ENVIRONMENTAL ASSESSMENT
FOR
1999 GROUNDFISH TOTAL ALLOWABLE CATCH SPECIFICATIONS
IMPLEMENTED UNDER THE AUTHORITY OF THE
FISHERY MANAGEMENT PLANS FOR THE
GROUNDFISH FISHERY OF THE BERING SEA AND ALEUTIAN ISLANDS AREA
AND
GROUNDFISH FISHERY OF THE GULF OF ALASKA AREA

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Abstract: The Environmental Analysis documents the analysis of the groundfish target species stock status, higher and lower trophic level species, and the physical and socioeconomic environment. The federal action consists of proposing the 1999 total allowable catch specifications for the Bering Sea and Aleutian Islands management area and the Gulf of Alaska management area. The specified total allowable catch will become the upper limit of groundfish harvested in the fisheries during calendar year 1999, and would encompass the interim 1999 specifications.

SUMMARY

In 1998 a Final Supplemental Environmental Impact Statement (FSEIS) was prepared that supplements the original Environmental Impact Statements (EIS) for the Fishery Management Plans for the Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI). The FSEIS analyzes the impacts of fishing over a range of TAC specifications and compares them to impacts of status quo fishing. NEPA guidelines require consideration of several, or a range of, alternatives, in addition to the proposed action. This action falls within the range of alternatives analyzed in the FSEIS, however, new information has arisen since then that must be addressed under NEPA, therefore, this environmental assessment (EA) is being prepared.

This EA presents a brief analysis of the environmental impacts associated with changing the total allowable catch (TAC) amounts from those set in 1998 to those proposed for 1999 for the federally managed Groundfish Fisheries in the Bering Sea and Aleutian Islands Management Area (BSAI) and in the Gulf of Alaska (GOA). Alternative actions include the interim 1999 TAC specifications and the final 1999 TAC specifications recommended by the North Pacific Fishery Management Council (Council) as compared to the 1998 TAC specifications as published in the final specification for the 1998 fisheries (BSAI 63 FR 12689, March 16, 1998; GOA 63 FR 12027, March 12, 1998). Potential impacts of the recommended 1999 TAC specifications compared to the 1998 TAC specifications on target groundfish species categories, higher trophic level species, Endangered Species Act listed species, habitat, other predators and prey which together constitute the ecosystem, and socioeconomic impacts are addressed.

Species listed under the Endangered Species Act (ESA) are present in the action area and some are negatively affected by the fishing action. NMFS 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 EEZ off Alaska, must be in compliance with the ESA. On December 3, 1998, NMFS completed a Biological Opinion concluding that trawl fisheries for walleye pollock in the BSAI and GOA, jeopardize the continued existence of the Steller sea lion and adversely modifies its critical habitat (NMFS, 1998b). On December 16, 1998, NMFS issued revised reasonable and prudent alternatives based on the Council's recommendations adopted during its December meeting, which adhere to the principles identified in the December 3, 1998, Biological Opinion (NMFS, 1998e) . NMFS is preparing emergency rules to avoid jeopardizing the endangered Steller sea lions during the 1999 fishing season. NMFS also completed informal consultation regarding impacts to newly listed and proposed Pacific salmon species (NMFS, 1998d). The USFWS extended the Section 7 Consultation for Short-tailed Albatross taken in the groundfish fisheries by longline fishing gear into 1999 (USFWS, 1998). Copies of these new section 7 consultations are contained in Volume 2 of the FSEIS (NMFS, 1998a).

Updated information on the status of groundfish stocks was reviewed by the Plan Teams for the groundfish fisheries of the BSAI and GOA at their September and November 1998 meetings, and was presented in the final Stock Assessment and Fishery Evaluation (SAFE) Reports for the Groundfish Resources of the BSAI and GOA as Projected for 1999 (NPFMC 1998a; b). Using the best available information, the Plan Teams determined biomass, the overfishing levels (OFLs), and acceptable biological catches (ABC) and TAC for the 1999 fisheries and recommended them to the Council in the SAFE reports. After reviewing the current information, the Council recommended 1999 TAC specifications to the Secretary of Commerce.

The sums of the recommended final 1999 ABC and OFLs specifications from the SAFE reports, and the TAC specifications as recommended by the Council follow. The Optimum Yields (OY) were established in the Fishery Management Plans for the Groundfish Fishery of the BSAI (NPFMC, 1995) and the GOA (NPFMC, 1994).

Parameters	BSAI (metric tons)	GOA (metric tons)
OY	2,000,000	800,000
ABC	2,247,846	532,590
TAC	2,000,000	306,535
OFL	3,719,391	778,890

NMFS acknowledges that certain mitigation measures must be in place before the start of the 1999 BSAI and GOA groundfish fisheries so that a finding of no significant impact can be reached. These measures include a final rule implementing changes to the Atka mackerel fishery in the BSAI to avoid jeopardizing the continued existence of the western population of endangered Steller sea lions, and an emergency interim rule implementing the revised reasonable and prudent alternatives for the BSAI and GOA Walleye pollock fisheries as outlined by NMFS in the 1998 Biological Opinion (NMFS, 1998b), and as updated in a memorandum on December 16, 1998 (NMFS, 1998e). A separate EA will address each of these pending rules, and will analyze the effects of that action on the human environment. If these mitigation measures cannot be implemented before the start of the fishery, NMFS, by emergency rule under the authority of the Magnuson-Stevens Act, will prohibit fishing until such time that mitigation measures can be fully implemented.

By regulation, the interim 1999 specifications are derived from the proposed 1999 specifications and are 25 percent of the proposed annual TAC, except for pollock which is the full first season allocation. Due to the decrease in the pollock ABC and TAC in the BSAI and GOA, the interim allocation of pollock will be amended by emergency interim rule before the start of the 1999 trawl fishery. This emergency interim rule will also address changes in the spatial and temporal prosecution of the pollock fishery in both the GOA and BSAI as required by the RPAs in the Biological Opinion issued by NMFS on December 3, 1998, in order to avoid jeopardizing the continued existence of the western population of endangered Steller sea lions.

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1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

The United States has exclusive fishery management authority over all living marine resources, except for migratory species, found within the exclusive economic zone between 3 and 200 nautical miles from the baseline used to measure the territorial sea under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) of 1996. The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in Regional Fishery Management Councils. In the Alaska region, the North Pacific Fishery Management Council (Council) has the responsibility to prepare fishery management plans (FMPs) for the marine resources it finds require conservation and management. The USDOC NOAA National Marine Fisheries Service (NMFS) is charged with carrying out the federal mandates of the Department of Commerce with regard to marine fish. NMFS Alaska Regional Office and Alaska Fisheries Science Center research, draft, and support the management actions requested by the Council.

The Magnuson-Stevens Act established that the FMPs must specify the optimum yield from each fishery, which would provide the greatest benefit to the Nation, and must state how much of that optimum yield can be expected to be harvested in U.S. waters. The FMPs must also specify the level of fishing that would constitute overfishing. Using the framework of the FMPs and current information about the marine ecosystem (stock status, natural mortality rates, and oceanographic conditions), the Council recommends total allowable catch (TAC) specifications and prohibited species catch (PSC) limits based on biological and economic determinations made by NMFS to the Secretary of Commerce. Intermediate determinations of acceptable biological catch (ABC) and overfishing level (OFL) for each of the FMP established target species or species groups precedes recommendations of TAC specifications and PSC limits.

Using stock assessments prepared annually by NMFS and ADF&G, Plan Teams calculate biomass, ABC, and OFL for each species or species group, as appropriate, for each of the various geographic areas of the Alaska EEZ that are open to harvest. The Plan Teams' rationale, models, and resulting ABC and OFL calculations are documented in the preliminary and final stock assessment and fishery evaluation (SAFE) reports. SAFE reports are reviewed by the Council's Advisory Panel and Scientific and Statistical Committee, the public, and the Council members and are part of the permanent record on the fisheries.

Total allowable catch specifications and prohibited species catch limits are determined by the Council and recommended to the Secretary annually. NMFS and ADF&G collect data for stock assessments annually. The Plan Teams meet in September and November. Preliminary SAFE reports are produced by the end of September and final ones by the end of November. Since 1990, specification of interim harvest levels are made. With few exceptions, the Secretary implements one-fourth of the proposed TAC specifications and one-fourth of each proposed PSC allowance and apportionments thereof toward fisheries occurring in the first quarter of the calendar year. Following completion of analysis of any new stock status, the Council at its December meeting determines what TAC specifications and PSC limits to recommend to the Secretary. The final specifications are generally implemented in February. The final TAC specifications and PSC limits replace the interim specifications upon approval by NMFS.

1.2 Purpose

This EA tiers off the FSEIS (NMFS, 1998a), to analyze the impacts of the 1999 Council recommended TAC in comparison with other alternative TAC specifications, and investigates possible environmental and socioeconomic impacts of groundfish harvests under a range of alternative TAC specifications for the BSAI and GOA.

The final 1999 SAFE reports (NPFMC, 1998a; b) incorporate biological survey work completed during

the summer of 1998, any new methodologies applied to obtaining these data, and ABC and OFL determinations that are based on the most recent stock assessments. At its September and December 1998 meetings, the Council, its Advisory Panel, its Scientific and Statistical Committee, and its Ecosystem Committee reviewed the SAFE reports and made recommendations based on that information about the condition of groundfish stocks in the respective fishing areas. The ABC specifications proposed by the Council for the 1999 fishing year, therefore, are based on the best available scientific information, including projected biomass trends, information on assumed distribution of stock biomass, and revised technical methods used to calculate stock biomass. The TAC specifications (Tables 1 and 2), once implemented, define upper harvest limits, or fishery removals, during the 1999 fishing year. Absent approval within the first quarter of calendar year 1999, directed fishing in excess of the interim TAC specification is unauthorized.

2.0 ALTERNATIVES INCLUDING PROPOSED ACTION

In this EA, NMFS is considering the following alternatives. Note that alternative A, implementation of the proposed 1999 TAC specifications, is the preferred alternative. These alternatives tier off the detailed analysis of alternatives in the FSEIS in sections 2.3 and 4.0.

Alternative A: Implement the recommended 1999 TAC specifications.

This is the agency's preferred alternative. Under this status quo alternative, TACs are set by species or species groups for each groundfish complex, and the sum of the TACs of the component species must stay within the OY range of the complex. The OY range for the BSAI groundfish complex is 1.4 to 2.0 million metric tons (mt), and that for the GOA is 116,000 to 800,000 mt. The TACs of the component species are determined annually based mainly on the biological status of the stocks and other ecological and socio-economic aspects of the fisheries. Under this alternative in section 2.3 of the FSEIS, mathematical models of the age-structure of the ten dominant stocks were developed to predict the stock composition and dynamics. Details of the structure and dynamics of the models are explained in section 4.3 of the FSEIS. Under the present management system, TACs are re-set each year based upon understanding of the status of the stocks for that year.

Alternative B: Implement specifications that set the sum of the TACs at the lower end of OY range while allowing for each species' TAC to be set lower than its OFL.

Under Alternative B, the sum of TACs are set at the lower end of the OY range. This alternative was examined in the FSEIS in section 2.3.2. In the FSEIS each TAC was decreased proportionately from its 1997 level to generate the TACs for this alternative. The sums of the 1997 TACs for the BSAI and GOA, respectively, were 2.0 million mt and 282,815 mt. Therefore, each BSAI TAC was set at 70 percent of its 1997 level and each GOA TAC was set at 41 percent of its 1997 in order to have TACs that summed to 1.4 million mt and 116,000 mt for the BSAI and GOA, respectively. With this alternative, each species' TAC is held constant for 1999 through 2002. The specific sets of TACs are shown under Alternative B of the FSEIS in Table 2-1 of the for the BSAI species complex and Table 2-2 for the GOA species complex.

Alternative C: Implement specifications that set the sum of the TACs at the upper end of OY range while allowing for each species' TAC to be set lower than its OFL.

Under Alternative C, the sum of the TACs are set at the upper end of OY range while allowing for each species' TAC to be set lower than its OFL. In the FSEIS section 2.3.3, the sum of the

BSAI TACs in 1997 was 2.0 million mt; therefore, the BSAI TACs for Alternative C were set equal to their 1997 levels. This was not done for the GOA because the 1997 GOA TACs summed to much less than the upper end of the OY range. The 1998 overfishing levels were used to set the GOA TACs for Alternative C. The upper end of the OY range is 800,000 and the sum of the 1998 OFLs is 817,620 mt; therefore, each TAC was set equal to 97.8 percent of the OFL for that species. With this alternative, each species' TAC in the FSEIS is held constant for 1999 through 2002. The specific sets of TACs are shown under Alternative C in the FSEIS in Table 2-1 for the BSAI species complex and Table 2-2 for the GOA species complex.

Alternative D: No directed fishing for groundfish in the Exclusive Economic Zone off Alaska.

Under Alternative D, in the FSEIS, no directed groundfish fisheries in the Exclusive Economic Zone off Alaska is assumed beginning in fishing year 1999. The TACs are set at zero from fishing years 1999 to 2002. The specific sets of TACs are shown in the FSEIS, under Alternative D in Table 2-1 for the BSAI species complex and Table 2-2 for the GOA species complex.

3.0 ENVIRONMENTAL AND ECONOMIC CONSEQUENCES OF ACTIONS

An EA is required by NEPA to determine whether a proposed action will result in significant effects on the human environment. If the environmental effects of the action are determined not to be significant based on an analysis of relevant considerations, the EA and resulting finding of no significant impact would be the final environmental documents required by NEPA. If this analysis concludes that the proposal is a major Federal action significantly affecting the human environment, an environmental impact statement must be prepared.

An EA must include a brief discussion of the need for the proposal, alternatives to the proposal, the environmental impacts of the proposed action, and a list of agencies and persons consulted. The purpose and need are discussed in Section 1. A description of the alternatives is in Section 2. Section 6 contains the list of agencies and persons consulted. This section contains the discussion of the environmental impacts including impacts on threatened and endangered species and marine mammals.

The environmental impacts generally associated with fishery management actions are effects resulting from: (1) Harvest of fish stocks that may result in changes in food availability to predators, changes in population structure of target fish stocks, and changes in community structure; (2) changes in the physical and biological structure of the benthic environment as a result of fishing practices (e.g., gear effects and fish processing discards); (3) entanglement/entrapment of non-target organisms in active or inactive fishing gear; and (4) major shifts in the abundance and composition of the marine community as a result of disproportionate fishing pressure on a small set of species (also known as "cascading effects," National Research Council, 1996). The FSEIS, comprehensively analyzes these effects at a variety of TAC levels. New information is presented in this EA which will tier off the FSEIS.

