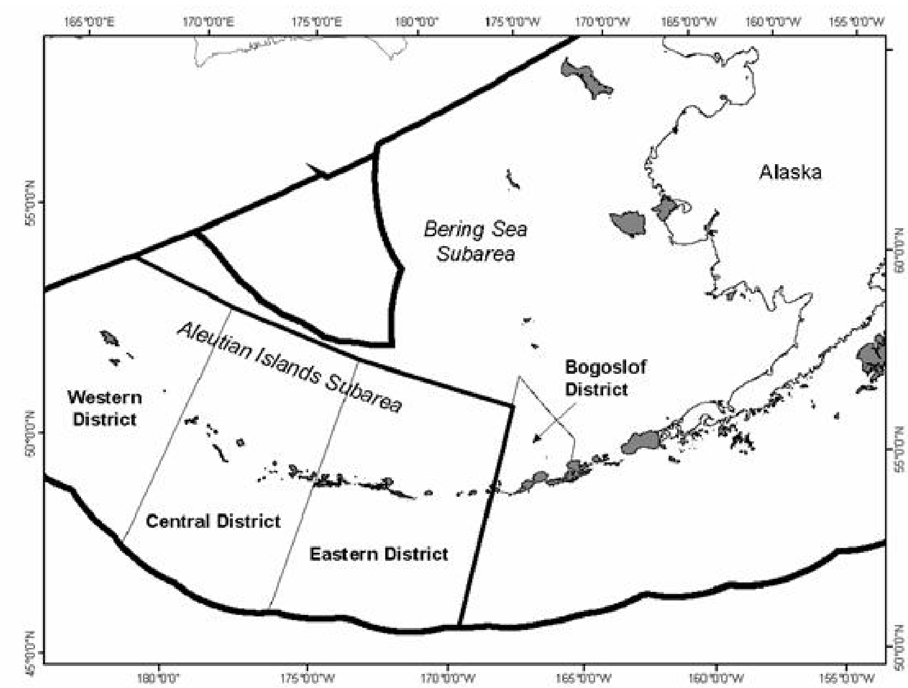
APPENDIX A

STOCK ASSESSMENT AND FISHERY EVALUATION REPORT FOR THE GROUNDFISH RESOURCES OF THE BERING SEA/ALEUTIAN ISLANDS REGIONS

Compiled by

The Plan Team

for the Groundfish Fisheries of the Bering Sea and Aleutian Islands



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Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Region

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Summary

By
The Plan Team for the Groundfish Fisheries of the Bering Sea and Aleutian Islands

Introduction

The *National Standard Guidelines for Fishery Management Plans* published by the National Marine Fisheries Service (NMFS) require that a stock assessment and fishery evaluation (SAFE) report be prepared and reviewed annually for each fishery management plan (FMP). The SAFE report summarizes the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries that are managed under Federal regulation. It provides information to the Councils for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, marine ecosystems, and fishery over time, and assessing the relative success of existing state and Federal fishery management programs. For the FMP for the Groundfish Fishery of the Bering Sea and Aleutian Islands (BSAI) Area, the SAFE report is published in three sections: a “Stock Assessment” section, which comprises the bulk of this document, and “Economic Status of Groundfish Fisheries off Alaska” and “Ecosystem Considerations” sections, which are bound separately.

The BSAI Groundfish FMP requires that a draft of the SAFE report be produced each year in time for the December meeting of the North Pacific Fishery Management Council. Each stock or stock complex is represented in the SAFE report by a chapter containing the latest stock assessment. New or revised stock assessment models are generally previewed at the September Plan Team meeting, and considered again by the Plan Team at its November meeting for recommending final specifications for the following two fishing years.

This Stock Assessment section of the SAFE report for the BSAI groundfish fisheries is compiled by the BSAI Groundfish Plan Team from chapters contributed by scientists at NMFS Alaska Fisheries Science Center (AFSC). These chapters include a recommendation by the author(s) for overfishing level (OFL) and acceptable biological catch (ABC) for each stock and stock complex managed under the FMP. This introductory section includes the recommendations of the Plan Team (Table 1). The ABC recommendations are reviewed by the Scientific and Statistical Committee (SSC), which may confirm the Plan Team recommendations. The Plan Team and SSC recommendations, together with social and economic factors, are considered by the Council in determining total allowable catches (TACs) and other measures used to manage the fisheries. Neither the author(s), Plan Team, nor SSC recommends TACs.

Members of the BSAI Plan Team who compiled this SAFE report were Loh-lee Low (chair), Jane DiCosimo (BSAI FMP coordinator), Kerim Aydin, David Carlile, Lowell Fritz, Steven Hare, Kathy Kuletz, Dan Lew, Brenda Norcross, Mike Sigler, Andrew Smoker, Grant Thompson, and Theresa Tsou.

Background Information

Management Areas and Species

The BSAI management area lies within the 200-mile U.S. Exclusive Economic Zone (EEZ) of the US (Figure 1). International North Pacific Fisheries Commission (INPFC) statistical areas 1 and 2 comprise the EBS. The Aleutian Islands (AI) region is INPFC area 5.

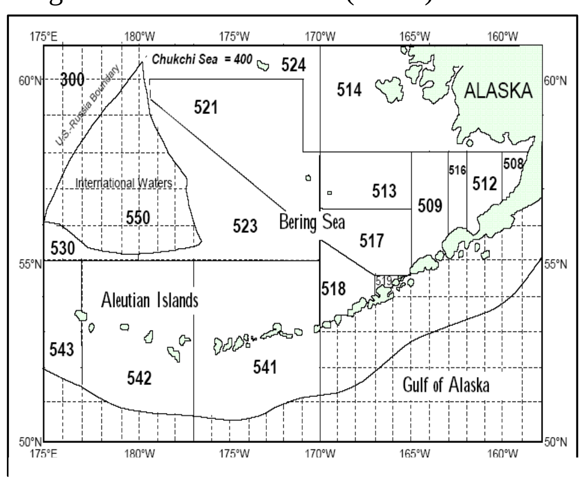

Figure 1. Bering Sea and Aleutian Islands statistical and reporting Areas

Five categories of finfishes and invertebrates have been designated for management purposes (see below). They are prohibited species (species that must be returned to the sea when caught), target species (species for which an individual TAC is established), other species (species for which an aggregate TAC is established), forage fish (species for which targeted harvest is prohibited, with a maximum of 2 percent retainable bycatch allowed), and non-specified species (all species not included in one of the other categories). This SAFE report describes the status of the stocks in the target species and "other species" categories only. The finfish species categories, other than non-specified species, are listed below:

Prohibited Species	**Target Species**	**Other Species**	**Forage Fish**
Salmon	Walleye pollock	Sculpins	Eulachon
Pacific halibut	Pacific cod	Sharks	Capelin
Pacific herring	Sablefish	Skates	Sandlance
Steelhead trout	Yellowfin sole		Myctophids
	Greenland turbot		Bathylagids
	Arrowtooth flounder		Sandfish
	Northern rock sole		Pholids
	Flathead Sole		Stichaeids
	Alaska plaice		Gonostomatids
	Other flatfish		
	Pacific Ocean perch		
	Northern rockfish		
	Shortraker rockfish		
	Rougheye rockfish		
	Other rockfish		
	Atka mackerel		

The invertebrate species categories, other than non-specified species, are listed below:

Prohibited Species	**Target Species**	**Other Species**	**Forage Fish**
King crab		Squid	
Tanner crab		Octopus	

Historical Catch Statistics

Catch statistics since 1954 are shown for the Eastern Bering Sea (EBS) subarea in Table 2. The initial target species was yellowfin sole. During the early period of these fisheries, total catches of groundfish peaked at 674,000 t in 1961. Following a decline in abundance of yellowfin sole, other species (principally walleye pollock) were targeted, and total catches peaked at 2.2 million t in 1972. Walleye pollock is now the principal fishery, with recent catches approximately 1.4-1.5 million t due to years of high recruitment. After the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) was adopted in 1976, catch restrictions and other management measures were placed on the fishery and total groundfish catches have since varied from one to two million t. In 2005, Congress implemented a statutory cap on TACs for BSAI groundfish of 2 million t. Catches generally total about 10 percent below the cap.

Catches in the Aleutian Islands (AI) subarea have always been much smaller than in the EBS. Target species have also differed (Table 3). Pacific Ocean perch (POP) was the initial target species. As POP abundance declined, the fishery diversified to other species. During the early years of exploitation, total AI groundfish catches peaked at 112,000 t in 1965. Atka mackerel is the largest fishery (53,700 t in 2007) in the AI, followed by Pacific cod (34,000 t in 2007). Recent catches have been about 100,000 t annually, after peaking at 191,000 t in 1996. Total 2007 AI catches were 117,000 t, reflecting a 10,000 t increase in Pacific cod catch in 2007.

Total 2007 BSAI catches were 1.85 million t. Total catches since 1954 for the EBS and AI combined are in Table 4.

Recent Total Allowable Catches

Amendment 1 to the BSAI Groundfish FMP provides the framework to manage the groundfish resources as a complex. Maximum sustainable yield (MSY) for the BSAI groundfish complex was originally estimated at 1.8 to 2.4 million t. The optimum yield (OY) range was set at 85% of the MSY range, or 1.4 to 2.0 million t. The sum of the TACs equals OY for the complex, which is constrained by the 2.0 million t cap.

Establishment of the Western Alaska Community Development Quota (CDQ) Program annual groundfish reserves is concurrent with the annual BSAI groundfish harvest specifications. Once annual BSAI groundfish TACs are established, certain species categories are allocated to the CDQ Program. This includes 10 percent of the BS and AI pollock TACs, 20 percent of the fixed gear sablefish TAC, and 7.5 percent of the sablefish trawl gear allocation. It also receives 10.7 percent of the TACs (up from 7.5 percent prior to 2008) for Pacific cod, yellowfin sole, rock sole, flathead sole, Atka mackerel, AI Pacific ocean perch, arrowtooth flounder, and BS Greenland turbot. The program also receives allocations of prohibited species quotas.

