response to these climate changes depends upon the stock and its timing and distribution. Overall, it appears that Pacific Northwest salmon may have been negatively affected in this phase of the cycle. One example is the Puget Sound chinook stocks which dropped to half of their 1974 to 1977 broods in 1979 (Cramer *et al.* 1999).

Pacific Northwest Salmon Comparative Baseline

Southeast salmon stocks reached their highest levels in the 1980s and 1990s (Rogers *et al.* 1987, Wertheimer 1997); spawning escapement has increased since the 1970s and have reached escapement objectives in recent years. Of the 407 chinook stocks harvested in the southeast, 81 percent are classified as not threatened, and 15 percent are special concern or at risk (Slaney *et al.* 1996). Large portions of the southeast chinook harvest originate from the Columbia River upriver bright chinook, Middle Columbia River bright chinook, and north-migrating Oregon coastal chinook; these stocks are considered stable (NMFS 2002b). Chinook stocks listed under the ESA make up a small portion of the southeast harvest, and nearly all coho salmon harvested originate from Alaskan streams (Weitkamp *et al.* 1995).

For current status information on West Pacific Coast and Columbia River Basin salmon stocks, refer to the 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 (NOAA Fisheries 2003).

Pacific Northwest Salmon Cumulative Effects Analysis Status

Due to the limited impacts of the BSAI and GOA groundfish fisheries on Pacific Northwest salmon, these stocks will not be brought forward for cumulative effects analysis. For up-to-date information on the status of these stocks and their habitat, visit the NOAA Fisheries Northwest Region website at http://www.nwr.noaa.gov. Comments on the Northwest Region Draft Programmatic EIS for Pacific Salmon Fisheries Management off the Coasts of southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin were due November 22, 2002. BiOps, FMPs, EISs, and other informative documents involving these stocks are also available on the Northwest Region website.