3.1 Overview of Status

The status of each target species category, biomass estimates, and ABC specification are presented both in summary and in detail in the GOA and BSAI SAFE reports (NPFMC, 1998a; b). This EA addresses significant changes between the 1998 TAC specifications and the Council recommended 1999 TAC specifications and provides relevant socioeconomic information. This EA tiers off information presented in the FSEIS; therefore, only new information regarding the status of stocks, evaluation methods, impacts on ESA listed species, and updated survey data are provided.

Four categories of species are likely to be taken in the GOA and BSAI groundfish fisheries: (1)

Prohibited species--those species and species groups the catch of which must be returned to the sea with a minimum of injury except when their retention is authorized by other applicable law; (2) target species--those commercially important species for which sufficient data exists to allow each to be managed on its own biological merits; (3) other species--those species and species groups currently of slight economic value and not generally targeted for harvest; and (4) nonspecified species--those species and species groups generally of no current economic value taken by the groundfish fishery in Federal waters only as incidental catch.

Amendments 44/44 to the BSAI and GOA Groundfish FMPs, approved by the Council in June 1996, define ABC and OFL for the BSAI and GOA fisheries. These Amendments define overfishing as any amount of fishing in excess of a prescribed maximum allowable rate. This maximum allowable rate is prescribed through a set of six tiers which are listed in section 3.3.1 of the FSEIS. Each target species assessment is analyzed under one of the six tiers according to the criteria outlined in section 3.3.1 of the FSEIS. The Council's SSC has final authority for determining whether a given item of information is " reliable" for the purpose of this definition, and may use either objective or subjective criteria in making such determinations.

1998 Groundfish Biological Opinion Authorizing the Pollock and Atka Mackerel Fisheries for 1999-2002
On December 3, 1998, NMFS issued its Biological Opinion on the 1999-2002 authorization of the BSAI Atka mackerel fishery, the BSAI pollock fishery, and the GOA pollock fishery under their respective groundfish fishery management plans (NMFS, 1998b). The opinion analyzes the effects of these fisheries on the endangered western population of Steller sea lions and its critical habitat. After reviewing the 1998 status of ESA listed species, the environmental baseline for the action area, the effects of the proposed 1999-2002 fisheries, and the recommendations of the NPFMC, NMFS' Biological Opinion finds no jeopardy to the continued existence of current ESA listed species or adverse impact to their critical habitat by the BSAI Atka mackerel fishery if current proposed mitigation measures for the fishery are effective in prior to the start of the fishing in 1999 (see below). However, for the proposed 1999-2002, BSAI and GOA Walleye pollock fisheries, NMFS' Biological Opinion found that the actions, as proposed, are likely to jeopardize the continued existence of the western population of Steller sea lions and also adversely modify its critical habitat.

For the pollock fisheries, NMFS established reasonable and prudent alternatives (RPAs) to avoid jeopardizing Steller sea lions and presented these RPAs to the Council during its December meeting. The Council recommended modified RPAs for the pollock fisheries that were then modified by NMFS to be in compliance with the RPAs of the Biological Opinion. The modified RPAs were issued by NMFS in a memorandum dated December 16, 1998 from Gary Matlock, Director, Office of Sustainable Fisheries. NMFS has determined that these mitigation measures would, if implemented, allow the proposed fishery to occur without jeopardizing the continued existence of Steller sea lions and would not result in the modification of critical habitat. NMFS is preparing an emergency rule to implement the final RPAs for 1999, as proposed by the Council and modified by NMFS. This emergency rule will be effective prior to the start of the 1999 pollock trawl fisheries, that will by current regulation, automatically open on January 20, 1999. The emergency rule will be accompanied by an EA that will analyze the environmental and socioeconomic impacts of the proposed changes to the pollock fishery. This suite of changes would primarily alter the fishery in time and space, thereby distributing effort more evenly than the pulse fisheries of the past. The emergency rule will not alter the total amount of the 1999 pollock TACs.

At its June 1998 meeting, the Council considered an analysis presented by NMFS regarding alternative measures in the Atka mackerel fishery that would mitigate fishery competition for prey with the endangered Steller sea lions. Six alternatives were presented to the Council; the alternative adopted would (1) divide the Atka mackerel TACs specified for each subarea and district of the BSAI into two

equal seasonal allowances, (2) reduce the percentage of Atka mackerel TAC taken from Steller sea lion critical habitat over a 4-year period in the Western and Central Districts of the Aleutian Islands Subarea, and (3) extend the seasonal 20 nm no-trawl zone around the Seguam and Agligadak rookeries in the Eastern District of the Aleutian Islands into a year-round closure. A proposed rule was published in the Federal Register on November 9, 1998 (63 FR 60288). This rule, if approved, would limit the amount of catch within Steller sea lion critical habitat as discussed above, but would not alter the overall Atka mackerel TAC amounts. A final rule is expected by NMFS to be published in the Federal Register before the regulatory start of the trawl fisheries on January 20, 1999. The determination of the Biological Opinion requires that these mitigation measures be effective prior to the start of the Atka mackerel trawl fishery to avoid jeopardizing the continued existence of the western population of endangered Steller sea lions. If the Atka mackerel mitigation measures are not implemented prior to January 20, 1999, NMFS, by emergency rule will close directed fishing with trawl gear in the BSAI until such time that the mitigation measures can be implemented.

3.1.1 Status of Groundfish Target Species in the BSAI

Designated target species and species groups in the BSAI are alleye pollock, Pacific cod, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, other flatfish, flathead sole, sablefish, Pacific ocean perch, other rockfish, Atka mackerel, squid, and other species. Differences between 1998 and 1999 for the BSAI area are presented in Table 1 and discussed below. For detailed life history, ecology, and fishery management information regarding groundfish stocks in the BSAI see Section 3.3.3 of the FSEIS.

Walleye pollock in the Eastern Bering Sea (EBS) region are assessed with an age-structured model which for 1999 incorporates data from the 1998 fishery and bottom trawl survey. The 1998 bottom trawl survey showed an estimated biomass decrease of 27 percent relative to the 1997 estimates. For 1999, of the nine models presented to the Plan Team, model 2 was chosen which assumes a Ricker stock-recruitment relationship and uses the average commercial fishery selectivity pattern from the most recent three years to make projections for future catch and stock size. The assessment model estimated that the biomass of the EBS pollock stock decreased by 3 percent from 1997 to 1998; but is expected to increase by 37 percent from 1998 to 1999 when an expected strong 1996 year-class recruits into the fishery. Overall, the stock biomass is slightly below B_{msy}. The Plan Team and the SSC determined for 1999 that pollock qualified for management under tier 2 of Amendment 44. The ABC was calculated at a conservative exploitation rate of $F_{40\%}$ due to concerns over the uncertainty of recent year classes. The calculated ABC is 992,000 mt, which the Council recommended as the 1999 TAC, down from 1,110,000 mt in 1998.

The Aleutian Islands region is managed under tier 5 of Amendment 44. The Plan Team for 1999, concluded that the 1997 survey biomass estimate was the best available and proposed keeping ABC and OFL at their respective 1998 levels. However, because of endangered Steller sea lion concerns the Council, at its December meeting recommended a 2,000 mt TAC in the Aleutian Islands to prohibit any directed fishing for pollock during the 1999 fishery. Therefore, only incidental catch amounts of pollock in the Aleutian Islands area may be harvested in 1999.

The American Fisheries Act (AFA) signed into law by the President on October 20, 1998, redistributes the pollock TAC among components of the BSAI fishery. The AFA reduces the overall number of catcher/processors that can participate in the pollock fishery, allocates a higher percentage of the pollock TAC to catcher vessels delivering shoreside, and requires protections for other groundfish fisheries from the listed catcher/processors. If listed catcher/processors form coops in 1999, that sector of the fishery could be transformed from a pulse fishery to one that is more evenly distributed in both time and space.

The Bogoslof region qualifies for management under tier 3 of Amendment 44. New data from the 1998 hydroacoustic survey indicated that the Bogoslof spawning biomass increased by 39 percent from 1997

to 490,000 mt; but was still considerably lower than the historical high of 2.4 mmt in 1988. Because of continued low biomass estimates, the Council at its December 1998, meeting adopted a motion that would prohibit directed fishing for pollock in 1999, in the Bogoslof region.

Atka mackerel are found from the Kamchatka Peninsula through the Bering Sea and GOA to southeast Alaska. Atka mackerel is a schooling, semi-demersal species most abundant in the Aleutian Islands, and is harvested primarily with trawl gear. In 1994, the Atka mackerel ABC in the Aleutian Islands subarea was divided between the Western, Central, and Eastern Aleutian districts. The stock assessment has been updated since 1998, incorporating new catch, age, and size composition data from the 1998 fishery, age data from the 1997 Aleutian Islands survey, and a change in the initial year of the data time series from 1972 to 1977. In 1998 the SSC determined that Atka mackerel qualified for management under tier 3 of Amendment 44. Projected spawning biomass for 1999 is 193,000 mt, placing Atka mackerel in sub-tier "a" of tier 3. The 1999 OFL is 148,000 mt and the ABC is 73,300 mt. The Council recommended a TAC of 66,400 mt for the 1999 fishery, which was lower than the ABC because of concerns over the uncertainty of recent Atka mackerel recruitment. The Atka mackerel stock is presently considered to be at a moderate level, but biomass is on a declining trend.

Pacific cod is managed as a single BSAI stock and is the second largest Alaskan groundfish fishery. A length-based synthesis model is used to assess Pacific cod biomass estimates. Annual trawl surveys in the eastern Bering Sea and triennial trawl surveys in the Aleutian Islands are the primary fishery independent sources of data. The stock assessment model estimated a 14 percent decrease in the age 3+ stock biomass relative to last year's estimate; but overall stock biomass is still moderately high. The SSC has determined that Pacific cod qualifies for management under sub-tier "b" of tier 3 under Amendment 44. The Plan Team has expressed concern that the trawl survey biomass estimate has decreased for four years in a row to a point only slightly higher than the all-time low and because the last three year classes (assessed at age 3) have all been well below average. The 1999 ABC and TAC recommended by the Council is 177,000 mt, down from 210,000 mt in 1998.

Sablefish have been shown to be highly migratory (Maloney and Heifetz 1997) and thus have been assessed as a single stock in Alaska using an age-structured model incorporating fishery and survey catch data of age and length compositions. New data incorporated into the model for the 1999 fishery include age data from the 1997 sablefish longline survey, relative abundance and length data from the 1998 sablefish longline survey, and length data from the 1997 longline fishery. New data from the IFQ fishery shows that the fishery tends to select for larger fish. Therefore, the age-structured model was altered to allow for differences in the fishery selectivity curve due to recent changes in the harvest of sablefish under the IFQ fishery. Sablefish has been determined to qualify for management under tier 3 of Amendment 44. The stock assessment model predicted that the combined-area "exploitable" biomass would decrease until the year 2002, then stabilize. The Council did not agree with the Plan Team and SSC recommend ABC (1,860 mt) for sablefish in the Aleutian Islands, because it was higher than the 1998 ABC. The Council recommended a TAC which was less than the ABC, but equal to last year's TAC of 1,380 mt. The Council felt that given declining survey biomass trends that an increase in TAC would be inconsistent. The TAC in the Bering Sea was set equal to the ABC of 1,340 mt.

Yellowfin sole (*Limanda aspera*) is the most abundant flatfish species in the eastern Bering Sea and is the target of the largest flatfish fishery in the United States. They inhabit the Bering Sea shelf and are considered to be one stock. The time-series of fishery and survey age compositions allows the use of an age-based stock assessment model (Wilderbuer 1997). New data incorporated into the model for the 1999 fishery include 1997 fishery and survey age compositions, 1998 trawl survey biomass point estimate and standard error, estimate of the discarded and retained portions of the 1997 catch, and an estimate of total catch and discard through September 5, 1998. The stock assessment model estimated a 2 percent increase in the age 2+ stock biomass from 1997 to 1998; and overall stock biomass is at

historical high. Given the resulting estimated spawning biomass level, yellowfin sole was found by the Plan Team to qualify for management under sub-tier "b" of tier 3 of Amendment 44. The ABC for yellowfin sole was calculated to be 212,000 mt, about 8,000 mt less than the 1998 ABC. A TAC of 207,980 mt was recommended by the Council, a value that is likely to be much higher than the harvested capacity of the fleet in 1999.

Rock sole (*Lepidopsetta bilineata*) is abundant on the eastern Bering Sea shelf and to a lesser extent in the Aleutian Islands. The time-series of fishery and survey age compositions allows the use of an age-based stock assessment model (Wilderbuer and Walters 1997). The SSC has determined that rock sole qualifies for management under tier 3 of Amendment 44. New data incorporated into the model for the 1999 fishery include 1997 fishery and survey age compositions, 1998 trawl survey biomass point estimates and standard error, and an estimate of catch and discard through September 5, 1998. The stock assessment model estimated that the biomass declined 4 percent from 1997 to 1998; but overall stock biomass is still near the historical high. The 1999 ABC for rock sole is 309,000 mt, and the Council recommended a 120,000 mt TAC which was a 20 percent increase over last year, well above the anticipated harvest capacity of the fleet.

Greenland turbot is distributed from Baja California northward throughout Alaska, primarily found in the BSAI region. A length-based stock assessment is used in the model. New data for 1999 include catch and survey data from the EBS bottom trawl survey. Projected spawning biomass for 1999 is 110,000 mt, placing Greenland turbot in sub-tier "b" of tier 3. The stock assessment model estimated a 6 percent increase in the age 1+ stock biomass from 1997 to 1998; and overall stock biomass is near the historical low. A lack of recruitment in recent years has led to extra caution in setting harvest levels. Age 1+ biomass for the three most recent recruitment estimates has constituted the three lowest values in the time series. The calculated ABC for Greenland turbot is 14,200 mt, however given declining stocks the Council at its December meeting recommended a reduced TAC of 9,000 mt, which was consistent with last year's catch and a more conservative approach to managing the stock.