For the non-specified reserve, both the trawl and non-trawl fisheries are prosecuted under a single TAC. The TAC specifications for the primary allocated species, and PSC specifications, are recommended by the Council at its December meeting. A portion of the TAC limits for sablefish in the trawl gear category, arrowtooth flounder, BS Greenland turbot, and those species not otherwise allocated to the CDQ Program are placed in a reserve. Apportionments to this reserve range from 4.3 percent to 15 percent of applicable TAC limits. The reserve is used for (1) correction of operational problems in the fishing fleets, (2) to promote full and efficient use of groundfish resources, (3) adjustments of species TACs according to changing conditions of stocks during fishing year, and (4) apportionments. The initial TAC (ITAC) for each species is the remainder of the TAC after the subtraction of these reserves.

New Data Summary

Since the SAFE Report for 2007 was issued (NPFMC 2006), the following new information has been incorporated into the stock assessments:

1) Eastern Bering Sea Walleye pollock: 1) updated 2006 and 2007 catch data; 2) an age-length transition matrix was estimated to use the current-year fishery length frequency data; 3) the ability to split the age-1 values from the rest of the age compositions for the EIT survey was added so that the interaction between age-1 variability and other age groups was reduced; 4) total age 2 and older numbers-at-age from the surveys were used to tune the model; and 5) the Tier 1 ABC estimation method now uses “fishable” biomass defined as the biomass of pollock available to the fishery as modified by the selectivity-at-age estimates.

1a) Aleutian Islands Walleye pollock: 1) catch from 2006 and 2007; and 2) age data from the 2006 AI bottom trawl survey.

1b) Bogoslof pollock: 1) updated 2006 and 2007 catch data; and 2) echo-integration trawl survey data.

2) Pacific cod: 1) updated 2006 and 2007 catch data; 2) commercial fishery size composition data were recompiled for 1990-2007; 3) size composition data from the 2007 EBS shelf bottom trawl survey; 4) biomass estimate from the 2007 EBS shelf bottom trawl survey; 5) the numeric abundance estimates from the 1979-2007 EBS shelf bottom trawl surveys; 6) age composition data from the 1995 and 2006 EBS shelf bottom trawl surveys; 7) seasonal catch per unit effort (CPUE)

data for the trawl, longline, and pot fisheries from 1991-2007; 8) catch rates from the 1998-2007 International Pacific Halibut Commission (IPHC) longline surveys; 9) size composition data from the 2007 IPHC longline survey.

3) Sablefish: 1) updated 2006 and 2007 catch data; 2) relative abundance and length data from the 2007 longline survey; 3) relative abundance and length data from the 2006 longline and trawl fisheries; 4) age data from the 2006 longline survey and longline fishery; 5) relative abundance and length data from 2007 GOA bottom trawl survey; and 6) older growth data (1981-1993) were updated, and new growth data were added (1996-2004) in the form of new age-length conversion matrices.
4) Yellowfin sole: 1) updated 2006 and 2007 catch data; 2) 2006 fishery age composition; 3) 2006 survey age composition; 4) 2007 trawl survey biomass point estimate and standard error; 5) Estimate of the discarded and retained portions of the 2006 catch; and 5) update of weight at age using biological data through 2006.
5) Greenland turbot: 1) updated 2006 and 2007 catch data; 2) EBS shelf survey 2007 biomass and length composition estimates; and 3) updated aggregated longline survey data index for the EBS and AI regions.
6) Arrowtooth flounder: 1) updated 2006 and 2007 catch data; 2) 2007 shelf survey size composition; 3) 2007 shelf survey biomass point-estimates and standard errors; 4) estimate of retained and discarded portion of the 2006 catch; and 5) include the 10 AI surveys and survey size compositions.
7) Northern rock sole: 1) updated 2006 and 2007 catch data; 2) 2006 fishery age composition; 3) 2006 survey age composition; 4) 2007 trawl survey biomass point estimate and standard error; and 5) Estimate of retained and discarded portions of the 2006 catch.
8) Flathead sole: 1) 2006 catch data; 2) 2007 fishery length compositions and 1990-2006 data were recalculated; 3) 2004 and 2005 fishery age compositions from previous years were recalculated; 4) estimated survey biomass from the 2007 EBS Trawl Survey; 5) sex-specific length compositions from the 2007 EBS Trawl Survey and previous data were recalculated; 6) sex-specific age compositions from the 2006 EBS Trawl Survey and previous data were recalculated; and 7) mean bottom temperature from the 2007 EBS trawl survey.
9) Alaska plaice: 1) 2006 catch data; 2) 2007 trawl survey biomass estimate and standard error, and 2007 survey length composition; 3) 2006 survey age composition; and 4) length bins and the transition matrix were extended from 45 to 60 cm.
10) Other flatfish: 1) 2007 catch; and 2) 2007 EBS trawl survey biomass estimates.
11) Pacific ocean perch: updated 2006 and 2007 catch data.
12) Northern rockfish: updated 2006 and 2007 catch data.
13) Shortraker and rougheye rockfish: updated 2006 and 2007 catch data.
14) Other rockfish: updated 2006 and 2007 catch data.
15) Atka mackerel: 1) 2006 and 2007 catch data; 2) 2006 fishery age composition data; 3) age data from the 2006 Aleutian Islands bottom trawl survey; 4) 2006 fishery and survey weight-at-age values; 5) updated population weight-at-age values; and 6) the years used to compute an average selectivity vector for projections was updated from 2001-2005 to 2002-2006.
16) Squids: updated 2006 and 2007 data.
17) Skates: 1) updated 2006 and 2007 data; 2) biomass estimates from the 2007 EBS shelf survey; 3) independent estimates of survey selectivity and catchability; 4) length frequencies from survey data; 5) mean length at age from survey and fishery collections; and 6) natural mortality, growth, and maturity parameters.
18) Sharks: 1) updated 2006 and 2007 catch data; and 2) bottom trawl survey biomass estimates for the 2007 EBS shelf.

19) Octopuses: 1) results of a cooperative research project that verified that all octopus observed in plant deliveries was confirmed as giant Pacific octopus; 2) results of observer program special project that noted that the observed 2007 sex ratios were different between octopus observed on vessels and those in plant deliveries; and 3) biomass estimates from summer 2007 Bering Sea Shelf Survey.
20) Sculpins: 1) updated 2006 and 2007 catch data; 2) total catch by target fishery and gear type for 2006; 3) biomass estimates from the 2007 Bering Sea Shelf Survey; and 4) new estimates of natural mortality for four species

Biological Reference Points

A number of biological reference points are used in this SAFE report. Among these are the fishing mortality rate (F) and stock biomass level (B) associated with MSY (F_{MSY} and B_{MSY}, respectively). Fishing mortality rates reduce the level of spawning biomass per recruit to some percentage P of the pristine level ($F_{P\%}$). The fishing mortality rate used to compute ABC is designated F_{ABC}, and the fishing mortality rate used to compute the overfishing level (OFL) is designated F_{OFL}.

Definition of Acceptable Biological Catch and the Overfishing Level

Amendment 56 to the BSAI Groundfish FMP, which was implemented in 1999, defines ABC and OFL for the BSAI groundfish fisheries. The new definitions are shown below, where the fishing mortality rate is denoted F, stock biomass (or spawning stock biomass, as appropriate) is denoted B, and the F and B levels corresponding to MSY are denoted F_{MSY} and B_{MSY} respectively.

Acceptable Biological Catch is a preliminary description of the acceptable harvest (or range of harvests) for a given stock or stock complex. Its derivation focuses on the status and dynamics of the stock, environmental conditions, other ecological factors, and prevailing technological characteristics of the fishery. The fishing mortality rate used to calculate ABC is capped as described under "overfishing" below.

Overfishing is defined 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 below in descending order of preference, corresponding to descending order of information availability. The SSC will have 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. For tier (1), a pdf refers to a probability density function. For tiers (1-2), if a reliable pdf of B_{MSY} is available, the preferred point estimate of B_{MSY} is the geometric mean of its pdf. For tiers (1-5), if a reliable pdf of B is available, the preferred point estimate is the geometric mean of its pdf. For tiers (1-3), the coefficient α is set at a default value of 0.05, with the understanding that the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information. For tiers (2-4), a designation of the form "$F_{X\%}$" refers to the F associated with an equilibrium level of spawning per recruit (SPR) equal to X% of the equilibrium level of spawning per recruit in the absence of any fishing. If reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to view SPR calculations based on a knife-edge maturity assumption as reliable. For tier (3), the term $B_{40\%}$ refers to the long-term average biomass that would be expected under average recruitment and $F=F_{40\%}$.

Overfished or approaching an overfished condition is determined for all age-structured stock assessments by comparison of the stock level in relation to its MSY level according to the following two harvest scenarios (Note for Tier 3 stocks, the MSY level is defined as $B_{35\%}$):

Overfished (listed in each assessment as scenario 6):

In all future years, F is set equal to F_{OFL}. (Rationale: This scenario determines whether a stock is overfished. If the stock is expected to be 1) above its MSY level in 2008 or 2) above ½ of its MSY level in 2008 and above its MSY level in 2018 under this scenario, then the stock is not overfished.)

Approaching an overfished condition (listed in each assessment as scenario 7):

In 2008 and 2009, F is set equal to *max* F_{ABC}, and in all subsequent years, F is set equal to F_{OFL}. (Rationale: This scenario determines whether a stock is approaching an overfished condition. If the stock is expected to be above its MSY level in 2020 under this scenario, then the stock is not approaching an overfished condition.)

For stocks in Tiers 4-6, no determination can be made of overfished status or approaching an overfished condition as information is insufficient to estimate the MSY stock level.

Tier

1) Information available: *Reliable point estimates of B and* B_{MSY} *and reliable pdf of* F_{MSY}.
   - 1a) Stock status: $B/B_{MSY} > 1$
     - $F_{OFL} = \mu_A$, *the arithmetic mean of the pdf*
     - $F_{ABC} \le \mu_H$, *the harmonic mean of the pdf*
   - 1b) Stock status: $\alpha < B/B_{MSY} \le 1$
     - $F_{OFL} = \mu_A \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
     - $F_{ABC} \le \mu_H \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
   - 1c) Stock status: $B/B_{MSY} \le \alpha$
     - $F_{OFL} = 0$
     - $F_{ABC} = 0$
2) Information available: *Reliable point estimates of B,* B_{MSY}, F_{MSY}, $F_{35\%}$, *and* $F_{40\%}$.
   - 2a) Stock status: $B/B_{MSY} > 1$
     - $F_{OFL} = F_{MSY}$
     - $F_{ABC} \le F_{MSY} \times (F_{40\%}/F_{35\%})$
   - 2b) Stock status: $\alpha < B/B_{MSY} \le 1$
     - $F_{OFL} = F_{MSY} \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
     - $F_{ABC} \le F_{MSY} \times (F_{40\%}/F_{35\%}) \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
   - 2c) Stock status: $B/B_{MSY} \le \alpha$
     - $F_{OFL} = 0$
     - $F_{ABC} = 0$
3) Information available: *Reliable point estimates of B,* $B_{40\%}$, $F_{35\%}$, *and* $F_{40\%}$.
   - *3a) Stock status:* $B/B_{40\%} > 1$
     - $F_{OFL} = F_{35\%}$
     - $F_{ABC} \le F_{40\%}$
   - *3b) Stock status:* $\alpha < B/B_{40\%} \le 1$
     - $F_{OFL} = F_{35\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$
     - $F_{ABC} \le F_{40\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$
   - *3c) Stock status:* $B/B_{40\%} \le \alpha$
     - $F_{OFL} = 0$
     - $F_{ABC} = 0$
4) Information available: *Reliable point estimates of B,* $F_{35\%}$, *and* $F_{40\%}$.
   - $F_{OFL} = F_{35\%}$
   - $F_{ABC} \le F_{40\%}$
5) Information available: *Reliable point estimates of B and natural mortality rate M.*
   - $F_{OFL} = M$
   - $F_{ABC} \le 0.75 \times M$
6) Information available: *Reliable catch history from 1978 through 1995.*
   - *OFL* = *the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information*
   - $ABC \le 0.75 \times OFL$

Overview of "Stock Assessment" Section

The current status of individual groundfish stocks managed under the FMP is summarized in this section. Plan Team recommendations for 2008 and 2009 ABCs and OFLs are summarized in Tables 1, 5 and 6. The added year was included to assist NMFS management since the TAC setting process allows for a period of up to two years to review harvest specifications. The sum of the recommended ABCs for 2008 and 2009 are 2,440,000 t and 2,560,000 t, respectively. These are approximately 236,000 t and 118,000 t below the sum of the 2007 ABCs. However, these values still exceed the 2 million t cap employed by the Council as a conservation measure in setting TACs. Overall, the status of the stocks continues to appear relatively favorable, although many stocks are declining due to poor recruitment in recent years. Total biomass for 2008 (16.6 million t) is less than last year's estimate of 16.9 million t.

Overall groundfish exploitable biomass is high but declining, especially for pollock and Pacific cod. The bottom trawl survey biomass estimate for pollock in 2007 was 4.3 million t, only 87% of the long-term mean of the bottom-trawl survey. The 2007 echo-integration (EIT) survey biomass estimate was 1.88 million t, only 55% of the long-term mean for this survey. Both surveys indicate that the 2006 year class is strong and that the 2005 year class is now apparently below average. The biomass estimate from the 2007 bottom trawl survey for Pacific cod of 424,000 t is down about 18% from the 2006 estimate, and is the all-time low. Plan Team ABC recommendations are trending down for gadoids, but generally up for flatfishes.

The abundances of AI pollock, sablefish, all rockfishes, all flatfishes, and Atka mackerel are projected to be above target stock size. The abundances of EBS pollock and Pacific cod are projected to be below target stock size (Figure 2).

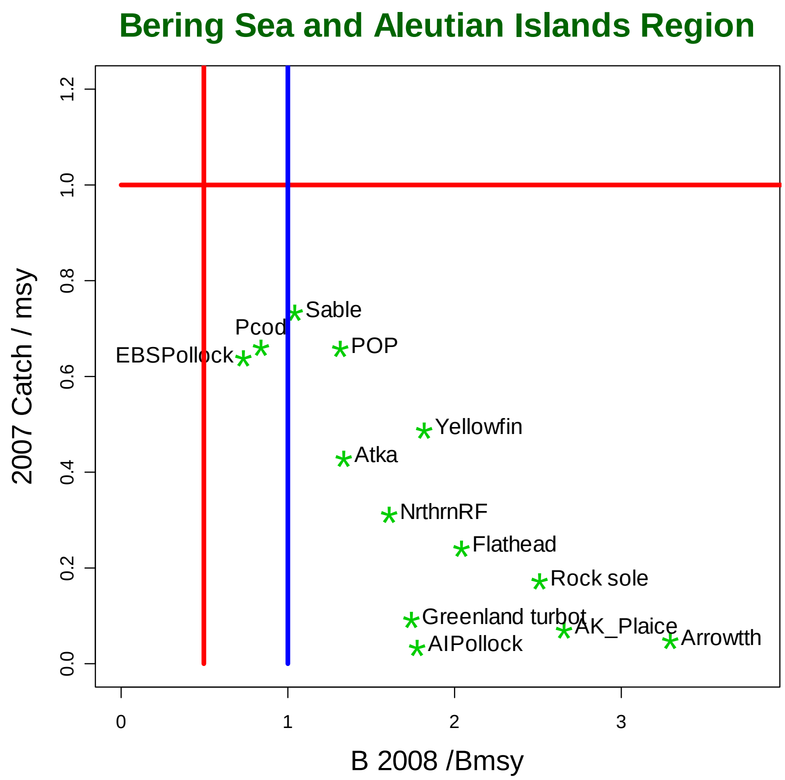

Figure 2. Summary status of age-structured BSAI groundfish species relative to 2007 catch levels (vertical axis) and projected 2008 spawning biomass relative to B_{msy} levels. Note that the 2007 MSY level is taken as the 2007 OFL

Summary and Use of Terms

Stock status is summarized and OFL and ABC recommendations are presented on a stock-by-stock basis in the remainder of this section, with the following conventions observed:

- "Fishing mortality rate" refers to the full-selection F (i.e., the rate that applies to fish of fully selected sizes or ages), except in the cases of the EBS pollock, yellowfin sole, and northern rock sole assessments. For these stocks, the fishing mortality rate consists of the ratio between catch (in biomass) and biomass at the start of the year. EBS pollock uses "fishable biomass" whereas the two flatfish stocks use age 6+ biomass for this calculation.
- "Projected age+ biomass" refers to the total biomass of all cohorts of ages greater than or equal to some minimum age, as projected for January 1 of the coming year. The minimum age varies from species to species. When possible, the minimum age corresponds to the age of recruitment listed in the respective stock assessment. Otherwise, the minimum age corresponds to the minimum age

included in the assessment model, or to some other early age traditionally used for a particular species. When a biomass estimate from the trawl survey is used as a proxy for projected age+ biomass, the minimum age is equated with the age of recruitment, even though the survey may not select that age fully and undoubtedly selects fish of younger ages to some extent.

- "Exploitation rate" refers to the ratio between catch (in numbers) and start-of-year stock size (also in numbers). Where information is lacking, the exploitation rate is sometimes multiplied by start-of-year biomass to compute ABC.
- Projected ABC, OFL, and biomass levels are reported to three significant digits, except when quoting a Council-approved value with more than three significant digits or when a stock-specific ABC is apportioned among areas on a percentage basis, in which case four significant digits may be used if necessary to avoid rounding error. Fishing mortality rates are reported to two significant digits.
- The reported ABCs and OFLs for the past year correspond to the values approved by the Council. Projected ABCs and OFLs listed for the next two years are the Plan Team's recommendations.
- Reported catches are as of October 27, 2007

Two-Year OFL and ABC Projections

Amendment 48 to the BSAI Groundfish FMPs, implemented in 2005, made two significant changes with respect to the stock assessment process. First, annual assessments are no longer required for rockfishes since new data during years when no groundfish surveys are conducted are limited. For example, since 2007 was an off-year for the NMFS BSAI groundfish trawl survey, only summaries for these species were produced.

The second significant change is that the proposed and final specifications are to be specified for a period of up to two years. This requires providing ABC and OFL levels for 2008 and 2009 (Table 1). In the case of stocks managed under Tier 3, 2008 and 2009 ABC and OFL projections are typically based on the output for Scenarios 1 or 2 from the standard projection model using assumed (best estimates) of actual catch levels.

In the case of stocks managed under Tiers 4-6, 2009 projections are set equal to the Plan Team's recommended values for 2008.

The 2009 ABC and OFL values recommended in next year's SAFE report are likely to differ from this year's projections for 2009, for the same reasons that the 2008 projections in this SAFE report differ from those in September.

Uncertainty

Statistical uncertainty is addressed in the individual assessments, and to some degree, by the tiers used to establish ABCs. Statistical uncertainty or natural variability in the stock led the Plan Team to recommend 2008 and 2009 ABC values lower than the maximum permissible level for walleye pollock and Greenland turbot. The Plan Team's recommended 2008 and 2009 ABC for pollock is 15 percent below the maximum permissible level. The Plan Team's recommended 2008 ABC for Greenland turbot is 82 percent below the maximum permissible level for 2008 and 2009.

Ecosystem Considerations / Research

Ecosystem considerations are addressed in the stock assessment chapters. Similar to past years, several assessments (walleye pollock, Pacific cod, yellowfin sole, arrowtooth flounder, northern rock sole, flathead sole) included discussions to estimate relationships between bottom trawl survey catchability and bottom temperature. In some assessments (rock sole, flathead sole, Alaska plaice), potential effects of a possible 1989 regime shift on the stock-recruitment relationship are investigated (the yellowfin sole assessment included a similar analysis for the 1978 regime shift). Assessments for BSAI arrowtooth flounder, BS flathead sole, EBS walleye pollock, AI walleye pollock, BSAI cod, and AI Atka mackerel assessment incorporated results from ecosystem models. Ecosystem model results were also included in the squid and other species assessments for squids, skates, sculpins, and octopus. Linkages between BSAI arrowtooth and EBS pollock were reviewed again this year, and recent data indicate that arrowtooth are an increasingly important predator of pollock in the EBS (although not at the scale observed in the Gulf of Alaska (GOA)).