Arrowtooth flounder (*Atheresthes stomias*) is common from Oregon through the eastern Bering Sea (Allen and Smith 1988). The very similar Kamchatka flounder (*Atheresthes evermanni*) also occurs in the Bering Sea. Because it is not usually distinguished from arrowtooth flounder in commercial catches, both species are managed as a group. The time-series of fishery and survey size compositions allows the use of a size-based stock assessment model (Wilderbuer and Sample 1997). Arrowtooth flounder qualifies for management under sub-tier "b" of tier 3 of Amendment 44. New data incorporated into the model for the 1999 fishery include an estimate of catch and discard through September 5, 1998 and 1998 Bering Sea shelf trawl survey biomass and size composition estimates. Survey observations in 1998 showed differential sex compositions in the population, but the model was set to a balanced sex ratio because of a lack of accuracy in predicting biomass estimates with differential sex ratios. The stock assessment model estimated an increased biomass amount of 1 percent from 1997 to 1998. The overall stock biomass is considered to be near the historical high. The 1999 ABC for arrowtooth flounder is calculated to be 140,000 mt. The council recommended a TAC of 134,354 mt, an amount higher than anticipated harvest capacity for 1999, the fleet harvested 14,930 mt in 1998. This motion was recommended by the Council to allow the CDQ fisheries to have adequate biomass for incidental catch of arrowtooth flounder in other directed fisheries.

Flathead sole (*Hippoglossoides elassodon*) is distributed from northern California northward throughout Alaska (Wolotira et al. 1993). In the northern part of its range, it overlaps with the related and very similar Bering flounder (Hippoglossoides robustus) (Hart 1973). Because it is difficult to separate these two species at sea, they are currently managed as a single stock (Walters and Wilderbuer 1997). Flathead sole is managed under a length-structured model as the primary assessment tool and incorporates new catch and survey information for 1999. The stock assessment model estimated that the

biomass declined 5 percent from 1997 to 1998; but overall stock biomass is still near the historical high. In 1998 flathead sole qualified for management under tier 4 of Amendment 44. However, the Plan Team considered new reliable estimates of biomass and now consider flathead sole in sub-tier "a" of tier 3 of Amendment 44. The 1999 ABC and TAC for flathead sole is 77,300 mt, a 22,700 mt reduction from the 1998 TAC. However, the fleet harvested only 24,228 mt of a 100,000 mt TAC in 1998 and are not expected to harvest the entire 1999 TAC.

Other flatfish compose eight species in the Bering Sea (Alaska plaice, rex sole, Dover sole, starry flounder, English sole, butter sole, sand sole, and deep sea sole). In the Bering Sea, Alaska plaice is the most abundant (comprising 92 percent of the group biomass) and commercially important of the other flatfish species. In general other flatfish are taken as incidental catch in other directed groundfish fisheries. The time series of fishery and survey age compositions allows the use of an age-based stock assessment model (Wilderbuer and Walters 1997). For 1999 new catch and survey information has been added to the model. The 1998 EBS bottom trawl survey resulted in a 30 percent decrease in the biomass estimate for Alaska plaice and a 5 percent increase for the remaining species. Overall, the stock assessment model for Alaska plaice estimated that the Age 1+ biomass decreased 4% from 1997 to 1998, but was still at a moderately high level. Given that the biomass exceeds $B_{40\%}$, the Plan Team's ABC and OFL recommendations for 1999 were calculated under sub-tier "a" of tier 3. The 1999 ABC and TAC recommended by the Council for other flatfish is 154,000 mt. The 1999 ABC was down from 164,000 mt in 1998.

Pacific ocean perch (POP) is primarily a demersal species which inhabits the North Pacific and Bering Sea. Pacific ocean perch is the most commercially important rockfish in Alaska's fisheries and is taken almost exclusively with bottom trawls. A time series of fishery and survey age compositions qualifies the stock into an age-based assessment model. For 1999, fishery catch information has been updated but results from the recent EBS shelf trawl surveys are not included in this year's assessment. A projected spawning biomass for 1999 EBS is 24,800 mt, placing true POP in sub-tier "b" of tier 3. The 1999 fishing mortality rate under tier 3b is lower than that in 1998. For the AI stock assessment, a projected spawning biomass of 129,000 mt places true POP in sub-tier "a" of tier 3. The 1999 ABC for POP in the EBS was calculated at 1,900, but given the Council's concern over a continually declining stock, a conservative TAC of 1,400 mt was recommended for 1999. The Aleutian Islands ABC and TAC as recommended by the Council is 13,500 mt.

Other red rockfish complex is composed of sharpchin, northern, shortraker, and rougheye rockfish in the EBS. Biomass estimates for the other red rockfish complex in the EBS are generally averaged over all years to obtain the best estimate of biomass for the species subcomplex using an age-based stock assessment model. However, for 1998 and 1999, data from two tows in the 1986 Aleutian Islands survey was eliminated from the stock assessment model because of exceptionally high biomass values. The Plan Team and SSC concluded that this revised value for biomass represented the best estimate of northern rockfish biomass in the EBS. A biomass estimate of 693 mt qualified management of the other red rockfish complex under tier 5 of Amendment 44. The Council recommended an ABC and TAC amount of 267 mt, equal to the amount in 1998.

Sharpchin and northern rockfish are broken out of the other red rockfish complex for management purposes in the Aleutian Islands area. Because sharpchin rockfish are found only rarely in the Aleutians, northern rockfish make up the major component of this complex. Bottom trawl survey biomass estimates for sharpchin/northern rockfish are averaged over all years to obtain the best estimate of biomass for the species subcomplex. This procedure results in a biomass estimate of 94,000 mt for 1999. In 1997 the SSC determined that management of this complex qualified under tier 5 of Amendment 44. The 1999 ABC and TAC for the sharpchin/northern subcomplex in the AI area is 4,230 mt, unchanged from 1998 amounts due to the lack of any new assessment data.

Shortraker and rougheye rockfish are broken out of the other red rockfish complex for management purposes in the Aleutian Islands area. A sufficient time series of fishery and survey age compositions is not available to construct an age-based stock assessment model for shortraker/rougheye rockfish. Therefore, survey biomass estimates for shortraker/rougheye rockfish are averaged over all years to obtain the best estimate of biomass for the species subcomplex. This procedure results in a biomass estimate of 46,500 mt for 1999. In 1997, the SSC determined that management of this complex qualified under tier 5 of Amendment 44. The 1999 ABC and TAC amount for the shortraker/rougheye subcomplex in the AI area is 965 mt, unchanged from 1998 amounts due to the lack of any new assessment data.

Other rockfish. Most of the species in the other rockfish complex have been reported to be demersal or semi-demersal, with different species occupying different depth strata. Most other rockfish are long lived with low natural mortality rates. The other rockfish complex assessment is based on biomass estimates from all bottom trawl surveys and are averaged over all years to obtain the best estimates of biomass for the species complex. The great majority of the biomass is based on thornyhead rockfish. The SSC determined that the other rockfish complex qualifies for management under tier 5 of Amendment 44. The 1999 ABC and TAC for the other rockfish complex is 369 mt, unchanged from 1998 due the lack of any new assessment data.

Squid are found throughout the Pacific Ocean and are not currently the target of groundfish fisheries in the BSAI region. They are primarily caught as incidental catch in trawl fisheries for pollock and rockfish. This year a preliminary surplus production model was presented for squid, but due to concerns by the author of inconclusive model results the Plan Team reverted to managing squid under tier 6 of Amendment 44. Thus, OFL and ABC are based on average catch levels from 1978 through 1995. The Plan Team hopes to further develop this model to move squid out of tier 6. The 1999 ABC and TAC for squid based on catch levels from 1978 through 1995 is 1,970 mt, which was unchanged from 1998.

Other species The assessment is an update of last years assessment, incorporating new catch and survey information from the EBS bottom trawl survey. This year's EBS bottom trawl survey resulted in a 9 percent decrease form last year's biomass estimate. Last year the SSC determined that "other species" category qualified for management under tier 5 of Amendment 44. However, the Plan Team recommended that ABC be set equal to the average catch from 1978 through 1995, and that the OFL be calculated from the tier 5 formula. At its December meeting, the Council recommended the SSC recommended ABC of 32,860 mt for the other species complex, and set TAC equal to ABC.

Table 1. Council recommended total allowable catch specifications for the Bering Sea and Aleutian Islands management area. 1998 ABC, TAC, and actual catch through November 7, 1998; and 1999 ABC, TAC, and OFL amounts (values are in mt).

		1998 Specifications			1999 Specifications		
Species	Area	ABC	TAC	Actual Catch	ABC	TAC	OFL
Pollock	Bering Sea (BS)	1,110,000	1,110,000	1,020,720	992,000	992,000	1,720,000
	Aleutian Is. (AI)	23,800	23,800	21,945	23,800	2,000	31,700
	Bogoslof District	6,410	1,000	8	15,300	1,000	21,000
Pacific cod	BSAI	210,000	210,000	179,115	177,000	177,000	264,000
Sablefish	BS	1,300	1,300	573	1,340	1,340	2,090
	AI	1,380	1,380	615	1,860	1,380	2,890
Atka mackerel	Total	64,300	64,300	55,782	73,300	66,400	148,000
	Western AI	27,000	27,000	24,000	30,700	27,000	.....
	Central AI	22,400	22,400	20,000	25,600	22,400	.....
	Eastern AI/BS	14,900	14,900	12,000	17,000	17,000	.....
Yellowfin sole	BSAI	220,000	220,000	95,036	212,000	207,980	308,000
Rock sole	BSAI	312,000	100,000	33,454	309,000	120,000	444,000
Greenland turbot	Total	15,000	15,000	8,856	14,200	9,000	29,700
	BS	.....	10,050	.....	9,515	6,030	.....
	AI	.....	4,950	.....	4,685	2,970	.....
Arrowtooth flounder	BSAI	147,000	16,000	14,930	140,000	134,354	219,000
Flathead sole	BSAI	132,000	100,000	24,228	77,300	77,300	118,000
Other flatfish	BSAI	164,000	89,434	15,137	154,000	154,000	248,000
Pacific ocean perch	BS	1,400	1,400	1,031	1,900	1,400	3,600
	AI Total	12,100	12,100	9,070	13,500	13,500	19,100
	Western AI	5,580	5,580	4,570	6,220	6,220	.....
	Central AI	3,450	3,450	2,500	3,850	3,850	.....
	Eastern AI	3,070	3,070	2,000	3,430	3,430	.....
Other red rockfish	BS	267	267	107	267	267	356
Sharpchin/Nrthrn.	AI	4,230	4,230	3,652	4,230	4,230	5,640
Shortrkr./rougheye	AI	965	965	668	965	965	1,290
Oher rockfish	BS	369	369	205	369	369	492
	AI	685	685	361	685	685	913
Squid	BSAI	1,970	1,970	908	1,970	1,970	2,620
Other species	BSAI	25,800	25,800	23,448	32,860	32,860	129,000
TOTAL		2,454,976	2,000,000	1,509,849	2,247,846	2,000,000	3,719,391

3.1.2 Status of Groundfish Target Species in the GOA

Designated target species and species groups in the GOA are walleye pollock, Pacific cod, deep water flatfish, rex sole, shallow water flatfish, flathead sole, arrowtooth flounder, sablefish, other slope rockfish, northern rockfish, Pacific Ocean Perch, shortraker and rougheye rockfish, pelagic shelf rockfish, demersal shelf rockfish, thornyhead rockfish, and other species. Differences between 1998 and 1999 for the GOA are presented in Table 2. and discussed throughout section 3.1.2. For detailed life history, ecology, and fishery management information regarding groundfish stocks in the GOA see Section 3.3 of the FSEIS.

Walleye pollock The projected 1999 exploitable biomass is 737,670 mt which represents age 3+ biomass as estimated from the current stock assessment model. Recent surveys show evidence of a strong 1994 year class, weak 1995 and 1996 year classes and a moderate 1997 year class. It was recommended by the Plan Team that the 1999 ABC amount be apportioned according to the distribution of exploitable biomass as observed in the 1996 bottom trawl survey. No new information was presented for establishing an ABC for the Eastern GOA. The Council recommended a motion that reduced the ABC for pollock by 2,100 mt, the guideline harvest level (GHL) for the 1999 State of Alaska's Prince William Sound pollock fishery. Although the Council accepted the SSC's ABC for the Eastern GOA for 1999, the Council divided the TAC for the Eastern GOA between the West Yakutat and East Yakutat/Southeast Outside areas in order to reduce the harvest amount of pollock in the West Yakutat area. The total recommended 1999 ABC for pollock in the GOA is 100,920 mt, down from 130,000 mt in 1998. The Council set the total TAC equal to ABC (see Table 2 for TAC amounts by management area).

Atka mackerel is a schooling, semi-demersal species, most abundant in the Aleutian Islands. Atka mackerel is harvested primarily with trawl gear. In 1994, Atka mackerel was separated from the other species group in the GOA to prevent overfishing Atka mackerel. Due to extreme catch variances, an estimate of biomass could not be determined from the 1996 trawl survey in the GOA. The ABC recommendation for 1999 was unchanged from 1998 (600 mt), an amount which should be sufficient for incidental catch in other directed fisheries.

Pacific cod The 1998 assessment incorporates new data on size composition from the commercial fisheries in 1997 through August of 1998. The model projected the 1999 total age 3+ biomass to be down about 17 percent from the 1998 projection. The long term projection of biomass for Pacific cod is also expected to decline. However, the stock assessment model estimated ABC to be 90,900 mt, an increase over the 1998 ABC of 77,900 mt. The SSCs ABC recommendation which the Council recommended was an average of the 1998 and 1999 ABC amounts, resulting in an ABC for 1999 of 84,400 mt. This was an increase of 6,500 mt from the 1998 ABC. The Council then reduced the 1999 TAC by the amount of the 1999 State of Alaska inshore Pacific cod harvest amount, so that total removals do not exceed the recommended 1999 ABC. The final recommended TAC is 67,835 mt for the GOA.

Deep water flatfish include Greenland turbot, Dover sole and deep sea sole. Deep water flatfish inhabit the continental shelf and slope across the northern Pacific Ocean from northern Baja California to Japan to depths as great as 1100 meters. These fish were separated from other flatfish in the GOA based on seasonal differences in the bycatch of Pacific halibut. New information for the 1998 assessment included updated catch estimates. Dover sole is the most abundant species in the assemblage. The 1999 exploitable biomass estimate was recalculated based on 1996 survey biomass estimates of Dover sole in the 1 to 500 meter depth range due to insufficient information from deep water areas, which were last sampled in 1987. This adjustment resulted in a 1999 ABC recommendation of 6,050 mt in the GOA. The assessment used an estimated natural mortality rate of 0.10. Following the implementation of the prohibition on the use of trawl gear in the East Yakutat/Southeast Outside management area, 1999 ABC

recommendations for all flatfish include a division of the Eastern GOA ABCs into the West Yakutat and East Yakutat/Southeast Outside areas to prevent disproportionate removals from the West Yakutat area as a result of the trawl prohibition in the remainder of the Eastern GOA area.