Last year, the BSAI Pacific cod ecosystem considerations reviewed the role of cod as a predator in the EBS and AI ecosystems. These results indicate that fishing mortality is the dominant source of explained cod mortality in both ecosystems, and that changing cod mortality in each ecosystem affects a different set of species with different magnitudes. This year, the Plan Team reiterated its suggestion that separate specifications for Pacific cod in the AI and EBS be considered as an ecosystem consideration in future assessments. During the discussion of natural mortality, it was discussed that “explained” sources of natural mortality (i.e., predation) only accounted for a natural mortality rate of 0.04 for cod, with the rest of the natural mortality being “unexplained” and perhaps due to disease, parasites, or migration. Thus predation mortality is uninformative in selecting a range of M for use in assessments.

A full ecosystem analyses for the EBS presented in the Ecosystem Assessment section of the Ecosystem Considerations chapter suggested that there may have been a decrease in forage species biomass in 1999-2007 relative to the 1980s-1990s. In general, the EBS was cold again this year, with a fuller ice extent and later ice retreat compared with recent years; it was remarked that this more “normal” condition was localized to the EBS, and that in general the Arctic continued its trend of warmer temperatures and lower ice coverage. The question of whether the changes in biota seen between 1998 and 2001 and the recent changes in ice cover represent a new or permanent “regime” was discussed in the context of whether pollock production was in a new regime, although no conclusion was reached or suggested. Although the Team was unable to identify any cases where these or other ecosystem considerations suggested an immediate need to adjust ABC, the Team encourages further development of ecosystem considerations. A full review of ecosystem status and trends is provided in the Ecosystem Considerations chapter.

Stock Status Summaries

1. Walleye Pollock

Status and catch specifications (t) of walleye pollock in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2007 and 2008 are those recommended by the Plan Team. Catch data are current through 10/27/07.

Area	Year	Age 3+ Biomass	OFL	ABC	TAC	Catch
Eastern Bering Sea	2006	8,050,000	2,090,000	1,930,000	1,485,000	1,486,413
	2007	6,360,000	1,640,000	1,394,000	1,394,000	1,350,530
	2008	4,360,000	1,440,000	1,000,000	n/a	n/a
	2009	n/a	1,320,000	1,000,000	n/a	n/a
Aleutian Islands	2006	130,000	39,100	29,400	19,000	1,735
	2007	229,000	54,500	44,500	19,000	2,488
	2008	197,000	34,000	28,200	n/a	n/a
	2009	n/a	26,100	22,700	n/a	n/a
Bogoslof	2006	253,000	50,600	5,500	10	0
	2007	240,000	48,000	5,220	10	0
	2008	292,000	58,400	7,970	n/a	n/a
	2009	n/a	58,400	7,970	n/a	n/a

Eastern Bering Sea

Changes from previous assessment

New data in this year's assessment include the following:

- Updated total catch for 2006 and a preliminary estimate of the 2007 catch.
- Biomass estimates from the 2007 bottom trawl survey and the 2007 echo-integration trawl (EIT) survey. The estimate from the bottom trawl survey was 4.3 million t, up 42% from the 2006 estimate. The estimate from the EIT survey was 1.88 million t, up 20% from last year's survey. Although both survey estimates are higher than last year's, both are substantially below the long-term means for their respective time series.
- Age composition data from the 2007 bottom trawl survey, updated age composition data from the 2006 EIT survey, and preliminary age composition data from the 2007 EIT survey (based on the age-length key from this year's bottom trawl survey). The 2007 survey age compositions give evidence of a large 2006 year class.
- Age and size composition data and weight-at-age data from the 2006 fishery. The new weight-at-age data resulted in a significant decrease in the 2006 mean weights at age relative to the values used in last year's assessment.
- Sample sizes specified in the model were re-evaluated using a bootstrap approach.

Changes in model structure include the following:

- Length composition data (not just age composition data) can now be used in the model.
- Relative abundance at age 1 in the EIT survey is now estimated separately (as an independent recruitment index) from the other age groups.
- The survey abundance index used for tuning the model was changed from age 1+ numbers to age 2+ numbers.
- The catch/biomass ratio used in applying the Tier 1 harvest control rules now uses "fishable biomass" (the sum of the product of selectivity-, weight-, and numbers-at-age) for the denominator instead of age 3+ biomass. This makes the computation less sensitive to fluctuations in incoming year class strength.

Spawning biomass and stock status trends

Consistent with the estimates produced in last year's assessment, abundance of EBS walleye pollock has declined steadily since 2003 due to poor recruitment from the 2001-2005 year classes. This string of five consecutive poor year classes is unprecedented in the known history of the stock. Spawning biomass is estimated to be 4% above B_{MSY} in 2007 but projected to be 28% below B_{MSY} in 2008. The age 3+ biomass for 2007 is estimated to be the lowest in the time series since 1980. Although preliminary indications are that the 2006 year class is well above average, spawning biomass is unlikely to exceed B_{MSY} until 2010.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The SSC has determined that reliable estimates of B_{MSY} and the probability density function for F_{MSY} exist for this stock. Therefore, EBS walleye pollock qualify for management under Tier 1. The Plan Team concurs with the assessment authors' conclusion that the Tier 1 reference points continue to be reliably estimated.

The updated estimate of B_{MSY} from the present assessment is 1.88 million t, compared to 2.06 million t from last year's assessment. Projected spawning biomass for 2008 is 1.38 million t, placing EBS walleye pollock in sub-tier "b" of Tier 1. As in recent assessments, the maximum permissible ABC harvest rate was based on the ratio between MSY and the equilibrium biomass corresponding to MSY. The harmonic mean of this ratio from the present assessment is 0.341, significantly higher than last year's value of 0.243. The difference is due to a change in the biomass measure used in the denominator of the ratio, from age 3+ biomass (in last year's assessment), to fishable biomass (in this year's assessment). The lead author noted that this method change results in the same average yield but with less inter-annual variability.

The harvest ratio of 0.341 is scaled according to the Tier 1b formula and then multiplied by the geometric mean of the projected fishable biomass for 2008 (4.77 million t) to obtain the maximum permissible ABC for 2008, which is 1.17 million t. This ABC is more than double the 2008 yield of 555,000 t that would correspond to a Tier 3b strategy based on a $B_{40\%}$ value of 2.63 million t and an $F_{40\%}$ value of 0.51.

A range of ABC values from 555,000 – 1,170,000 t was discussed by Plan Team, with arguments offered in support of candidate values spanning the full range. Arguments in support of setting the 2008 ABC at 1.17 million t included the following:

- The stock qualifies for management under Tier 1, so the maximum permissible Tier 1 ABC should have priority unless there is a compelling reason to set a lower ABC.
- The Tier 1 harvest control rules already have a built-in precautionary adjustment for stocks that fall below B_{MSY}.
- Uncertainty is already factored into the Tier 1 harvest control rules.
- A 2008 ABC of 1.17 million t would already constitute a very large (16%) reduction from the 2007 ABC of 1.394 million t and would result in greater short-term catch stability than a lower ABC.
- Biomass is expected to rebuild to B_{MSY} under the maximum permissible ABC about as fast as it would under more conservative strategies (Figure 1.43).

Arguments in support of an ABC lower than 1.17 million t included the following:

- A 2008 ABC of 1.17 million t would imply an all-time high spawning exploitation rate. Keeping the 2008 ABC at or below about 1 million t would not exceed the all-time high spawning exploitation rate.
- There are many examples of strong year classes being produced when biomass is near $B_{40\%}$, but only one strong year class has been produced at a biomass lower than the projected 2008 value, implying that it would be desirable to increase biomass sooner rather than later.
- The stock rebuilt successfully from a similarly low level in the late 1970s and early 1980s when catches were limited to 1 million t or less.
- The possibility of a retrospective bias calls for additional precaution.
- The five-year string of consecutive poor recruitments spawned between 2001 and 2005 is unprecedented, also calling for additional precaution.

After lengthy discussion, the Plan Team voted to support the authors' recommendation of a 1 million t ABC for 2008. The decision was not unanimous, with some Plan Team members voting for lower values (specifically, 976,000 t and 555,000 t). The Plan Team emphasized that its recommendation is intended to constitute a precautionary ABC, and that if next year's assessment does not confirm the current estimated strength of the 2006 year class, further reductions may be necessary. A 2008 ABC of 1 million t would correspond to a harvest ratio of 0.21 and an $F_{39\%}$ harvest rate (compared to Tier 1A ABC rate of $F_{32\%}$). The current projection for maximum permissible ABC in 2009 given a 2008 catch of 1 million t is 1.07 million t. However, the Team recommended 1 million t for 2009 ABC.

The OFL harvest ratio under Tier 1a is 0.422, the arithmetic mean of the ratio between MSY and the equilibrium fishable biomass corresponding to MSY. The product of this ratio, rescaled according to the Tier 1b formula, and the geometric mean of the projected fishable biomass for 2008 gives the OFL for 2008, which is 1.44 million t. A 2008 OFL of 1.44 million t would correspond to a harvest ratio of 0.30. The current projection for OFL in 2009 given a 2008 catch of 1 million t is 1.32 million t. The walleye pollock stock in the EBS is not overfished and is not approaching an overfished condition.

Aleutian Islands

Changes from previous assessment
Model 2B is similar to the model accepted by the SSC last year and is recommended by the authors again this year.

Spawning biomass and stock status trends
Age 2+ biomass is estimated to have increased from 1999 to 2004, after which it has been stable. Spawning biomass is estimated to have been increasing slowly since 1999. The 2000 year class is estimated to have been well above average (third largest in the time series), and preliminary indications are that the 2005 and 2006 year classes may be slightly above average. Spawning biomass for 2008 is projected to be 82,300 t.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The SSC has determined that this stock qualifies for management under Tier 3. Given that spawning biomass has been increasing and is above the $B_{40\%}$ value of 51,500 t, the Plan Team concurs with the authors' recommendation to set 2008 ABC at the maximum permissible value (Tier 3a, with $F_{40\%}$=0.20) of 28,200 t. Assuming a 2008 catch equal to the ABC, the maximum permissible ABC for 2009 is projected to be 22,700 t.

Following the Tier 3a formula with $F_{35\%}$=0.24, OFL for 2008 is 34,000 t. The projected OFL for 2009 is 26,100 t. The walleye pollock stock in the Aleutian Islands is not overfished and is not approaching an overfished condition.

Bogoslof

Changes from previous assessment
No changes in analytic approach were made in this assessment.

Spawning biomass and stock status trends
Survey biomass estimates since 2000 have all been lower than estimates prior to 2000, ranging from a low of 198,000 t in 2003 to a high of 301,000 t in 2000. The 2007 estimate is the highest since the 2000 estimate.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The SSC has determined that this stock qualifies for management under Tier 5. Traditionally, the ABC for this stock has been set using a formula similar to the Tier 3 formula, but substituting a reference biomass level of 2 million t for $B_{40\%}$. The Plan Team concurs with the authors' recommendation to continue this practice. Given $F_{40\%}$=0.27, this results in F_{ABC}=0.022 and a 2008 ABC of 7,970 t. The projected ABC for 2009 is the same.

Following the Tier 5 formula with M=0.20, OFL for 2008 is 58,400 t. The OFL for 2009 is the same. As a Tier 5 stock, it is not possible to determine whether Bogoslof pollock is overfished or is approaching an overfished condition.

2. Pacific Cod

Status and catch specifications (t) of Pacific cod in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through early Oct, 2007.

Area	Year	Age 3+ Biomass	OFL	ABC	TAC	Catch
BSAI	2006	922,000	230,000	194,000	194,000	191,906
	2007	960,000	207,000	176,000	171,000	172,407
	2008	1,080,000	176,000	150,000	n/a	n/a
	2009	n/a	190,000	162,000	n/a	n/a

Changes from previous assessment

The assessment of the BSAI Pacific cod stock has been particularly challenging as more refinements are made to the modeling approaches and use of the data. The document described the evolution of analytical approaches. Following a series of modifications from 1993 through 1997, the base assessment model remained completely unchanged from 1997 through 2001. As data refinement and analytical techniques developed, a major change took place in 2005 when the model was migrated to the Stock Synthesis 2 (SS2) program. Difficulties encountered at the 2006 assessment resulted in a thorough review of the 2006 assessment model in April 2007 during a public work shop that brought together 44 participants. Many suggestions for changes and refinements of the analytical approaches were made.

The assessment authors took into consideration the results of the public work shop and preliminary SAFE Report in developing 4 versions of the analytical model for the 2007 assessment. The following points may be made to distinguish these 4 models:

Model 1 was developed to respond to requests of the SSC where, among all the other model parameters, the natural mortality (M) is to be based on external analyses of life history parameters which resulted in $M = 0.34$;

Model 2 is the same as Model 1 except that M is fixed at 0.37 (that was used in previous year's assessments);

Model 3 is the same as Model 1 except that M is estimated internally; and Model 4 which differs from Model 1 in several respects to respond to public comments on the use and fitting of the data.

While the assessment document elaborated on nine major categories of new input data, they are essentially necessary routine applications of updated data from the fisheries and surveys. The following new pieces of data stand out: 1) a new biomass for Pacific cod was estimated at 424,000 t from the 2007 EBS shelf bottom trawl survey (this biomass is 18% lower than the 2006 survey estimate and is the all-time low in the time series), and 2) the numbers of fish for 2007 was estimated by the survey at 713 million fish, up about 86% from the 2006 estimate. This dramatic increase in numbers of fish is due primarily to higher recruitment of the 2006 year class as age 1 fish in the survey. The addition of this new data point to the series of survey population numbers from 1979-2006 has a material impact on the projection of Pacific cod population numbers and biomass into the future.

The main features and challenges of the Pacific cod assessment, however, are still the fitting of the data to the four assessment models. Because all of the models seem to perform reasonably well in terms of fitting the data, the authors used the following three major criteria for selection of the best model to represent the dynamics of the stock. These criteria are:

- The model should use a reasonable value of M;
- The model should estimate mean trawl survey lengths for ages 1-3 that are close to the first 3 modes from the long-term average trawl survey size composition;

- The model should estimate a reasonable average for the product of trawl survey catchability and trawl survey selectivity for the 60-81 cm size range.

Based on these criteria, Model 1 was selected by the authors to best represent the population dynamics of the BSAI Pacific cod stock. The Plan Team agrees with this selection and added the following comments:

- All selectivity curves estimated by the 4 models appear reasonable, except for the IPHC longline survey selectivity curve. Increasing the number of parameters from 4 to 6 still did not overcome the stated problems with estimating selectivity.
- Model 4 ignores age data. It makes little sense to discard data that provides information on relative cohort strength, even if the fit is "not very good". Relying on length data alone is not as informative as incorporating age data because there is not a one-to-one relationship between length and age, except for the youngest ages.
- Model 1, 2, 3 and 4 biomass (Fig. 2.3) and recruitment (Fig. 2.2) trends are similar. These models differ primarily in values of M (except that Model 4 has other structural differences). The implication of the model results is that the data are sufficient to estimate trends, but the biomass scalar is sensitive to values of M.
- The best estimate of M is 0.34. It is based on a derivation from standard functional relationships for the life history of Pacific cod reported by Jensen (1996). This value compares favorably with data and parameter estimates from other reports (e.g., Beverton and Holt (1963)).
- For model selection, Model 3 actually fits the data best, but the model was not selected because its M value (0.22) was too low. Model 2 (M=0.37) was not selected because it did not meet criterion 3. Model 4 was not selected because M=0.46 was judged to be too high.

Since Model 1 (M=0.34) was selected, the ABC and other parameters values for 2008 and 2009 are provided by the model results shown in Table 2.15 b and c. In accepting these values, the Plan Team made the following observations:

- The 2008 ABC of 150,000 t is a decline from 176,000 t in 2007. This ABC drop is consistent with the 18% decline in the NMFS survey biomass from 2006 to 2007, which currently is at its historic minimum.
- Five consecutive year classes of the EBS Pacific cod stock from 2001-2005 (that ranged from 204-399 million age zero fish) are noticeably below the 30-year average year class strength (658 million age zero fish from 1977-2006). However, the 2006 year class appears to be more than 2 ½ times higher than the average recruitment.
- The female spawning biomass for 2008 and 2009 are projected to be at about 29% of the unfished female spawning biomass; at least until the strong 2006 year class can contribute substantially to spawning from 2010.

Spawning biomass and stock status trends
A standard set of projections is required for each stock managed under Tiers 1, 2 or 3. The authors evaluated 7 harvest scenarios to make projections of the biomass and status trends to satisfy Amendment 56, NEPA, and the MSFCMA. The Plan Team has selected Scenario 1 as the most likely representation to determine how the spawning biomass and stock status would trend. Scenario 1 assumes that in all future years, F is set equal to max F_{abc} which is close to the Council's decisions in the past to set TACs at or close to the maximum ABCs.

Under Scenario 1, the spawning biomass is projected to continue a slow decline from 2007 to 2009 before the strong 2006 year class would boost the female spawning biomass from 398,000 t during the 2008-09 period to 454,000 t in 2010 and 542,000 t in 2011 (Table 2.26). This projected increase in biomass and upward trend of stock status are predicated on the continued strength and contributions of the 2006 year class. This 2006 year class indicator is still an early indicator and it must be tracked carefully as the year class follows through the population in time. The effect of such a strong year class following through is particularly important to the stock as it follows 5 consecutive weak year classes from 2001-2005. The average recruitment of age zero fish for the 30-year time series (1977-2006) was 658 million fish. The 4 years of consecutive weak year classes from 2001-05 ranged from 204-399 million fish. The 2006 year class at age zero was estimated to be 1.835 billion fish, the second highest on record in the 30 year time series that included the known strong 1977 year class that was estimated at 2.533 billion fish. The 2006 strong year class bodes well for the status of the stocks as it ages and moves into the fishery.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
According to criteria set by the SSC, this stock qualifies for management under Tier 3, where reliable estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ exist for the stock. The updated point estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ from the present assessment are 540,000 t, 0.31 and 0.37, respectively. Pacific cod specifically qualifies for management under sub-tier "b" of Tier 3 because the projected biomass for 2008 (398,000 t) is below $B_{40\%}$. Fishing at the adjusted Tier 3b rate of 0.22 is projected to result in a 2008 catch of 150,000 t, which is the maximum permissible ABC under Amendment 56.

The Plan Team recommends setting the 2008 ABC at the maximum permissible value of 150,000 t (which is 14.8% below the 2007 ABC of 176,000 t). This ABC is projected to increase to a maximum permissible ABC of 162,000 in 2009.

The OFL for 2008 under Tier 3b is 176,000 t (F_{OFL}=0.26) and the projected OFL for 2009 is 190,000 t.

The stock is not overfished nor approaching an overfishing condition.

Ecosystem Considerations summary
The Pacific cod chapter included a discussion paper on "results from ecosystem models on the role of Pacific cod in the eastern Bering Sea and Aleutian Islands ecosystems" as well as an extended discussion section on "ecosystem considerations". While these discussions provide useful clarifying information about the ecological dynamics of Pacific cod and its fisheries to the rest of the ecosystem, there was no special identification of ecosystem features that would require adjustments to the estimated ABCs and their attendant reference population parameters.

Area apportionment
At present, ABC of the BSAI pacific cod is not allocated by area. However, the biomass distribution analysis made in 2006 using the Kalman filter approach estimated the biomass distribution at 84% EBS and 16% AI.

3. Sablefish

Status and catch specifications (t) of sablefish in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 10/27/07.