Rex sole inhabit the continental shelf and slope at depths from the surface to 800 meters but are most abundant below 200 meters. Rex sole was separated from the deep water flatfish group in 1993 due to high incidental catch rates of Pacific ocean perch while targeting Rex sole. Bottom trawl gear is used in the directed fishery for all of the flatfish target species. The 1999 stock assessment is based upon the estimated abundance estimates of the 1996 trawl survey, includes updated catch information from the 1998 fishery, and uses an assumed natural mortality rate of 0.20. The 1999, ABC recommendation of 9,150 mt is unchanged from 1998. The Council recommended a proposed TAC equal to the ABC.

Shallow water flatfish comprise all flatfish species in the GOA, except those species for which a separate ABC is calculated (deep water flatfish, rex sole, flathead sole, arrowtooth flounder, and Pacific halibut). The 1998 assessment is based on abundance estimates from the 1996 trawl survey and an assumed natural mortality rate of 0.20 for all species and includes updated catch information from 1998. Due to overlapping distributions of flatfish, it is not possible to target on a singular flatfish species. Therefore, flatfish species may be subjected to higher fishing mortalities than recommended by the ABCs. Even the most abundant species of the shallow water category, rock sole, could be over-harvested given the present species grouping. However, the 1998 shallow water flatfish fishery harvested only about 8 percent of the 1998 ABC amount. Historically, catches have been well below the ABC levels, mainly due to the relatively low market value of the fish, and restraints placed upon the fishery by the PSC bycatch limitations. The 1999, ABC recommendation of 43,150 mt was unchanged from 1998, however, the TAC was up slightly from 18,630 mt in 1998 to 18,770 mt in 1999.

Flathead sole occurs widely over the continental shelf and slope from northern California through the North Pacific and Bering Sea to Japan. They are widely found from near the surface to depths of 800 meters. A separate ABC was assigned for flathead sole because they overlap the depth distributions of the deep and shallow water flatfish groups. The 1998 assessment included updated catch information and was based on abundance estimates from the 1996 trawl survey and an assumed natural mortality rate of 0.20. 1999 ABC recommendations were unchanged from 1998.

Arrowtooth flounder occurs over the continental shelf and slope from depths near the surface to 900 meters from California to the eastern Bering Sea. Arrowtooth flounder were separated from the other flatfish complex in 1990, due to their disproportionally high abundance. The 1999 assessment includes a biomass projection based on a stock synthesis model which relies on age composition data from the 1993 and 1996 trawl surveys. Current biomass estimates for arrowtooth flounder in the GOA is greater than the long-term average biomass that would be expected under average recruitment and average fishing mortality. Selective harvesting of high value species may have provided a competitive opportunity for arrowtooth flounder which may account for the increase in abundance. Recent harvests of arrowtooth flounder have been considerably less than the available ABC amount, primarily because of the limited marketability of the product. In recent years however, industry has sought out new markets and products for arrowtooth flounder, yet the ABC remains underutilized. The Plan Team at its October meeting initiated a research team to look into the long term ramifications of disproportionally harvesting groundfish species. The 1999 ABC recommendation is 217,110 mt, up from 208,340 mt in 1998. The Council recommended a TAC of 35,000 mt, an amount which is more than double last year's actual harvest amount.

Sablefish The 1999 assessment includes new information on catch at age data from the 1997 sablefish longline survey, new relative abundance and length at age data from the 1998 sablefish longline survey, and a revised selectivity curve for the sablefish IFQ fishery.
The population is estimated to be decreasing from a peak in the mid-1980s due to weak recruitment in

recent years. The survey abundance index decreased 5.7 percent in numbers and 5.8 percent in weight, from 1997 to 1998. The survey catch rate of fish, 55-57 cm fork length, in 1998 was greater than usual, representing the 1995 year class. The 1999 projected exploitable biomass is 155,000 mt, but is projected to decline to a level of 136,000 mt in 2002, then stabilize. The 1999 ABC recommendation for the GOA is 12,700 mt, down 1,420 mt from the 1998 level of 14,120 mt.

As in 1998, 5 percent of the East Yakutat/Southeast Outside area ABC has been subtracted, and added to the West Yakutat area TAC. This adjustment of TAC allows up to 5 percent of the total Eastern GOA TAC to be available to trawl gear as incidental catch in other directed fisheries following the prohibition of trawl gear east of 140 degrees west longitude. This adjustment does not change the allocation of TAC to fixed gear in any management area of the Eastern GOA.

Other slope rockfish The 1998 assessment includes updated catch information from 1998, species composition and discard rates in the commercial fishery, and age composition data from the 1996 trawl survey. The Plan Team however, recommended an ABC for 1999 equal to 1998. The recommended ABC is based on a harvest rate set equal to natural mortality applied to exploitable biomass. Exploitable biomass is determined from the average of the three most recent trawl surveys. The majority of other slope rockfish are harvested with bottom trawl gear. For 1999, the TAC recommendations include a split in the Eastern Gulf ABC between the West Yakutat and East Yakutat/Southeast Outside areas, to prevent disproportionate harvest of other slope rockfish from the West Yakutat area. The recommended 1999 ABC for other slope rockfish is 5,270 mt, up 10 mt from 1998. However, the Council recommended a TAC for 1999 equal to the ABC (5,270 mt), which is higher than the 1998 TAC of 2,170 mt.

Northern rockfish are found from the GOA through the Bering Sea at depths generally greater than 100 meters. Northern rockfish are harvested with bottom trawl gear. A separate ABC has been recommended since 1993 to prevent overfishing of the highly valued northern rockfish. The 1998 assessment includes updated catch information from 1998, species composition and discard rates in the commercial fishery, and age composition from the 1996 trawl survey. The recommended ABC is based on a harvest rate set equal to natural mortality applied to exploitable biomass. Exploitable biomass is determined from the average of the three most recent trawl surveys. The Plan Team determined that the 1999 ABC should be set equal to the 1998 amount, due to the limited amount of new survey data. In the Eastern GOA, the recommended 1999 ABC of 10 mt is considered impracticable to manage by the Council and was therefore added to the other slope rockfish TAC in the West Yakutat area. The 1999 TAC for northern rockfish is proposed to be 4,150 mt in the Central region, and 840 mt in the Western region.

Pacific ocean perch (POP) inhabit the outer continental shelf and slope regions of the North Pacific and Bering Sea at depths of 100 to 450 meters. As in 1997, the stock synthesis model was used to estimate 1999 exploitable biomass of POP. New information in the 1999 assessment includes updated catch information from 1998, species composition and discard rates in the commercial fishery, a projection of biomass based on the stock synthesis model, and age composition data from the 1996 trawl survey. The recommended ABC of 13,120 mt for 1999 is 300 mt higher than 1998. However, the Council recommended a more conservative 1999 TAC amount of 12,590 mt. For 1999, the Council recommended a split in the Eastern GOA between the West Yakutat and East Yakutat/Southeast areas to prevent disproportionate harvest of POP from the West Yakutat area (see Table 2 for TAC amounts by area).

Shortraker and rougheye rockfish are found from California to the Bering Sea, at depths from 100 to 800 meters. In 1991, shortraker and rougheye rockfish were separated from the other slope rockfish complex to prevent overfishing of shortraker and rougheye rockfish. Due to their low abundance and relatively high incidental catch rates in other directed trawl and longline fisheries, a directed fishery for shortraker and rougheye rockfish has not been possible. The 1998 assessment includes updated catch information

from 1998, species composition and discard rates in the commercial fishery, and age composition data from the 1996 trawl survey. The Plan Team determined that the 1999 ABC should be set equal to the 1998 amount, due to the limited amount of new survey data. The proposed 1999 ABC and TAC is 1,590 mt.

Pelagic shelf rockfish inhabit the continental shelf of the GOA and typically exhibit midwater schooling behavior. The assemblage was separated from the other slope rockfish complex in 1988. Pelagic shelf rockfish are taken primarily by trawl and jig gear in the GOA. In 1998, two species, black rockfish and blue rockfish, were removed from the pelagic shelf rockfish complex so that the State of Alaska could manage these near shore species. The 1999 assessment revised biomass estimates of the pelagic shelf rockfish complex based on the removal of black and blue rockfish. New information for the 1999 assessment includes updated catch and discard information from the 1998 fishery, length frequency data for dusky rockfish from the commercial fishery in 1998, and a length-weight relationship for dusky rockfish. The ABC recommendation for 1999, was unchanged from 1998, 4,880 mt. For 1999, it was recommended by the Council, that the Eastern GOA ABC be split between the West Yakutat and East Yakutat/Southeast Outside areas (see Table 2 for area splits).

Demersal shelf rockfish (DSR) is a subgroup of seven species from the other slope rockfish complex which is managed by the State of Alaska in the Southeast Outside area of the GOA. DSR was separated from other slope rockfish in 1987. These rockfish are bottom dwelling in shallow near shore waters, and are primarily harvested with longline gear. The stock assessment for 1999 includes updated catch information, and was based on surveys using line transects to estimate the abundance of adult yelloweye rockfish. The 1999 ABC recommendation was unchanged from 1998, 560 mt. For 1999, it is recommended by the Council that the Eastern GOA ABC be split between the West Yakutat and East Yakutat/Southeast Outside areas (see Table 2 for area splits).

Thornyhead rockfish inhabit the outer continental shelf and slope throughout the northeastern Pacific and Bering Sea at depths of 90 to 1,460 meters. Thornyheads are taken as incidental catch in other directed trawl and longline fisheries. Thornyheads have been managed as a single stock in the GOA since 1980. Beginning in 1998, the gulfwide thornyhead ABC was divided between the Western, Central, and Eastern areas of the GOA. The 1998 assessment includes updated estimated catch information. The 1999 ABC recommendation of 1,990 mt is down 10 mt from the 1998 ABC recommendation. The Council set TAC equal to ABC, 1,990 mt.

Other species in the GOA includes sharks, skates, sculpins, squid, and octopus. At present, these species are not targeted in the GOA and are taken incidentally in trawl and longline fisheries. There presently is no biomass assessment for the other species complex in the GOA. The TAC for other species, is set at five percent of the sum of the TACs of all directed fisheries in the GOA.

Table 2. Council recommended total allowable catch specifications for the Gulf of Alaska management area. 1998 ABC, TAC specifications, and actual catch through November 7, 1998; and 1999 ABC, OFL, and TAC specifications (values are in mt).

		1998				1999			
Species	Area	OFL	ABC	TAC	Catch	Area	OFL	ABC	TAC
Pollock	W (610)		29,790	29,790	29,311	W (61)		23,120	23,120
	C (620)	170,500	50,045	50,045	49,128	C (62)	134,100	38,840	38,840
	C (630)		39,315	39,315	39,047	C (63)		30,520	30,520
	E	15,600	10,850	5,580	6,367	W. Yakutat	12,300	8,440	2,110
						E. Yak./SEO			6,330
	Total	186,100	130,000	124,730	123,853	Total	146,400	100,920	100,920
Pacific Cod	W		27,260	23,170	19,845	W		29,540	23,630
	C		49,080	41,720	41,632	C		53,170	42,935
	E		1,560	1,170	850	E		1,690	1,270
	Total	141,000	77,900	66,060	62,327	Total	134,000	84,400	67,835
Flatfish, Deep Water	W		340	340	16	W		240	240
	C		3,690	3,690	2,348	C		2,740	2,740
	E		3,140	3,140	108	W. Yakutat		1,720	1,720
						E. Yak./SEO		1,350	1,350
	Total	9,440	7,170	7,170	2,472	Total	8,070	6,050	6,050
Rex Sole	W		1,190	1,190	439	W		1,190	1,190
	C		5,490	5,490	2,197	C		5,490	5,490
	E		2,470	2,470	35	W. Yakutat		850	850
						E. Yak./SEO		1,620	1,620
	Total	11,920	9,150	9,150	2,671	Total	11,920	9,150	9,150
Flatfish, Shallow Water	W		22,570	4,500	269	W		22,570	4,500
	C		19,260	12,950	3,199	C		19,260	12,950
	E		1,320	1,180	72	W. Yakutat		250	250
						E. Yak./SEO		1,070	1,070
	Total	59,540	43,150	18,630	3,540	Total	59,540	43,150	18,770
Flathead Sole	W		8,440	2,000	568	W		8,440	2,000
	C		15,630	5,000	1,171	C		15,630	5,000
	E		2,040	2,040	8	W. Yakutat		1,270	1,270
						E. Yak./SEO		770	770
	Total	34,010	26,110	9,040	1,747	Total	34,010	26,110	9,040
Arrowtooth	W		33,010	5,000	2,997	W		34,400	5,000
	C		149,640	25,000	9,687	C		155,930	25,000
	E		25,690	5,000	379	W. Yakutat		13,260	2,500
						E. Yak./SEO		13,520	2,500
	Total	295,970	208,340	35,000	13,063	Total	308,880	217,110	35,000
Sablefish[3]	W		1,840	1,840	1,425	W		1,820	1,820
	C		6,320	6,320	5,778	C		5,590	5,590
	W. Yakutat		5,960	2,473	1,877	W. Yakutat		5,290	2,090
	E. Yak./SEO			3,487	3,421	E. Yak./SEO		-	3,200
	Total	23,450	14,120	14,120	12,501	Total	19,720	12,700	12,700
Rockfish, Other Slope	W		20	20	47	W		20	20
	C		650	650	701	C		650	650
	E		4,590	1,500	112	W. Yakutat		470	470
						E. Yak./SEO		4,130	4,130
	Total	7,560	5,260	2,170	860	Total	7,560	5,270	5,270
Rockfish, Northern	W		840	840	67	W		840	840
	C		4,150	4,150	2,974	C		4,150	4,150
	E		10	10	10	E		-	-
	Total	9,420	5,000	5,000	3,051	Total	9,420	4,990	4,990
Pacific Ocean Perch	W		1,810	1,810	850	W	2,610	1,850	1,850
	C		6,600	6,600	7,501	C	9,520	6,760	6,760
	E		4,410	2,366	610	W. Yakutat	6,360	1,350	820
						E. Yak./SEO		3,160	3,160
	Total	18,090	12,820	10,776	8,961	Total	18,490	13,120	12,590

Table 2 - continued. Council recommended total allowable catch specifications for the Gulf of Alaska management area. 1998 ABC, TAC specifications, and actual catch through November 7, 1998; and 1999 ABC, OFL, and TAC specifications (values are in mt).