Area	Year	Age 4+ Biomass	OFL	ABC	TAC	Catch
EBS	2006	34,000	3,680	3,060	3,060	1,055
	2007	34,000	3,520	2,980	2,980	1,088
	2008	41,000	3,380	2,860	n/a	n/a
	2009	n/a	2,910	2,610	n/a	n/a
AI	2006	32,000	3,740	3,100	3,100	1,130
	2007	32,000	3,320	2,810	2,810	1,078
	2008	34,000	2,890	2,440	n/a	n/a
	2009	n/a	2,510	2,230	n/a	n/a

Changes from previous assessment

Sablefish are assessed as a single stock in the BSAI and GOA using a split sex age structured model. The split sex model approach was fully implemented in 2006 and was deemed appropriate given differences in growth between males and females. The assessment model incorporates the following new data into the model: relative abundance and length data from the 2007 longline survey, relative abundance and length data from the 2006 longline fishery, length data from the 2006 trawl fishery, and age data from the 2006 longline survey and longline fishery. In addition, relative abundance and length data from the 2007 Gulf of Alaska trawl survey were included with the expectation of improving estimates of recruitment. New growth data were added (1996-2004) in the form of revised age-length transition matrices, and older growth data (1981-1993) were updated. Fishery CPUE data from observer data and logbooks were used in the catch rate analysis. The commercial CPUE observer data were screened to exclude sets where killer whale depredation and targeting of other species occurred. Logbook data were similarly screened to account for multiple gear configurations. The results showed a good agreement between observer and logbook fishery CPUE and the survey CPUE in most years. The only major changes to the model were the inclusion of informative priors on catchability for all abundance indices. The survey abundance index decreased 14% between 2006 and 2007, a change which follows the 13% increase between 2005 and 2006. The fishery abundance index was down 8% from 2005 to 2006.

Spawning biomass and stock status trends

The spawning biomass is projected to be similar from 2007 to 2008, but is expected to decline through 2012. The projected 2008 female spawning biomass is 37% of unfished biomass compared with about 29% of unfished biomass estimated during the 1998 to 2001 period. The 2000 year class now appears to be larger than the 1997 year class and is expected to comprise 18% of the spawning biomass in 2008.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

This stock qualifies for management under Tier 3. The updated point estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ from this assessment are 122,000 t (combined across the EBS, AI, and GOA), 0.093, and 0.111, respectively. Projected spawning biomass (combined areas) for 2008 is 112,000 t (91% of $B_{40\%}$), placing sablefish in sub-tier “b” of Tier 3. The maximum permissible value of F_{ABC} under Tier 3b is 0.084, which translates into a 2008 catch (combined areas) of 18,000 t and is the Plan Team’s recommended combined 2008 ABC. The recommended 2008 ABC is approximately 10% lower than the 2007 ABC of 21,000 t. The OFL fishing mortality rate under Tier 3b is 0.101. This fishing mortality rate translates into a 2008 OFL (combined areas) of 21,300 t. The Team’s recommendations for EBS and AI sablefish OFLs and ABCs are provided in the table above. Alaska sablefish are not overfished nor are they approaching an overfished condition.

Additional Plan Team recommendations

The combined ABC has been apportioned to regions using a weighted moving average method since 1993. Since 2000, both survey and fishery data have been used to apportion ABC. The current method is to compute a 5-year exponential weighting for each index which are then combined, with the survey data weighted twice as heavily as the fishery data. The original rationale for this was that the variance for the fishery data was twice that of the survey data. Recent improvements to the sample size of observer and logbook collections have reduced the variance on the fishery source and led to industry requests to weight the two data sets equally. The Plan Team heard no compelling evidence to switch from the present weighting scheme to the other and for this year has simply continued the recent method of double weighting the survey data, which is reflected in the recommended area apportionments. The Plan Team notes that the increase in fishery data has largely occurred due to voluntary submission of logbooks as well as the availability of funds to enable the IPHC to collect and process the fishery data. If equal weighting of the two data sets is envisioned, it becomes paramount that a more stable or permanent source of funding be found to ensure continued collection of logbooks. The Plan Team notes that the difference in apportionment between the two methods is relatively minor for 2007.

Area apportionment
A 5-year exponential weighting of longline survey and fishery relative abundance indices (the survey index is weighted double the fishery index) may be used to apportion the combined 2008 ABC among regions, resulting in the following values: 2,860 t for EBS and 2,440 t for AI. Relative to 2006, apportionments to the EBS and AI decreased.

Using the survey/fishery based apportionment scheme described above, 2008 OFL also may be apportioned among regions and results in the following values: 3,380 t for EBS and 2,890 t for AI. These values also represent a decrease from 2007 OFL levels for all regions.

4. Yellowfin Sole

Status and catch specifications (t) of yellowfin sole in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 10/27/07.

Area	Year	Age 2+ Bio.	OFL	ABC	TAC	Catch
BSAI	2006	1,680,000	144,000	121,000	95,700	99,068
	2007	2,000,000	240,000	225,000	136,000	119,332
	2008	2,200,000	265,000	248,000	n/a	n/a
	2009	n/a	296,000	276,000	n/a	n/a

Changes from previous assessment
Changes to the input data for this year's assessment are the inclusion of 2006 fishery and survey age compositions, the 2007 trawl survey biomass point estimate and standard error, estimates of the discarded and retained portions of the 2006 catch, catch through 8 September 2007 and an update of weight-at-age estimates using biological data through 2006

This year's EBS bottom trawl survey resulted in a biomass estimate of 2,150,000 t, about 1% greater than last year's survey biomass of 2,130,000 t.

Spawning biomass and stock status trends
The projected female spawning biomass estimate for 2008 is 550,000 t. Relative to the 585,000 t projected spawning biomass from the 2006 assessment; this continues the slight monotonic decline in model estimates of spawning biomass exhibited since 1994. However, above average recruitment from the 1995 and 1999 year-classes is expected to maintain the abundance of yellowfin sole at a level above B_{40} in the near future.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The SSC has determined that reliable estimates of B_{MSY} and the probability density function for F_{MSY} exist for this stock. Accordingly, yellowfin sole qualify for management under Tier 1. The estimate of B_{MSY} from the present assessment is 303,000 t. As in last year's assessment, 1978-2002 spawner recruit data were used this year as the basis to determine the Tier 1 harvest recommendation. This provided an $F_{ABC} = F_{\text{harmonic mean Fmsy}} = 0.19$. The $F_{OFL} = F_{MSY} = 0.2$. The product of the harmonic mean of F_{MSY} and the geometric mean of the 2008 biomass estimate produced the author- and PT-recommended ABC of 248,000 t and OFL of 265,000 t.

Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

Ecosystem Considerations summary
The assessment contains an ecosystem component by representing catchability of the EBS shelf trawl survey as an exponential function of average annual bottom temperature during the EBS shelf trawl survey.

5. Greenland turbot

Status and catch specifications (t) of Greenland turbot in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 10/27/07.

Year	Area	Age 1+ Bio.	OFL	Subarea	ABC	TAC	Catch
2006	BSAI	74,200	14,200		2,740	2,740	1,965
				EBS	1,890	1,890	1,440
				AI	850	850	525
2007	BSAI	119,000	15,600		2,440	2,440	1,946
				EBS	1,680	1,680	1,435
				AI	760	760	511
2008	BSAI	104,100	15,600		2,540	n/a	n/a
				EBS	1,750	n/a	n/a
				AI	787	n/a	n/a
2009	BSAI		16,000		2,540	n/a	n/a
				EBS	1,750	n/a	n/a
				AI	787	n/a	n/a

Changes from previous assessment
This year's Greenland turbot assessment model included updated 2006 and 2007 catch data, EBS shelf survey 2007 biomass and length composition estimates, and aggregated longline survey data index for the EBS and Aleutian Islands regions. A simplified Tier 5 approach was also provided for contrast to the Stock Synthesis 2 model results. As in last year's assessment, the slope-trawl survey was assumed to index 75% of the Greenland turbot stock inhabiting US waters.

Spawning biomass and stock status trends
The current estimate of 2008 female spawning biomass is 58,100 t. Compared to the 2007 spawning biomass of 56,900 t this represents a very slight increase, a departure from the decline prevalent since the mid 1970s.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The SSC has determined that reliable estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ exist for this stock. Greenland turbot therefore qualify for management under Tier 3a. Updated point estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ from the present assessment are 38,200 t, 0.51, and 0.67, respectively. Projected spawning biomass for 2008 is 58,100 t. The maximum permissible value of F_{ABC} under this tier translates into a 2008 ABC of 12,200 t. Although there appear to be some favorable recruitments in recent years, fishing mortalities consistent with recent history are recommended for ABCs until another slope survey can be completed. Therefore the authors recommended setting the 2008 ABC at a value less than the maximum permissible. The Plan Team agrees with the authors' recommendation to use F_{ABC} = 5-year average catch, which results in a 2008 ABC of 2,500 t corresponding to a full selection fishing mortality rate of 0.09. The OFL fishing mortality rate is computed under Tier 3a, $F_{OFL} = F_{35\%} = 0.67$, and translates into a 2008 OFL of 15,600 t.

Additional Plan Team recommendations
The PT recommended conducting the EBS slope survey in 2008. This could provide information needed to determine whether abundance is sufficient to warrant recommending an ABC set to the maximum permissible level in the future.

6. Arrowtooth Flounder

Status and catch specifications (t) of arrowtooth flounder in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2007 and 2008 are those recommended by the Plan Team. Catch data are current through 10/27/07.

Area	Year	Age 1+ Bio.	OFL	ABC	TAC	Catch
BSAI	2006	964,000	166,000	136,000	12,000	13,302
	2007	1,280,000	193,000	158,000	20,000	11,701
	2008	1,780,000	297,000	244,000	n/a	n/a
	2009	n/a	300,000	246,000	n/a	n/a

Changes from previous assessment

The present assessment is a straightforward update of last year's assessment. Input data were updated with the inclusion of fishery catch and discards through 8 September 2007, new data were also included for the 2007 shelf trawl survey size composition and biomass point-estimates and standard errors. Estimates of retained and discarded portions of the 2006 catch were added.

The stock assessment was expanded to include the 10 Aleutian Islands surveys and the survey size composition for arrowtooth flounder. Formerly 87% of the arrowtooth flounder stock was in shelf survey. With AI data added, only 73% of the stock is now from the Bering Sea shelf. The remaining fish come from the Bering Sea slope.

The ABC and OFL numbers appear to be greatly increased, but it is artifact of model because the Aleutian Islands data were included in this analysis.

Spawning biomass and stock status trends

The stock assessment model resulted in a biomass estimate of 1,780,000 t. This was an increase in the biomass estimate compared to the 2006 estimate of 1,280,000 t. The surveys in 2005 and 2006 had the highest biomasses of arrowtooth flounder recorded in the EBS to date. There is a long-term trend of increasing arrowtooth flounder biomass in the EBS. The trend in increasing biomass is expected to continue as recruitment has also been increasing for the last 10 years. Arrowtooth flounder in the AI leveled off in 1990s, but has been steadily increasing since then.

The authors noted that the ABC recommendation is for the combined harvest of arrowtooth flounder and Kamchatka flounder, which are difficult to distinguish and had similar biomass trends from the EBS trawl survey since 1991. Though Kamchatka flounder can now be identified and separated from arrowtooth flounder on AFSC surveys, it is not distinguished in the fishery. Therefore, the estimate is for one *Atheresthes* spp. stock.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The Plan Team concurred with the authors that there are structural problems with this model that must be resolved before arrowtooth flounder can be changed to Tier 1 status. Therefore, according to previous SSC determination that reliable estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ exist for this stock, arrowtooth flounder was assessed for management under Tier 3. The updated point estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ from the present assessment are 345,000 t, 0.24, and 0.30, respectively. Given that the projected 2008 spawning biomass of 994,000 t exceeds $B_{40\%}$, the Plan Team's ABC and OFL recommendations for 2008 were calculated under sub-tier "a" of Tier 3. The Plan Team recommends setting F_{ABC} at the $F_{40\%}$ (0.24) level, which is the maximum permissible level under Tier 3a. Projected harvesting at the $F_{40\%}$ level gives a 2007 ABC of 244,000 t. The OFL fishing mortality rate under Tier 3a is $F_{35\%}$ (0.30), which translates to a 2008 OFL of 297,000 t.

As there is little to no fishery for arrowtooth flounder the model is mostly driven by the survey data.

More female arrowtooth flounder are caught than males during the fisheries and the surveys. As in recent assessments, the base model that does not include the Aleutian Islands was evaluated using a range of male natural mortality rates between 0.27 and 0.34. It is believed males are not missed by the survey, but that they experience higher mortality than the females do. The best fit for males was M=0.28, but male selectivity is only 0.65.

To employ the base model without AI, the sex ratio must be changed. The authors recommend M=0.33, selectivity = 0.89. That leaves room for some male arrowtooth flounder to migrate down slope or be missed in survey. The age data from the GOA has few males >17 yrs, but lots of females that live to 25 yrs. Therefore, natural mortality of male arrowtooth flounder must be increased, as opposed to decreasing gear selectivity at older ages in the male population. If the fish were up in water column feeding and therefore not available to trawls, it would not be sex related. The authors tested a range of M, and determined M = 0.33 to be reasonable because 0.9 is a reasonable selectivity.

The catchability of some other flatfish species, notably yellow-find sole, relates to water temperature. The authors examined the relationship of water temperature and catchability of arrowtooth flounder. However, at this time, the authors are uncertain as to how to interpret their findings. Therefore, this relationship was not included in the model.

Status determination
Arrowtooth flounder is an unexploited stock in the BSAI. Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

Response to SSC comments
The AI surveys were added to the model.

Individual estimates were made for Kamchatka flounder, though the ABC and OFL values are reported for a combined arrowtooth-Kamchatka stock.

There are structural problems with this model that must be resolved before it is ready for Tier 1 status.

Ecosystem Considerations summary
Given the trend of increasing BSAI arrowtooth flounder stock size and in response to a request by the SSC, this chapter includes an enhanced ecosystem considerations section.

Arrowtooth flounder both eat pollock and are eaten by pollock. They prey on ages 0, 1, and 2, sizes not caught by trawl survey because the pollock are off bottom at those ages. Once pollock get to be >30 cm, outside range of being ATF food.

A 30-yr ecosystem simulation provided interesting results. Examining the effects of arrowtooth flounder on other species showed that a decrease of Arrowtooth flounder by 10% decreased Arrowtooth flounder adults and juveniles, slightly increased flathead sole and produced a negligible effect on pollock. However, it should be noted that those results were for a 10% increase. If Arrowtooth flounder increased by 50%, the result could be significantly different, as seen in the GOA simulation. Currently both Pacific cod and Arrowtooth flounder are negatively affecting pollock.

7. Northern Rock sole

Status and catch specifications (t) of rock sole in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2007 and 2008 are those recommended by the Plan Team. Catch data are current through 10/27/07.

Area	Year	Age 2+ Bio	OFL	ABC	TAC	Catch
BSAI	2006	1,490,000	150,000	126,000	41,500	36,452
	2007	1,670,000	200,000	198,000	55,000	37,013
	2008	1,880,000	304,000	301,000	n/a	n/a
	2009	n/a	379,000	375,000	n/a	n/a

Changes from previous assessment
The present assessment is a straightforward update of last year's assessment. Northern rock sole (*Lepidopsetta polyxystra*) is the dominant rock sole species in the Bering Sea. Only 2% of the commercial catch is estimated to be southern rock sole (*Lepidopsetta bilineata*). Therefore this assessment for 2008 is for northern rock sole only. No attempt was made to correct past catch or survey data by species.

Changes to input data in this analysis include addition of 2006 rock sole fishery age composition, 2006 northern rock sole survey age composition, and 2007 northern rock sole trawl survey biomass point estimate and standard error. Only Bering Sea survey data (no Aleutian Islands data, 3% of total rock sole) were used in calculations. Another change to the input data was inclusion of an estimate of retained and discarded portions of the 2006 rock sole catches. Analysis was conducted with fishery catch and discards through 8 September 2007.

Spawning biomass and stock status trends
The stock assessment model resulted in a biomass estimate of 1,880,000 t. This was an increase in the biomass estimate compared to the 2006 estimate of 1,670,000 t. The rock sole stock is expected to remain stable through 2009. However, good recruitment in 2001 through 2004 should increase the stock biomass at the beginning of the next decade.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The SSC has determined that northern rock sole qualifies as a Tier 1 stock; therefore the 2008 assessment was calculated using Tier 1 methodology. In 2006, the SSC selected the 1978-2001 data set for the Tier 1 harvest recommendation. Increasing to a Tier 1 resulted in a large increase in ABC and OFC estimates over the 2006 assessment values.

The Plan Team agreed with the authors' recommendation (Model 1). Thus the Tier 1 2008 ABC harvest recommendation is 301,000 t ($F_{ABC} = 0.177$) and a 2008 OFL of 304,000 t ($F_{OFL} = F_{MSY} = 0.179$). Note that with this new Tier 1 assessment, there is only a 4,000 t difference between the ABC and OFL levels. This will require a more tightly managed fishery. The 2009 also used Tier 1 methodology. However, projections for 20 years into the future uses Tier 3.

M and q were estimated within the model yielded M=0.15 and q=1.87. This was very different from the previous estimates of M=0.16 and q=1.52. While experiments indicate herding, this estimate of q means that 40% of fish are herded into the net. The authors do not think this is a realistic estimate of herding. It is most likely biased because of the skewed age composition from low recruits in 1990s. Therefore, the q estimated in past assessments was used (M=0.15, q=1.5).

Status determination
This is a stable fishery that lightly exploits the stock because it is constrained by prohibited species catch limits and the BSAI optimum yield limit. Model projections indicate that this stock is neither overfished nor approaching an overfished condition. Usually the fishery only takes a small portion of the rock sole ABC, but there will be more room in cap this year because the pollock ABC is lower.

Response to SSC comments
The SSC requested continued management strategy evaluation (MSE) for Tier 1 management. The authors intend to continue this exploration for climate and productivity changes.

The authors will examine a split-sex model for the fall 2008 assessment.

8. Flathead Sole

Status and catch specifications (t) of flathead sole in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through November 10, 2007.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
BSAI	2006	636,000	71,800	59,800	19,500	17.947
	2007	875,000	95,300	79,200	30,000	19,477
	2008	820,000	86,000	71,700	n/a	n/a
	2009	814,000	83,700	69,700	n/a	n/a

Changes from previous assessment
The present assessment is a straightforward update of last year's assessment. The present assessment includes updated catch, survey biomass, length composition, and age composition data. Sex-specific length compositions from the 2006 and 2007 EBS trawl surveys were added and survey age compositions from previous years were recalculated. Normalization of age and length compositions was changed to being within-sex to summing over both sexes; this was found to aid model convergence.

Spawning biomass and stock status trends
According to the 2007 assessment, the age 3+ biomass decreased from 809,000 t in 2006 to 796,000 t in 2007, a 2% decrease. However, the trend between assessments represents a greater decrease, as the 2006 assessment estimate for 2007 was 875,000 t, so the decrease in 2007 estimated biomass estimated in 2006 vs. 2007 is 9%.

This year's survey biomass was 571,000t, a 12% decrease from 2006.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The SSC has determined that reliable estimates of $B_{40\%}$ (140,000 t) $F_{40\%}$, (0.28) and $F_{35\%}$ (0.34) exist for this stock, thereby qualifying the stock for management under Tier 3. Given that the projected 2008 spawning biomass of 251,000 t exceeds $B_{40\%}$, the ABC and OFL recommendations for 2008 were calculated under sub-tier "a" of Tier 3. The Plan Team recommends setting F_{ABC} at the $F_{40\%}$ (0.28) level, which is the maximum permissible level under Tier 3a. Projected harvesting at the $F_{40\%}$ level gives a 2008 ABC of 71,700 t. The OFL was determined from the Tier 3a formula, where an $F_{35\%}$ value of 0.34 gives a 2008 OFL of 86,000 t. Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

Additional Plan Team recommendations
In response to SSC and Plan Team comments, the author examined the distribution of Bering flounder with respect to the fishery. The northerly distribution of the species did not seem to overlap the spatial distribution of the fishery, although mismatch in seasonal timing of the survey versus the fishery means that this is not conclusive. The Plan Team recommended placing Bering flounder in the “other flatfish” category in future assessments.