		1998				1999			
Species	Area	OFL	ABC	TAC	Catch	Area	OFL	ABC	TAC
Shortraker/Rougheye	W		160	160	124	W		160	160
	C		970	970	865	C		970	970
	E		460	460	701	E		460	460
	Total	2,740	1,590	1,590	1,690	Total	2,740	1,590	1,590
Rockfish, Pelagic Shelf	W		620	620	60	W		530	530
	C		3,260	3,260	2,477	C		3,370	3,370
	E		1,000	1,000	572	W Yakutat		740	740
						E Yak./SEO		240	240
	Total	8,040	4,880	4,880	3,109	Total	8,190	4,880	4,880
Rockfish, Demersal Shelf	SEO	950	560	560	306	SEO	950	560	560
Atka Mackerel	Gulfwide	6,200	600	600	316	Gulfwide	6,200	600	600
Thornyhead	W		250	250	206	W		260	260
	C		710	710	572	C		700	700
	E		1,040	1,040	352	E		1,030	1,030
	Total	2,840	2,000	2,000	1,130	Total	2,800	1,990	1,990
Other Species	Gulfwide		NA	15,570	3,698	Gulfwide		NA	14,600
GULF OF ALASKA	TOTAL	817,270	548,650	327,046	245,295	TOTAL	778,890	532,590	306,535

3.2 Prohibited Species Stock Status

Prohibited species taken incidentally in groundfish fisheries include: Pacific salmon (chinook, coho, sockeye, chum, and pink salmon), steelhead trout, Pacific halibut, Pacific herring, and Alaska king, Tanner and snow crab. The Council recommends PSC limits to control its bycatch of prohibited species in the groundfish fisheries. During haul sorting, these species or species groups are to be returned to the sea with a minimum of injury except when their retention is required by other applicable law. The status of the different prohibited species are summarized as follows:

Pacific salmon are managed by the State of Alaska. A detailed description of its management, production history, and life history are contained in Section 3.7.2 of the FSEIS. Salmon runs off Alaska have exhibited wide variations throughout its known history and have generally been strongly correlated to environmental factors.

In 1997 and 1998, some disastrous salmon returns occurred to some rivers off Alaska. The sockeye salmon run to Bristol Bay declined drastically two years in a row (1997 and 1998) and returns of chum and king salmon to the Yukon River were below expectations. The situations were declared national economic disasters by NMFS. The causes of these run declines and similar changes to the production of other marine species throughout the North Pacific Ocean have been the subject of several scientific symposia. These scientific forums have documented that large environmental changes have been taking place throughout the world and significant El Niño events, coupled with decadal environmental shifts, have occurred throughout the North Pacific Ocean. The demise of the Bristol Bay sockeye and Yukon salmon runs appeared to have been caused by these natural changes to the atmospheric and ocean dynamics.

In the Bering Sea, a prohibited species catch (PSC) limit of 48,000 chinook salmon exists between January 1 and April 15, for trawl gear in the Chinook Salmon Savings Area (CSSA) (Figure 3-9 of the FSEIS (§ 679.21 (e)(1)(v)). A PSC limit of 42,000 non-chinook salmon between August 15 and October 15 in the Catcher Vessel Operational Area (§ 679.21 (e)(1)(vi) was also established. Pacific salmon bycatch data are routinely tabulated by species only for chinook salmon. All other salmon species and steelhead trout are merged as "other salmon".

In the GOA, while PSC limits have not been established for salmon, the timing of seasonal openings for pollock in the Central and Western GOA have been adjusted to avoid periods of high chinook and chum salmon bycatch. In the BSAI in 1998, neither the chinook or non-chinook PSC limits were exceeded to trigger closure of the CSSA or CVOA. At the December 1998 Council meeting, NMFS reported the BSAI 1998 incidental takes of salmon according to Table 3.

Table 3--Incidental Take of Salmon in BSAI Trawl Fisheries in 1998 (values are in numbers of fish).

BSAI Trawl Fishery Group	Chinook	Other Salmon	Total
Midwater Pollock	55,566	69,816	125,383
Bottom Pollock	0	0	0
Pacific Cod	3,091	670	3,761
Yellowfin Sole	106	239	344
Rock Sole/Other Flatfish	403	94	497
Rockfish	0	0	0
Other	1,446	1,983	3,430
Total	60,612	72,803	133,415

Pacific halibut fisheries are managed by a Treaty between the United States and Canada through recommendations of the International Pacific Halibut Commission (IPHC). Pacific halibut is considered to be one large interrelated stock, but is regulated by subareas through catch quotas. The commercial and recreational fishery has a long tradition dating back to the late 1800s . Further details on the management, production history, and life history of Pacific halibut are described in section 3.7.2 of the FSEIS.

The halibut resource is considered to be healthy, with total catch near record levels. The exploitable biomass of the Pacific halibut stock apparently peaked at 326,520 mt in 1988 (Sullivan, 1998). The population has since declined slightly and has maintained a biomass in the range of 270,000 to 277,000 mt for the past 5 years. The long-term average reproductive biomass for the Pacific halibut resource was estimated at 118,000 mt (Parma, 1998). Long-term average yield was estimated at 26,980 mt, round weight (Parma, 1998). The species is fully utilized. Recent average catches (1994-96) were 33,580 mt for the U.S. and 6,410 mt for Canada, for a combined total of 39,990 mt for the entire Pacific halibut resource. This catch was 48 percent higher than long-term potential yield, which reflects the good condition of the Pacific halibut resource. At its January 1998 annual meeting, the IPHC recommended commercial catch limits totaling 32,580 mt for the United States and Canada in 1998, up from 30,030 mt in 1997.

The IPHC will be holding its annual meeting to set the 1999 Pacific Halibut catch quotas and other fishing regulations in January 1999. The preliminary update on the status of the stocks (IPHC, 1998) concludes that the exploitable biomass remains at a relatively high level but that it has declined slightly in the central and southern portions of the halibut range. The staff of the IPHC has recommended a preliminary 1999 catch quota that is slightly higher than the 1998 catch quota.

Fixed PSC mortality limits have been set for the Alaska groundfish fisheries. These PSC amounts for Pacific halibut are actually deducted from the available fishery yields for the directed Pacific Halibut fishery by the IPHC. Therefore, the allowable commercial catch of halibut is reduced on account of halibut bycatch in the groundfish fisheries.

In the GOA, the PSC mortality limit for halibut is 2,300 mt (allocated as 2,000 mt for the trawl fisheries and 300 mt to the hook & line fisheries). The BSAI halibut PSC mortality limit is 4,675 mt (3,775 mt for trawl and 900 mt for non-trawl gear). The trawl mortality component (3,775 mt) is sub-allocated to target groundfish fisheries (Pacific cod, yellowfin sole, rock sole, pollock/Atka mackerel/other species, rockfish). The Council uses the best estimate of halibut bycatch mortality rates each year and the groundfish TAC apportionments to project halibut bycatch mortality allowances for each gear and target fishery group. NMFS monitors halibut bycatch performance throughout the fishing season, including the extrapolation of data to unobserved vessels, and closes fishing by gear group before bycatch mortality

limits are reached. The 1998 bycatch amounts of Pacific halibut by the trawl groundfish fisheries are given in Table 4. Although some target fisheries exceeded their bycatch allocations, the overall halibut PSC limit was not exceeded.

Table 4--Halibut Bycatch in BSAI Trawl Fisheries in 1998.

BSAI Trawl Fishery Group	Bycatch (mt)	Cap (mt)	Percent
Pacific cod	1,159	1,434	81%
Yellowfin sole	993	930	107%
Rock sole/Flathead sole/Other Flats	821	735	112%
Pollock/Atka mackerel/Other Spp.	352	324	109%
Rockfish	19	69	28%
Turbot/Arrowtooth flounder/Sablefish	63	0	
Total	3,407	3,492	98%

The bycatch amounts of Pacific halibut by the fixed-gear groundfish fisheries are given in Table 5. None of the target fisheries exceeded their bycatch allocations.

Table 5--Halibut Bycatch in BSAI Fixed Gear Fisheries in 1998.

BSAI Fixed Gear Fishery Groups	Bycatch (mt)	Cap (mt)	Percent
Pacific cod, Hook & Line	687	777	88%
Other species, Hook & Line, Jig	59	56	105%
Total	746	833	90%

Pacific Herring fisheries are managed by the State of Alaska. A detailed description of its management, production history, and life history are contained in Section 3.7.4 of the Final Groundfish SEIS. The fisheries occur in specific areas in the Gulf of Alaska and the Bering Sea when the stocks come inshore to spawn. In the Gulf of Alaska, spawning concentrations occur mainly off southeastern Alaska, in Prince William Sound, and around the Kodiak Island-Cook Inlet area. In the Bering Sea, the centers of abundance are in northern Bristol Bay and Norton Sound. Although most herring are harvested near-shore in the sac-roe season in spring, fall seasons are also designated for food and bait fisheries. From catch records, it is evident that herring biomass fluctuates widely due to influences of strong and weak year-classes. The Bering Sea and Gulf of Alaska stocks are currently at moderate levels. In Prince William Sound, however, herring abundance is at a historic low following a disease outbreak in 1993.

Pacific herring PSC limitations in the groundfish fisheries apply to trawl gear in the Bering Sea. The PSC limit for trawl gear is determined each year during the ABC and TAC setting process, and is set at 1 percent of the estimated EBS herring biomass, which is further apportioned by target fishery (§ 679.21 (e)(1)(iv)). Should the herring PSC limit for a particular groundfish target fishery be reached during the fishing year, the trawl fishery for that species is closed in the Herring Savings Areas (Figure 3-10 of the FSEIS) (§ 679.21 (e)(7)(v)). In 1998, the bycatch amounts of Pacific herring in the trawl groundfish fisheries are given in Table 6. None of the bycatch allocations were exceeded.

Table 6--Herring Bycatch in the BSAI Area in 1998.

BSAI Trawl Fishery Group	Bycatch (mt)	Cap (mt)	Percent
Midwater pollock	820	1,146	72%
Pacific cod	1	20	4%
Yellowfin sole	14	248	6%
Rockfish	0	7	0%
Other	76	143	53%
Rock sole/Other flatfish	1	20	5%
Total	912	1,584	58%

Alaska king, Tanner and snow crab fisheries are managed by the State of Alaska, with federal oversight established in the FMP for the BSAI crab fisheries. The commercially important crab species are: red king crab (*Paralithodes camtschaticus*), blue king crab (*Paralithodes platypus*), golden or brown king crab (*Lithodes aequispinus*), Tanner crab (*Chionoecetes bairdi*), and snow crab (*Chionoecetes opilio*). A detailed description of their management, production history, and life history are contained in Section 3.7.1 of the FSEIS.

Annual trawl surveys for crab stock assessments are conducted by NMFS in the BSAI. A length-based analysis, developed by ADF&G, incorporates survey, commercial catch, and observer data to estimate stock abundance (Zheng, 1995; Zheng, 1998). Abundance estimates generated by this model are used to set guideline harvest levels for the crab fisheries. Catches are restricted by guideline harvest levels, seasons, permits, pot limits, and size and sex limits that restrict landings to legal sized male crabs. Fishing seasons are set at times of the year which avoid molting, mating, and softshell periods, both to protect crab resources and to maintain product quality.

The latest status of red king crabs are as follows -- Based on analysis of the 1998 NMFS survey results, large female crabs and pre-recruits increased in abundance and legal males decreased in abundance from 1997 (NMFS, 1998c). Legal males increased from an estimated 5.58 million crabs in 1996 to 9.4 million crabs in 1997, and then decreased to 7.4 million crabs in 1998. Large females (>89 mm carapace length) increased from 11.9 million in 1996 to 25.3 million crabs in 1997 to 35.3 million crabs in 1998 (Morrison, 1998; NMFS, 1998c). Due to this increase in effective spawning biomass, ADF&G increased the 1998 guideline harvest level from a 10 percent to a 15 percent exploitation rate (Zheng, 1998). Though the stock abundance increases are encouraging, the Bristol Bay stock remains depressed compared to past abundance levels. Survey and fishery data also indicate a long term decline of Pribilof Islands red king crab. Localized, high concentrations of Pribilof Islands red king crabs were not apparent during the 1997 survey, though in years past such concentrations had occurred frequently (Morrison, 1998). In 1998, the bycatch amounts of red king crab by the various trawl target fisheries in Zone 1 are listed in Table 7.

Table 7--Bycatch of Red King Crab in BSAI Fisheries in 1998.

BSAI Trawl Fishery Group	Number of Crab	PSC Cap (number of crab)	Percent
Rock sole/Other flatfish	15,136	45,094	34 %
Pacific cod	3,022	6,938	44 %
Yellowfin sole	6,182	9,250	67 %
Pollock/Atka mackerel/Other Spp.	14,028	6,938	202 %
Total	38,367	68,220	56 %

Although the trawl fishery for the pollock/Atka mackerel/other species category greatly exceeded its

PSC allocation, the overall red king crab bycatch was not exceeded and represented only 41 percent of the PSC limit.

The blue king crab population in the Pribilof district is low and population trends are not easily detectable (NMFS, 1998c). The 1998 NMFS survey estimated legal male abundance in the Pribilof district at 0.8 million crabs. Blue king crabs in the St. Matthews Island area appear to be above established threshold levels, with an estimated abundance of 3.1 million legal sized males crabs. Blue king crab female abundance is considered imprecise because trawling does a poor job of sampling the inshore, rocky substrate preferred by females (Morrison, 1998).

ADF&G and NMFS do not make annual abundance estimates for Bering Sea golden king crabs and commercial harvest is controlled by ADF&G permit (Morrison, 1998). Catches have declined from the early years of the fishery as the virgin stock was exploited and recruitment was unable to sustain the fishery at its initial harvest levels (Morrison, 1998). In 1995 the State of Alaska mandated observer coverage for all vessels targeting golden king crab in the Aleutian Islands.

The Tanner crab fishery was closed in 1997 and 1998 due to low abundance. The 1998 survey abundance estimates for large males (≥135 mm carapace width) and large females is the lowest on record for the survey (NMFS, 1998c). Most legal males encountered were in the Eastern District, with the highest abundance in central Bristol Bay. The cohort which began recruiting into the fishery in 1988-1992 has declined as a result of natural mortality and fishery removals. During the 1997 survey, 95 percent of legal males encountered were old shelled and not expected to molt again, and few young males in the 50-115 mm carapace width were surveyed. Given these two factors, it is likely that the Bering Sea Tanner crab population will continue to decline for years (Morrison, 1998). The NPFMC considers the stock overfished and the Council's Crab Plan Team is creating a rebuilding plan for the stock (NMFS, 1998c). The 1998 bycatch amounts of Tanner crab in the BSAI area by the various trawl target fisheries in Zones 1 and 2 are given in Table 8. The trawl target fisheries did not exceed any Tanner crab PSC allocations.

Table 8--Bycatch of Tanner crab in the BSAI by Area in 1998.

BSAI Trawl Fishery Group	Zone 1			Zone 2		
	Crabs #	Cap #	%	Crabs #	Cap #	%
Rock sole/Other Flatfish	242,945	273,848	89%	200,614	330,225	61%
Pacific cod	65,292	123,232	53%	38,914	180,375	22%
Yellowfin sole	231,557	255,592	91%	614,475	990,675	62%
Pollock/Atka/ Other Spp.	19,214	47,077	47%	37,449	434,750	9%
Rockfish	0	0	0%	699	6,475	11%
Turbot/A.Flounder/Sablefish	0	0	0%	2,445	0	0%
Total	559,007	693,749	81%	894,597	1,942,500	46%

From a low in 1985, snow crab rebounded sharply, producing high catches in 1991. A recent decline in the commercial stock has been masked by increasing numbers of pre-recruit males, which should provide improved catches in the next few years. Harvests of snow crab from the Bering Sea were approximately

53,000 mt, and reached 108,848 mt in 1998 (http://www.cf.adfg.state.ak.us). Recent stock assessments show increases in snow crab and decreases in Tanner crab biomass (Stevens, 1998). According to the 1996 survey, the majority (87 percent) of large male crabs were located east of the 173°W longitude. Recruitment for the 1997 fishery apparently was due to southward migration and growth of a population of small males, which had previously concentrated at the northern limit of the survey areas. The 1998 survey indicates that the abundance of large males has peaked and declined 17 percent from 1997. The snow crab population is expected to decline rapidly next year, but continued recruitment of small crab may offset the decline (NMFS,1998c). The 1998 bycatch amounts of *C. opilio* crab by the trawl target groundfish fisheries are given in Table 10. In 1998, *C. opilio* was not apportioned by fishery. No PSC allocation was exceeded.

Table 10--Bycatch of *C. opilio* Crab by Trawl Fisheries in the BSAI in 1998.

BSAI Trawl Fishery Group	Crab #s	Cap #s	Percent
Rock sole/Other flatfish	424,939		
Pacific cod	49,775		
Yellowfin sole	2,042,443		
Pollock/Atka mackerel/Other Spp.	83,100		
Rockfish	0		
Turbot/Arrowtooth flounder/Sablefish	0		
Total	2,600,258	4,304,950	60%

3.3 Forage Species

Forage fish species are abundant fishes that are preyed upon by marine mammals, seabirds and other commercially important groundfish species. Forage fish perform a critical role in the complex ecosystem functions of the Bering Sea and Aleutian Islands management area and the Gulf of Alaska by providing the transfer of energy from the primary or secondary producers to higher trophic levels. Because of their importance to so many ecosystem components, a new management assemblage for forage fish was established in 1998 in Amendments 36 and 39 to the BSAI and GOA FMPs, respectively (63 FR 13009, March 17, 1998). Although ABC and TAC amounts are not specified for species in the forage fish category, the amendments provide protection for forage fish by preventing the development of commercial fisheries for these species. Directed fishing for forage fish species is restricted year-round with a maximum retainable bycatch of 2 percent. These Amendments also established mandatory reporting categories for forage fish species that took effect during 1998.

The following forage species are included in the new forage fish category established in 1998: Osmeridae (which includes capelin and eulachon), Myctophidae, Bathylagidae, Ammodytidae, Trichodontidae, Pholidae, Stichaeidae, Gonostomatidae, and the Order Euphausiacea. For further detailed discussion of forage fish species, see section 3.3.3.13 of the FSEIS.

3.4 Status of Marine Habitat

Inclusively all the marine waters and benthic substrates in the management areas comprise the habitat of the target species. Additionally the adjacent marine waters outside the EEZ, adjacent State waters inside the EEZ, shoreline, freshwater inflows, and atmosphere above the waters, constitutes habitat for prey species, other life stages, and species that move in and out of, or interact with, the target species in the management areas. Distinctive aspects of the habitat include water depth, substrate composition, substrate infauna, light penetration, water chemistry (salinity, temperature, nutrients, sediment load, color, etc.), currents, tidal action, plankton and zooplankton production, associated species, natural disturbance regimes, and the seasonal variability of each aspect. Substrate types include bedrock, cobbles, sand, shale, mud, silt, and various combinations of organic material and invertebrates which may be termed biological substrate. Biological substrates present in these management areas include corals, tunicates, mussel beds, tube worms. Biological substrate has the aspect of ecological state (from pioneer to climax) in addition to the organic and inorganic components. Ecological state is heavily dependant on natural and anthropogenic disturbance regimes. The fishery management plans (NPFMC 1995; 1994) contain some descriptions of habitat preferences of the target species and projects are underway to systematically present biological requirements for each life history stage that are known (NMFS-Council in progress). Much remains to be learned about habitat requirements for most of the target species.

The Council, its advisory panels, and habitat committees have requested that effort be placed into

identifying critical habitat areas and the effects of fishing on these areas. Synoptic information about the seabed is required to enhance basic descriptions of essential fish habitat (EFH) and to support investigations of potential adverse effects of mobile fishing gear on EFH. To address these needs scientists in cooperation with industry have been examining the feasibility of acoustic seabed classification. In 1996, the *QTC View* seabed classification system was identified as the most appropriate technology for NMFS applications and a single unit was purchased. In 1997 the system was deployed on the *Miller Freeman* during gear trials in Puget Sound, and in the Bering Sea during routine hydroacoustic assessments of walleye pollock (Collins and McConnaughey, 1998). In both cases, a classification catalog was developed and ground truth samples collected. During Summer 1997, raw acoustic data in two frequencies was collected along a 14,000 km trackline in the Bering Sea. In 1998 the team intends to: (1) assess the quality of all data collected during *Miller Freeman* cruise MF 97-08, (2) determine the optimum parameters for acoustic classification of the Bering Sea seafloor using a *QTC View* system, (3) identify acoustically distinct bottom types from the 38 and 120 kHz data sets, preferentially using unsupervised classification methods, (4) determine the optimum operational scenario for seafloor classification at each frequency, (5) produce final habitat classification maps for the full 38 kHz and 120 kHz acoustic data sets, and (6) identify primary and secondary sites for *QTC View* calibration and seafloor class groundtruthing in the Bering Sea. Work on subsequent phases of the project is underway. Approximately 100 grab samples collected during this cruise are currently undergoing laboratory grain size analysis for identification of the unsupervised sediment classes.

3.4.1 Effects of Trawling on Seafloor Habitat and Associated Invertebrates

Effects of bottom trawling on "hard-bottom" (pebble, cobble, and boulder) seafloor were studied on the outer continental shelf in the eastern Gulf of Alaska in August 1996 (Freese et. al., 1998). A chartered trawler was outfitted with a modified Nor'eastern bottom trawl. Eight sites ranging in depth from approximately 200 to 250-m were subjected to a single trawl pass. A research submersible was then used to videotape each trawl path and a nearby reference transect to obtain quantitative data. Boulders were displaced, and large epifaunal invertebrates were removed or damaged by a single pass of the trawl. These structural components of habitat were the dominant features on the seafloor. There was a significant decrease in density and an increase in damage to sponges and anthozoans in trawled versus reference transects. Changes in density or damage to most motile invertebrates were not detected.

Delayed mortality of apparently undamaged invertebrates may have resulted in greater impact than we detected. Alternatively, over time some invertebrates may recover from damage. Accordingly, the team returned to the study sites with a research submersible in July 1997 and videotaped the trawl and reference transects. Data from the videotape is currently being quantified. Striations on the seafloor caused by the trawl gear were readily apparent one year post-trawl. Large erect sponges that were torn or overturned by the trawl were also readily apparent and showed no visible signs of regrowth, and although damaged showed no signs of delayed mortality. Preliminary examination of the videotape suggests no significant differences in numbers of smaller sessile organisms or motile organisms between trawl and reference transects.

Areas of high bottom trawl density and low bottom trawl density are currently being compared using data from NMFS triennial research survey. Species composition data from the research trawls will be used to describe attributes of community structure in areas of heavy and low trawl concentrations from similar depths.

For further information, see Section 3.1 and 3.6 of the FSEIS, and the Ecosystem Considerations for 1999 chapter of the 1999 SAFE report (NPFMC, 1998).

3.5 Status of Marine Mammal Pinniped Species

The FSEIS contains a detailed analysis on the ecology, population trends, and the impacts of an array of

alternative TACs on marine mammals. For further information see Section 3.4 and 4.3.2 of the FSEIS, and the section on marine mammals in the chapter titled "Ecosystem Considerations for 1999" of the 1999 SAFE report (NPFMC, 1998). New information on population status and current management concerns for selected marine mammals is summarized below.

Steller Sea Lions

The most comprehensive review of the status of Steller sea lions in Alaska is contained in the December 3, 1998 Biological Opinion on ESA listed species issued by NMFS. The following is an analysis of 1998 survey data.

NMFS and ADF&G conducted surveys of Steller sea lion pups and non-pups during June-July 1998 from southeast Alaska to the western Aleutian Islands. Generally, the numbers of non-pups in the western stock (west of 144°W) continued to decline in 1998 (see Table 11). In the Kenai-Kiska area, non-pup numbers at trend sites declined by 13.1 percent from 1994 to 1998 (18,713 to 16,259) and 9.2 percent (17,900 to 16,259) from 1996 to 1998 (see Table 12). This compares to a Kenai- Kiska decline of 4.6 percent from 1994 to 1996. The Aleutian Islands as a whole declined by 7.8 percent from 1996 to 1998, as compared to a marginal increase (1.1 percent) from 1994 to 1996. In combination, the western and central Gulf of Alaska declined 12.4 percent from 1996 to 1998, and 4.0 percent from 1997 to 1998. The central Aleutian Islands (Islands of Four Mountains to Kiska) was the one area that did show a marginal increase (3.2 percent) from 1996 to 1998.

Although the numbers for Southeast Alaska show a decrease, only 18 sites were surveyed in 1998, and other indications, particularly pup counts suggest that the population in this region is stable. Survey coverage in the eastern Gulf of Alaska was too incomplete to provide a reliable trend for non-pups.

NMFS and ADF&G conducted counts of Steller sea lion pups at all rookeries in Alaska, from the Forrester Complex in Southeast Alaska to Attu Island in the western Aleutian Islands from 19 June-5 July 1998. Compared to 1994, the last range-wide pup counts, pup numbers decreased by 10.8 percent (from 14,198 pups to 12,670) at all rookeries (Table 12). For the western stock (reflected by the counts from Kenai to Kiska) the decline was 19.1 percent over 4 years. Rookeries in the western Aleutian Islands (particularly those in the Near Islands: 3 rookeries at Attu and Agattu Islands) were counted completely for the first time in 1997. Pup numbers at these three rookeries declined by 18.0 percent in one year (979 pups to 803 pups). The 2 rookeries in the eastern Gulf of Alaska declined 23.7 percent from 1994 to 1998, but increased 13 percent from 1997 to 1998 (610 pups to 689). Pup numbers in Southeast Alaska have increased 12.3 percent from 1994, but showed little change from 1997 to 1998.

Table 11--Counts of Non-pup Steller Sea Lions at Trend Sites (Rookeries and Haulouts) During Aerial Surveys in Alaska, 1994 to 1998.

Region	Non-pup counts at Trend Sites			Percent change	
	1994	1996	1998	1994-98	1996-98
Western Aleutian Islands	2,037	2,190	1,913	- 6.1	-12.6
Central Aleutian Islands	5,790	5,528	5,705	- 1.5	3.2
Eastern Aleutian Islands	4,421	4,716	3,847	-13.0	-18.4
Western Gulf of Alaska	3,982	3,741	3,361	-15.6	-10.2
Central Gulf of Alaska	4,520	3,915	3,346	-26.0	-14.5
Kenai to Kiska subtotal	18,713	17,900	16,259	-13.1	- 9.2

Table 12--Counts of Steller Sea Lion Pups in Alaska, 1994 to 1998.

Region	Number of rookeries	1994	1997	1998	Percent change 94-98	97-98
Western Aleutian Islands	4		979	803		-18.0
Central Aleutian Islands	16	3,162		2,862	-9.5	
Eastern Aleutian Islands	6	1,870		1,516	-18.9	
Western Gulf of Alaska	4	1,662		1,493	-10.2	
Central Gulf of Alaska	5	2,831		1,876	-33.7	
Eastern Gulf of Alaska	2	903	610	689	-23.7	13
Western Stock subtotal (Kiska to Seal Rocks)	33	10,428		8,436	-19.1	
Southeast Alaska	3	3,770	4,160	4,234	12.3	1.8

Northern fur seals

Much of the research effort for fur seals takes place on the Pribilof Islands (St. Paul and St. George). The National Marine Mammal Lab (NMML) conducts counts of adult males (bulls) annually, and counts of pups biennially. Analysis of the 1998 bull and pup counts is not completed, but preliminary results suggest a slight decrease in fur seal numbers on both of the Pribilof Islands. From 1996 to 1997 the total number of adult males on the Pribilof Islands decreased by 5.4 percent. Because of the high variability in these counts, however, several more years of data are needed to determine if a trend exists. The total estimated number of pups born on St. Paul Island in 1996 (170,125) was not significantly different from the 1990, 1992, and 1994 estimates. The 1996 estimate of number of pups born on St. George Island (27,385) suggested that a downward population trend observed on the Island since the mid-1980s may have abated. However, preliminary data collected in 1998 indicate that pup numbers have decreased again.

Harbor seals

During 1998, the NMML conducted aerial assessment surveys for harbor seals in the southern portion of Southeast Alaska, from Frederick Sound to the U.S.-Canada border. The northern portion of Southeast Alaska was surveyed in 1997. From 18-28 August, the entire coastline was surveyed from small, single-engine aircraft equipped with floats, at an altitude of 200-250 m (700-800 ft.). Observers estimated the number of seals hauled out and took photographs of all seal haulouts. These data will be analyzed during the fall and winter. Results from the assessment and correction factor surveys will be used to estimate the number of harbor seals in Alaska and determine key components used in NMFS annual stock assessment report.

3.6 Seabird Species Population Status

Seabirds spend the majority of their life at sea rather than on land. The group includes the Procellariiformes

(albatross, shearwaters, and petrels), Pelecaniformes (comorants), and two families of the Charadriiformes: Laridae (gulls) and Alcidae (auks, such as puffins, murres, aukelets and murrelets). Detailed seabird information on species population status, life history, ecology, and bycatch is contained in section 3.5 of the FSEIS. New information since publication of the FSEIS is presented here.

On October 22, 1998, NMFS reported the incidental take of 2 endangered short-tailed albatrosses in the hook-and-line groundfish fishery of the Bering Sea/Aleutian Islands (BSAI). The first bird was taken on September 21, 1998at 57 30'N, 173 57'W. The bird had identifying leg bands from its natal breeding colony in Japan. It was 8 years old. In a separate incident, one short-tailed albatross was observed taken on September 28, 1998 at 58 27'N, 175 16'W but the specimen was not able to be retained. Identification of the bird was confirmed by U.S. Fish and Wildlife Service (USFWS) seabird experts. The confirmation was based upon the observer's description of key characteristics that matched that of a subadult short-tailed albatross to the exclusion of all other species. A second albatross was also taken on September 28, but the species could not be confirmed (3 species of albatross occur in the North Pacific). Both vessels were using seabird avoidance measures when the birds were hooked.

The current world population of the endangered short-tailed albatross is approximately 1000 individuals. The short-tailed albatross is protected by the Endangered Species Act (ESA) and under the law, an incidental take level of 4 birds is allowed during the 2-year period of 1997 and 1998 for the BSAI and Gulf of Alaska (GOA) hook-and-line groundfish fisheries. If the incidental take limit is exceeded during that time, any operations causing such take must cease pending reinitiation of consultation with the USFWS. NMFS Regional Office, NMFS Groundfish Observer Program, and the USFWS Offices of Ecological Services and Migratory Bird Management are actively coordinating efforts and communicating with each other in response to these take incidents and are complying to the fullest extent with ESA requirements to protect this species. Regulations at 50 CFR Parts 679.24(e) and 679.42(b)(2) contain specifics regarding seabird avoidance measures. NMFS presented an initial analysis on seabird mitigation measures to the Council at its December meeting, that investigated a number of seabird avoidance methods that could be employed by the long-line fleet to further reduce the take of seabirds. The Council requested further analysis by NMFS that will be presented to the Council for final review at its February meeting. The focus of this action is to require large long-line vessels to use lining tubes while deploying long-line gear. These tubes would protect the baited hooks from seabirds attempting to feed on them while the hooks were above the surface of the water. Pending NMFS approval, new seabird avoidance measures are expected to be effective by the start of the 2000 fishery.

3.7 Endangered Species Act Considerations

3.7.1 ESA Listed Species

Species currently listed as endangered or threatened under the ESA and occurring in the GOA and/or BSAI groundfish management areas.

Common Name	Scientific Name	ESA Status
Northern Right Whale	*Balaena glacialis*	Endangered
Bowhead Whale [1]	*Balaena mysticetus*	Endangered
Sei Whale	*Balaenoptera borealis*	Endangered
Blue Whale	*Balaenoptera musculus*	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered
Humpback Whale	*Megaptera novaeangliae*	Endangered
Sperm Whale	*Physeter macrocephalus*	Endangered
Snake River Sockeye Salmon	*Oncorhynchus nerka*	Endangered
Short-tailed Albatross	*Diomedia albatrus*	Endangered
Steller Sea Lion	*Eumetopias jubatus*	Endangered and Threatened [2]
Snake River Fall Chinook Salmon	*Oncorhynchus tshawytscha*	Threatened
Snake River Spring/Summer Chinook Salmon	*Oncorhynchus tshawytscha*	Threatened
Spectacled Eider	*Somateria fishcheri*	Threatened
Steller Eider	*Polysticta stelleri*	Threatened

[1] The bowhead whale is present in the Bering Sea area only.
[2] Steller sea lions are listed as endangered west of Cape Suckling and threatened east of Cape Suckling.

3.7.2 Status of Section 7 Consultations

Section 7 consultations have been done for all the above listed species, some individually and some as groups. Below are summaries of consultations recently completed or currently underway. See the FSEIS, section 3.8, for summaries of all previous section 7 consultations and Biological Opinions.

NMFS 1998 Biological Opinion, Authorization of the Pollock and Atka Mackerel Fisheries for 1999-2002
On December 3, 1998, NMFS issued its Biological Opinion on the 1999-2002 authorization of the BSAI Atka mackerel fishery, the BSAI pollock fishery, and the GOA pollock fishery under their respective groundfish fishery management plans (NMFS, 1998b). The opinion analyzes the effects of these actions on the endangered western population of Steller sea lions and its critical habitat. After reviewing (1) the 1998 status of ESA listed species, (2) the environmental baseline for the action area, (3) the effects of the proposed 1999-2002 fisheries, and (4) the recommendations of the NPFMC, NMFS' Biological Opinion concludes that the Atka mackerel fisheries will not jeopardize the continued existence of current ESA listed species or adversely modify their critical habitat if current proposed mitigation measures are effective in 1999 (see below). However, for the proposed 1999-2002 BSAI and GOA pollock fisheries, NMFS' Biological Opinion concluded that the action, as proposed, are likely to jeopardize the continued existence of the western population of Steller sea lions and adversely modify its critical habitat.

For the pollock fisheries, NMFS established RPAs to avoid jeopardizing Steller sea lions and presented those RPAs to the Council during its December meeting. Mitigation measures for the pollock fisheries were proposed by the Council and then modified by NMFS. These modified RPAs were issued by NMFS in a memorandum dated December 16, 1998 from Gary Matlock, Director, Office of Sustainable Fisheries. NMFS has determined that these mitigation measures would, if implemented, allow the proposed fishery to occur without jeopardizing the continued existence of Steller sea lions and avoid

adverse modification of its critical habitat. NMFS is preparing an emergency rule that will implement the RPA actions as proposed by the Council and modified by NMFS. This emergency rule will be effective prior to the start of the 1999 pollock trawl fisheries, scheduled to start on January 20, 1999. However, if the emergency rule is not effective prior to the scheduled regulatory opening of the pollock trawl fisheries, NMFS will close trawl fishing for pollock by emergency rule. The emergency rule to implement the RPAs will be accompanied by an EA that will address the environmental and socioeconomic impacts of the proposed changes to the fishery. These changes would disperse the fishery in time and space, distributing effort more evenly than the pulse fisheries of the past. The RPAs will not contain any changes to the 1999 annual TAC amounts.

At its June 1998 meeting, the Council considered an analysis presented by NMFS regarding alternative measures in the Atka mackerel fishery that would mitigate fishery competition for prey with the endangered Steller sea lions. Six alternatives were presented to the Council, the alternative recommended would (1) divide the Atka mackerel TACs specified for each subarea and district of the BSAI into two equal seasonal allowances, (2) reduce the percentage of Atka mackerel TAC taken from Steller sea lion critical habitat over a 4-year period in the Western and Central Districts of the Aleutian Islands Subarea, and (3) extend the seasonal 20 nm no-trawl zone around the Seguam and Agligadak rookeries in the Eastern District of the Aleutian Islands into a year-round closure. The proposed rule was published in the Federal Register on November 9, 1998 (63 FR 60288). This rule, if approved, would limit the amount of catch within Steller sea lion critical habitat as discussed above, but would not alter the overall TAC amounts. A final rule is expected by NMFS to be published in the Federal Register before the scheduled start of the trawl fisheries on January 20, 1999. The determination of the Biological Opinion requires that these mitigation measures be effective prior to the start of the fishery to avoid jeopardy. This EA assumes that those measures will be in implemented. If the Atka mackerel mitigation measures are not effective prior to January 20, 1999, NMFS, by emergency rule under authority of the Magnuson-Stevens Act, will close directed fishing with trawl gear in the BSAI and GOA until such time that the mitigation measures can be implemented.

NMFS 1998 Biological Opinion, Authorization of the BSAI and GOA Groundfish Fisheries for 1999
Pursuant to the ESA, NMFS has prepared a section 7 consultation Biological Opinion on the 1999 BSAI and GOA groundfish fisheries. The Biological Opinion examined the 1999 proposed TAC specifications for the BSAI and GOA and the effect of this action on ESA listed species. The Biological Opinion concluded that mitigation measures recommended by the Council and modified by NMFS, for the BSAI and GOA pollock fisheries and the BSAI Atka mackerel fisheries, are sufficient to avoid jeopardizing the continued existence of the western population of Steller sea lions and avoid adverse modification to its critical habitat. This conclusion requires that NMFS, implement the recommended revised reasonable and prudent alternatives before the scheduled regulatory start of the 1999 BSAI and GOA trawl fisheries (see discussion above regarding Atka mackerel and pollock mitigation measures). NMFS Biological Opinion concluded that implementation of the BSAI and GOA groundfish fisheries, as outlined under the FMPs and amended by the Steller sea lion mitigation measures for pollock and Atka mackerel, would not jeopardize the continued existence of Steller sea lions or other ESA listed marine mammals. If the recommended mitigation measures are not effective prior to January 20, 1999, NMFS, by emergency rule under authority of the Magnuson-Stevens Act, will close directed fishing with trawl gear in the BSAI and GOA until such time that the mitigation measures can be implemented.

Biological Opinion on Potential Impacts of BSAI and GOA Groundfish Fisheries on ESA Listed Salmon
In a letter dated December 1, 1998, Mr. William W. Stelle (NMFS, 1998d) concluded under an informal section 7 consultation that the continued implementation of the BSAI and GOA groundfish FMPs were unlikely to significantly impact endangered salmon species. Additional chinook and chum salmon have been proposed for listings, however, an assessment of impacts to these salmon will be better made once the listing decisions are known. NMFS must reinitiate this ESA consultation if new information becomes available or circumstances occur that may affect listed species or their critical habitat in a

manner or to an extent not previously considered, or a new species is listed or critical habitat is designated that may be affected by the action.

USFWS Biological Opinion on the BSAI Trawl and Hook-and-Line Fisheries

In a letter dated December 2, 1998 (USFWS, 1998), the Fish and Wildlife Service extended the 1997-1998 Biological Opinion on the BSAI hook-and-line groundfish fishery and the BSAI trawl groundfish fishery for the ESA listed short-tailed albatross, until it is superseded by a subsequent amendment to that opinion. Based on current information available to the USFWS, they do not anticipate that their final Biological Opinion will determine that the 1999 BSAI groundfish fishery places the short-tailed albatross in jeopardy of extinction. The statutory receipt of a final BO and incidental take statement for the BSAI hook and line groundfish fishery is Friday, March 19, 1999.

3.8 Socioeconomic Summary

The most recent description of the groundfish fishery is contained in the *Economic Status of the Groundfish Fisheries Off Alaska, 1997* (Greig et al. 1998). The report, incorporated herein by reference, presents the economic status of groundfish fisheries off Alaska in terms of economic activity and outputs using estimates of catch, bycatch, ex-vessel prices and value, the size and level of activity of the groundfish fleet, the weight and value of processed products, wholesale prices, exports, and cold storage holdings. The catch, ex-vessel, ex-processor, and fleet size and activity data are for the fishing industry activities that are reflected in Weekly Production Reports, Observer Reports, fish tickets from processors who file Weekly Production Reports, and the annual survey of groundfish processors. All catch data for 1991 through 1997 are based on the blend estimates of total catch which are used by NMFS to monitor groundfish and PSC quotas during each fishing year. External factors included, which in part, determine the economic status of the fisheries are foreign exchange rates, the prices and price indexes of products that compete with products from these fisheries, and fishery imports.

3.8.1 Summary of 1997 Exvessel Values

The commercial groundfish catch off Alaska totaled 2.06 million mt in 1997, 1 percent over 1996. The increase in catch was accompanied by a 1 percent increase in the average ex-vessel price of groundfish and the estimated ex-vessel value of the catch, excluding the value added by at-sea processing, from $542 million in 1996 to $583 million in 1997. The value of the 1996 catch after primary processing was estimated at $1.18 billion. The groundfish fisheries accounted for the largest share of the ex-vessel value of all commercial fisheries off Alaska in 1997, while the Pacific salmon fishery was second with $248 million or 22 percent of the total Alaska ex-vessel value. The value of the shellfish catch amounted to $172 million or 15.3 percent of the total for Alaska (Greig et al., 1998).

During the last ten years, the total catch in the commercial groundfish fisheries off Alaska (including foreign and joint venture fisheries as well as the domestic fishery) varied between 1.85 and 2.38 million t. The peak catch occurred in 1991, in part because blend estimates of catch and bycatch were not yet used to monitor most quotas. If they had been, several fisheries would have been closed earlier in the year (Greig et al., 1998).

The ex-vessel value of domestic landings, excluding the value added by at-sea processing, increased from $425 million in 1993 to $570 million in 1997. In 1997, catcher vessels accounted for 43.8 percent of the ex-vessel value of the groundfish landings compared to 40.7 percent of the total catch, because catcher vessels take a higher percentage of valuable species such as sablefish which was $2.25 per pound in 1997. Similarly, trawl gear accounted for only 67.2 percent of the total ex-vessel value compared to 91.6 percent of the catch because much of the trawl catch is of low priced species such as pollock which was about $0.10 per pound in 1997 (Greig et al., 1998)

Average ex-vessel prices, including the value added by at-sea processing, in 1994 were up slightly from $0.102 per pound in 1993 to $0.107 per pound, round weight in 1994. The average price of pollock increased from $0.073 per pound in 1994 to $0.089 in 1996. Average prices of sablefish rose from $0.969 in 1993 to $1.924 in 1996. Pacific cod prices went from $0.220 in 1993 to $0.212 in 1996. Flatfish prices were $0.158 in 1993, rose to $0.181 in 1995, and fell to $0.155 in 1996. Rockfish prices declined from $0.216 in 1992 to $0.181 in 1996. Atka mackerel in 1996 were $0.145 (Greig et al. 1998).

Walleye pollock has been the dominant species in the commercial groundfish catch off Alaska. The pollock catch in 1997 totaled 1.24 million t and accounted for 60 percent of the total groundfish catch of 2.06 million t. The pollock catch was down 2.6 percent from 1996. The next major species, Pacific cod, accounted for 326,200 t or 15.8 percent of the total 1997 groundfish catch. The Pacific cod catch was up 5.5 percent from a year earlier. The 1997 catch of flatfish, which includes yellowfin sole, rock sole, and arrowtooth flounder was 345,600 t in 1997, up 24.9 percent from 1996. Pollock, Pacific cod, and flatfish comprised 92.6 percent of the total 1997 catch. Other important species are sablefish, rockfish, and Atka mackerel (Greig et al., 1998).

3.8.2 Description of the Groundfish Fleet

NMFS blend estimates and fish ticket data were examined to determine the current composition of the domestic groundfish fishing fleet. Preliminary data through June 1995 indicates a total of 1,425 vessels landed groundfish in the GOA and BSAI groundfish fisheries in 1995.

The number of vessels harvesting groundfish off Alaska did not consistently increase, on an annual basis, as did landings. The total number fluctuated from 1,449 in 1986 to 1,859 in 1987, declined to 1,576 in 1989, increased to 2,341 in 1992, and stood at 2,077 in 1994. During this period, the number of trawl vessels increased annually from 80 in 1986 to 296 in 1992, but was 254 in 1994. The greatest impact has been the increase of the largest vessel classes. The number of trawlers greater than 185 feet (56 m) in length increased from 8 in 1987 to 30 in 1989, and to 50 in 1991. However, this group fell to 40 in 1993 but increased to 45 in 1994. From 1986 to 1992, the number of vessels using hook and line gear increased from 1,356 to 1,948, dropped to 1,649 vessels in 1993, then bounced back to 1,807 vessels in 1994. Vessels using pot gear jumped from 24 in 1986 to 285 in 1992, the number declined by one-half to 132 in 1993, but increased by 14 vessels to 146 in 1994.

3.8.3 Economic Considerations of the 1999 TACs

The actual value realized from the groundfish harvest is dependent on factors unquantifiable at present, including market demand, costs of harvesting and processing, proportion of catch processed at sea (value added), and the degree to which the harvests are constrained by PSC limits. See Tables 1 and 2, for TAC, ABC, and OFL specifications for 1999.

A component of the 1996 Sustainable Fisheries Act amendments to the Magnuson-Stevens Act is the requirement to evaluate affects of changes in TAC on economic value of the harvest. Analysis to predict the 1999 product prices by regulatory area for target species management groups, utilizing the catch specification, bycatch and discard rates is not, however, available. Harvest of flatfish species in amounts well below the approved TAC specification negates any effect the change in TAC specification would have on economic value of those species.

4.0 CONSEQUENCES OF THE ALTERNATIVES AND CONCLUSIONS

Section 4.0 of the FSEIS analyzes the possible impacts of the alternatives on future catches, marine mammals, seabirds, forage species, and prohibited species, as well as other components of the physical and chemical environment. However, new information has arisen since that analysis that must be addressed under NEPA, therefore this EA is being prepared. This discussion tiers off the analysis discussed in the FSEIS, and falls within the range of alternatives analyzed on the setting of TAC amounts in the GOA and BSAI.

4.1 Impacts of the Alternatives on Groundfish Species

Alternative A: This is the preferred alternative. Under this alternative, 1999 TAC specifications for each target groundfish category are equal to or less than respective ABC and OFL specifications. The sum of the BSAI and GOA TAC specifications would be 2,000,000 mt and 306,535 mt, respectively. The BSAI would operate at the maximum OY level, while the GOA would operate at a level between the maximum and minimum OY level. Updated information on the status of groundfish stocks was reviewed by the Plan Teams for the groundfish fisheries of the BSAI and GOA at their September and November 1998 meetings, and was presented in the final SAFE Reports for the Groundfish Resources of the BSAI and GOA as Projected for 1999. Using the best available information, the Plan Teams determined biomass, OFLs, and ABCs for the 1999 fisheries and recommended them to the Council in the SAFE reports. After reviewing the current information, the Council recommended 1999 TAC specifications to the Secretary of Commerce. The ABC and TAC for each species category would be based on the best available scientific information, and therefore no significant adverse impacts are expected.

Alternative B: The projected total groundfish catch for the BSAI under Alternative B would be less than 1.4 million mt. This includes pollock, Pacific cod and yellowfin sole catches, respectively, of about 811,000 mt, 198,000 mt, and 161,000 mt. The projected catch for this alternative is about 85% of the mean catch of Alternative A or 74% of the catch of Alternative C or actual catch in 1997. The projected total groundfish catch for the GOA and Alternative B is about 103,000 mt. This includes about 32,800 mt of pollock and 28,100 mt of Pacific cod. The projected catch for this alternative is about 35% of the mean catch of Alternative A or about 13% of the catch of Alternative C.

Alternative C: The sum of the 1997 BSAI TACs was equal to the upper end of the OY range; therefore, the 1997 catches are used as the Alternative C catch projections. Total groundfish catch is projected to be over 1.8 million mt and to exceed the mean catch projection for Alternative A by about 14%

Total groundfish catch in the GOA with Alternative C is projected to be almost 817,000 mt. This is substantially greater than the catch in any recent year or the catch of Alternatives A and B. In comparison, the mean catch for Alternative A and the catch for Alternative B are only about 297,000 mt and 103,000 mt, respectively. These high catch projections are based on the assumption that any target fishery could increase without limit from its 1997 level to help ensure that the TACs of Alternative C would be taken fully. This would, for example, require the arrowtooth flounder fishery in the central Gulf to take about 175,000 mt of arrowtooth flounder compared to the total GOA catch of arrowtooth flounder in all fisheries of about 16,400 mt in 1997. The reasons such an increase is unlikely to occur include the following: (1) the markets for that amount of arrowtooth have not been developed; (2) the halibut bycatch associated with that size of an arrowtooth flounder fishery probably would be prohibitive; and (3) the bycatch of pollock, Pacific cod and rockfish may be unacceptable to those who target those species. The large expansion of the flatfish fisheries projected for Alternative C results in smaller Pacific cod longline, pot and trawl fisheries than would occur in three years with Alternative A even though the total catch of Pacific cod is substantially larger for Alternative C than for any year with Alternative A.

The only TACs that are not projected in the FSEIS to be taken fully with Alternative C are: (1) the TACs for which no target fisheries occurred in 1997 and (2) the TACs for species that are targeted jointly with another TAC species that is taken fully.

Alternative D: This alternative would prohibit fishing within the EEZ and result in TAC levels to be set at zero. A detailed discussion of the effects of this alternative are found in section 4.3 of the FSEIS. It is expected that stocks would return to unfished levels.

4.2 Effects of the Alternatives on Marine Mammals and Species Listed as Threatened or Endangered Under the ESA

The effects of alternatives on marine mammals is discussed in section 4.3.2 of the FSEIS. Assessment of potential impacts resulting from any of the four alternatives is somewhat simpler for direct interactions than for indirect considerations. Estimates of marine mammal incidental takes in the federally managed groundfish fisheries are based on observer data whereby mortalities are tallied and observed takes are extrapolated to fishery-wide totals. In all cases in the groundfish fisheries, levels of direct incidental take are low relative to each marine mammal stock's Potential Biological Removal. As noted previously, two short-tailed albatross were taken in 1998 in the long-line fishery, however, this was within incidental take guidelines and did not prompt the USFWS to re-initiate consultation. The Council has initiated an analysis of alternative seabird avoidance measures that could be implemented for the year 2000.

Indirect interactions between marine mammals and commercial fisheries are much more difficult to detect and document. They include, competition for similar prey resources which may result in local scarcity of prey, and disturbance by fishing activities. Additional impacts have been suggested, including alteration of the age structure of fish stocks targeted by a fishery, resulting in a shift in biomass from older to younger age groups, and alteration of the actual and relative abundance of fish stocks in the ecosystem and increase in the dominance of less desirable forage species. Whereas the first two indirect effects are based on observed overlaps in marine mammal diets and harvested species and on spatial and temporal overlaps in fisheries and marine mammal distributions, the latter two suggest specific outcomes of ecosystem processes even though the processes themselves are poorly understood. As such, these concerns are speculative and can not be objectively evaluated with regard to their impacts on marine mammals under any of the proposed alternatives.

Causal relationships between commercial harvesting of groundfish in the EEZ off Alaska and the status and trends of marine mammal populations distributed there have not been established. The complexity of potential interactions at multiple temporal and spatial scales that might affect foraging behavior, coupled with the paucity of data available to characterize those relationships, inherently limit detection of fisheries effects. Thus, the mechanisms by which fish biomass removals might translate to marine mammal fitness or mortality are largely unknown at this time.

Interactions, either direct or indirect, between commercial fisheries and the 26 species of marine mammals inhabiting federal waters off Alaska vary widely, given those mammals diverse life histories and spatial distribution patterns. In general, the impacts resulting from the fisheries are likely to be constrained to those marine mammal species with the greatest potential dependence on prey species that are harvested commercially. Likewise, those marine mammals which feed more extensively in the commercial fishing grounds may be proportionally more affected. Of the 26 marine mammal species described in section 3.4 of the FSEIS, only a subset have been shown to consume groundfish species as a large part of their diet, and to potentially do so in areas coincident with groundfish harvest operations. Thus, the greatest

emphasis is placed on those species: Steller sea lion, northern fur seal and harbor seal. Among the cetacean species, a few include groundfish in their diets, but most exploit a larger prey base, with extensive consumption of invertebrates and small schooling fishes.

The new information on marine mammals presented in section 3.5 does not contain any impacts that would be considered significant or that were not already analyzed in the FSEIS.

The two section 7 consultations recently completed by NMFS considered the impacts of the BSAI and GOA fisheries on ESA listed and depleted marine mammals in Alaska. These Biological Opinions considered the TACs being recommended for 1999 and concluded that certain mitigation measures must be effective prior to the regulatory start of fishing in the BSAI and GOA. Therefore, implementation of any of the alternatives would be subject to Steller sea lion mitigation measures which must be implemented prior to the start of the 1999 fishery. However, the RPAs were designed using the preferred alternative A as the base for future fishing effort. The pollock and Atka mackerel Biological Opinion and the Groundfish Biological Opinion concluded that fishery removals equal to or less than the ABC amounts was scientifically sound (under status quo TAC setting), but that these removals should be redistributed more evenly in time and space. Emergency rulemaking by NMFS will redistribute the 1999 pollock and Atka mackerel fisheries both temporally and spatially (proportionally with biomass), thereby reducing competition for prey between the fishery and Steller sea lions. Therefore, Alternative A would be most appropriate as it would propose TAC specifications based on the best available scientific information, and still meet the criteria of limiting fishery removals to the ABC amounts, the sum of which would not violate the maximum OY range.

A jeopardy finding for Steller sea lions is a significant effect that would require the preparation of an SEIS. However, prior to the opening of the 1999 trawl fisheries, NMFS will implement all measures necessary (as identified earlier) to mitigate the impacts of the pollock and Atka mackerel fisheries as outlined in the RPAs of the Biological Opinion. If the recommended mitigation measures are not effective prior to January 20, 1999, NMFS, by emergency rule under authority of the Magnuson-Stevens Act, will close directed fishing with trawl gear in the BSAI and GOA until such time that the mitigation measures can be implemented. NMFS believes implementation of these measures will relieve Steller sea lions from the activity that jeopardizes their continued existence and therefore remove all significant impacts associated with the pollock and Atka mackerel fisheries.

4.3 Effects of the Alternatives on Species Prohibited in Groundfish Fisheries Harvest

None of the alternatives are expected to adversely affect stocks of fish or invertebrates prohibited in groundfish fisheries harvest. Catches of Pacific halibut, crabs, salmon, and herring are controlled by PSC limits that are established based in proportion to the biomass estimates of those species. Section 4.3.5 of the FSEIS describes the possible impacts of alternatives on prohibited species. New information presented in section 3.2 does not demonstrate any impacts that NMFS considers to be significant or that were not already analyzed in the FSEIS.

4.4 Socioeconomic Impacts of the Alternatives

Socioeconomic impacts of a range of alternatives are discussed in section 4.4 of the FSEIS. All the alternatives are anticipated to have different net economic benefits. The actual value realized is dependent on factors unquantifiable at present, including market demand, costs of harvesting and processing, proportion of catch processed at sea, and the degree to which the TAC specifications are constrained by PSC limits. Alternative A is the preferred alternative because it is based on the best available scientific information, and is consistent with the long term socioeconomic needs of the Nation.

Alternative A: Alternative A is the preferred alternative because it incorporates the best available

scientific data in establishing the harvest levels for the 1999 groundfish fisheries. Alternative A also achieves optimum yield while preventing overfishing. All entities receive the maximum benefits under alternative A in that they will be able to harvest target species and species groups at the highest available level based on stock status and ecosystem concerns.

Alternative B: By failing to utilize the most recent biological data on the status of groundfish stocks in the BSAI and GOA, this alternative may allow the overharvest and underharvest of groundfish target species and species groups and could result in overfishing.

Alternative C: The alternative that would have the greatest immediate economic benefit would be setting the sum of the TACs at the maximum OY level. However, this alternative would not achieve the maximum long-term benefit in that it could result in overfishing and could lead to overfished stocks. Long term consequences of harvesting at maximum OY in the GOA are presented in section 4.1.1 of the FSEIS.

Alternative D: No fishery, would result in no groundfish specifications for the 1999 fishing year. This alternative would have severe socioeconomic impacts on all small entities that currently participate in the BSAI and GOA groundfish fisheries. It is not consistent with NMFS's fisheries management objectives and obligations under the Magnuson-Stevens Act to achieve optimum yield from the fisheries under Federal management. Furthermore, it would not be supported by the fishing industry, the CDQ groups, or the State of Alaska, all of whom have an interest in the groundfish fisheries.

There are a variety of at least partially external factors that affect the economic performance of the BSAI and GOA groundfish fisheries. They include landing market prices in Japan, wholesale prices in Japan, U.S. imports of groundfish products, U.S. per capita consumption of seafood, U.S. consumer and producer price indexes, Foreign exchange rates, and U.S. cold storage holdings of groundfish. More information on these factors are included in Tables 39-49 of the 1998 Economic SAFE.

Management actions that will decrease groundfish catches or increase operating costs may result from continued concerns with: (1) the bycatch of prohibited species, (2) the discard and utilization of groundfish catch, and (3) the effects of the groundfish fisheries on marine mammals and sea birds. The implementation of the American Fisheries Act also is expected to result in major changes in the economic performance of the BSAI and GOA groundfish fisheries.

FINDING OF NO SIGNIFICANT IMPACT

NMFS acknowledges that certain mitigation measures must be in place before the start of the 1999 BSAI and GOA groundfish fisheries so that a finding of no significant impact can be reached. These measures include a final rule implementing changes to the Atka mackerel fishery in the BSAI to avoid jeopardizing the continued existence of endangered Steller sea lions, and an emergency interim rule implementing the revised reasonable and prudent alternatives for the BSAI and GOA Walleye pollock fisheries as outlined by NMFS in the 1998 Biological Opinion (NMFS, 1998b), and as updated in a memorandum on December 16, 1998 (NMFS, 1998e). If the recommended mitigation measures are not effective prior to scheduled regulatory opening of the trawl fisheries on January 20, 1999, NMFS, by emergency rule under authority of the Magnuson-Stevens Act, will close directed fishing with trawl gear in the BSAI and GOA until such time that these mitigation measures can be implemented. A separate EA will address each of these pending rules, and will analyze the effects of that action on the human environment.

For the reasons discussed above, implementation of the preferred Alternative would not significantly affect the quality of the human environment. Therefore, the preparation of an environmental impact statement is not required by section 102(2)(C) of NEPA or its implementing regulations.

_____ 12/24/98

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