Ecosystem Considerations
The assessment authors presented updated information on predators and prey of flathead sole, temperature-dependent habitat quality, and bycatch in the fishery. No specific concerns were noted by the author or the Plan Team.

9. Alaska plaice

Status and catch specifications (t) of Alaska plaice in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2007 and 2008 are those recommended by the Plan Team. Catch data are current through 10/27/07

Area	Year	Age 3 + Bio.	OFL	ABC	TAC	Catch
BSAI	2006	1,008,000	237,000	188,000	8,000	17,309
	2007	1,340,000	241,000	190,000	25,000	19,411
	2008	1,850,000	248,000	194,000	n/a	n/a
	2009	n/a	277,000	217,000	n/a	n/a

Changes from previous assessment

The present assessment is a straightforward update of last year's assessment. Input data were updated with 2007 catch data and inclusion of fishery catch through 8 September 2007. The 2007 trawl survey biomass estimate and standard error, and 2007 length composition of survey catch also were added to the model. The 2006 survey ages were read from otoliths and the 2006 survey age composition was added to the assessment. In response to a request from the SSC, length bins and the transition matrix were extended from 45 to 60 cm.

Spawning biomass and stock status trends

The female spawning biomass trend is similar to the overall biomass trend, It was slowly decreasing from 1985 to 2005 and has been increasing since then. The increase in total biomass is expected to continue. The shelf survey biomass has been fairly steady since the mid 1980s. Above-average recruitment year classes since 1998, with an exceptionally strong year class in 2003, will support the increasing trend in this stock.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

Reliable estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ exist for this stock, therefore qualifying it for management under Tier 3a of the BSAI Groundfish FMP. The updated point estimates are $B_{40\%}$ = 145,000 t, $F_{ABC} = F_{40\%} = 0.59$, $F_{OFL} = F_{35\%} = 0.81$. These are high values for flatfishes, but these values are the consequence of Alaska plaice maturing before recruiting to the fishery. Given that the projected 2008 spawning biomass of 335,000 t exceeds $B_{40\%}$, the ABC and OFL recommendations for 2008 were calculated under sub-tier "a" of Tier 3. Projected harvesting at the $F_{40\%}$ level gives a 2008 ABC of 194,000 t. The OFL was determined from the Tier 3a formula, which gives a 2008 OFL of 248,000 t.

Status determination

Model projections indicate that this species is neither overfished nor approaching an overfished condition. There is not a targeted fishery for this species as there is no market. Alaska plaice is caught only as bycatch and is mostly discarded.

Response to SSC comments

The SSC asked the authors to extend the range of the length bins to mimic the dynamics of larger fish. The authors improved the modeling by extending the maximum length bin from 45 to 60 cm.

The authors will implement a split-sex model for the fall 2008 assessment.

10. Other flatfish complex

Status and catch specifications (t) of other flatfish in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2007 and 2008 are those recommended by the Plan Team. Catch data are current through 11/10/07.

	Year	Total Bio.	OFL	ABC	TAC	Catch
BSAI	2006	121,000	24,200	18,100	3,500	3,157
	2007	149,000	28,500	21,400	10,000	5,838
	2008	149,000	28,800	21,600	n/a	n/a
	2009	n/a	28,800	21,600	n/a	n/a

Changes from previous assessment
With the removal of Alaska plaice from this category in 2002, the species currently collected in the "other flatfish" category in the Eastern Bering Sea survey are Arctic flounder, butter sole, curlfin sole, deepsea sole, Dover sole, English sole, longhead dab, Pacific sand dab, petrale sole, rex sole, roughscale sole, sand sole, slender sole, starry flounder, and Sakhalin sole. The species currently collected in the "other flatfish" category in the Aleutian Islands survey are Dover sole, rex sole, starry flounder, butter sole and English sole. Starry flounder, rex sole and butter sole comprise the majority of the species caught with a negligible amount of other species. Of those, starry flounder comprised 74 % in 2007, an increase in starry flounder in the shelf survey biomass from ~50 % in 2006. In 2007, 25 % was rex sole and butter sole.

The present assessment is a straightforward update of last year's assessment. The assessment incorporates 2006 total catch and discard; catch through 8 September 2007 and 2007 EBS trawl survey information. As there was no AI survey in 2007, a linear regression was used to predict AI biomass for 2007. Together the 2006 EBS bottom trawl survey and AI prediction resulted in a biomass estimate of 149,000 t, the same value that resulted from the 2006 surveys.

Spawning biomass and stock status trends
Because this complex is managed under Tier 5, no models are available from which to predict future trends.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
With the removal of Alaska plaice from this category in 2002 the SSC reclassified "other flatfish" as a Tier 5 species complex with harvest recommendation calculated from estimates of biomass and natural mortality. Natural mortality values for rex and Dover sole in the GOA SAFE document and starry flounder on the west coast are used. For all other species, a natural mortlity rate of 0.20 is assumed. Projected harvesting at the 0.75 M level (F_{ABC} = 0.15), gives a 2008 ABC of 21,600 t for the "other flatfish" species. The corresponding 2008 OFL (= 0.20) is 28,000 t.

Status determination

It is not possible to determine whether the "other flatfish" complex is overfished or approaching an overfished condition because it is Tier 5 and not managed under Tiers 1-3. Insufficient information about these species makes model analysis impossible.

This group of fisheries is usually closed prior to attainment of TAC because of the bycatch of Pacific halibut, a prohibited species. With the implementation of Amendment 80, higher TACs for other flatfishes are anticipated in the future.

Response to SSC comments
No progress was made on the assessment of bottom temperature effect on catchability of other flatfish species.

Estimated biomass of "other" flatfish species are available in Table 10.5

The catch numbers in the summary table were corrected. The numbers were lowered by subtracting flathead sole from the total catch reported by NMFS.

11. Pacific Ocean Perch (POP)

Status and catch specifications (t) of Pacific ocean perch. Biomass corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 10/27/07.

Year	Area	Age 3+ Bio	OFL	Subarea	ABC	TAC	Catch
2006	BSAI	385,000	17,600		14,800	12,600	12,856
				EBS	2,960	1,400	1,040
				Eastern AI	3,260	3,080	3,069
				Central AI	3,210	3,030	3,242
				Western AI	5,370	5,090	5,506
2007	BSAI	457,000	26,100		21,900	19,900	17,772
				EBS	4,170	2,160	811
				Eastern AI	4,980	4,970	5,116
				Central AI	5,060	5,050	4,423
				Western AI	7,730	7,720	7,421
2008	BSAI	453,000	25,700		21,700	n/a	n/a
				EBS	4,200	n/a	n/a
				Eastern AI	4,890	n/a	n/a
				Central AI	4,970	n/a	n/a
				Western AI	7,590	n/a	n/a
2009	BSAI	449,000	25,400		21,300	n/a	n/a
				EBS	4,140	n/a	n/a
				Eastern AI	4,820	n/a	n/a
				Central AI	4,900	n/a	n/a
				Western AI	7,490	n/a	n/a

Changes from previous assessment
Beginning in 2005, POP assessments are being conducted on a 2-year cycle. There is no new survey for 2007. Catch data were updated and the projection model was re-run using results from the 2006 assessment model as the starting point.

Spawning biomass and stock status trends
The estimated spawning biomass is projected to decline slightly from 155,000 t in 2007 to 153,000 t in 2008 and further to 150,000 t in 2009.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The SSC has determined that reliable estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ exist for this stock, thereby qualifying Pacific ocean perch for management under Tier 3. The current estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ are 132,500 t, 0.059, and 0.070 respectively. There are reliable estimates of the 2007 spawning biomass (B), $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ and B>$B_{40\%}$ (153,000 t > 133,000 t). Therefore the POP reference fishing mortality is defined in Tier 3a. For this tier, F_{ABC} is constrained to be $\leq F_{40\%}$, and F_{OFL} is constrained to be equal to $F_{35\%}$. The ABC associated with the $F_{40\%}$ level of 0.059 is 21,700 t. Model projections indicate that this stock is neither overfished nor approaching an overfished condition. For 2008, the recommended ABC is 21,700 t, and the OFL is 25,700 t.

Area apportionment

The Team agrees with the author's recommendation that ABCs be set regionally based on the proportions in combined survey biomass as follows: BS = 4,200 t, Eastern Aleutians (Area 541) = 4,890 t, Central Aleutians (Area 542) = 4,970 t, Western Aleutians (Area 543) = 7,590 t. The OFL fishing mortality rate is computed under Tier 3a as 25,700 t, which is the author's and Plan Team's recommended OFL for the BSAI. The OFL for BSAI is not regionally apportioned.

12. Northern Rockfish

Status and catch specifications (t) of Northern rockfish. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch is reported through October 27, 2007.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
BSAI	2006	204,000	10,100	8,530	4,500	3,823
	2007	212,000	9,750	8,190	8,190	3,936
	2008	212,000	9,740	8,180	n/a	n/a
	2009	n/a	9,680	8,130	n/a	n/a

Changes from previous assessment

This was an "off-year" for a biennial assessment. This update was produced by updating the catch data and re-running the projection model using the results from the 2006 assessment model as a starting point.

Spawning biomass and stock status trends

Estimates of age 3+ biomass increased from 204,000 t in 2006 to 212,000 t in 2007 estimates (a 4% increase).

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The SSC has determined that this stock qualifies for management under Tier 3 due to the availability of reliable estimates for $B_{40\%}$ (52,000 t), $F_{40\%}$ (0.045), and $F_{35\%}$ (0.053). Because the female spawning biomass of 73,500 t is greater than $B_{40\%}$, sub-tier "a" would be applicable, with $F_{ABC} = F_{40\%}$ and $F_{OFL} = F_{35\%}$. Under Tier 3a, the maximum permissible ABC is 8,180 t, which is the authors' and Plan Team's recommendation for the 2008 ABC. Under Tier 3a, the 2008 OFL is 9,740 t for the Bering Sea/Aleutian Islands combined. The Plan Team continues to recommend setting a combined BSAI OFL and ABC. As the TAC has routinely been lower than the ABC, the TAC of the previous year was assumed as the 2008 catch, in order to make projections to 2009.

Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

13. Shortraker/Rougheye Rockfish

Status and catch specifications (t) of shortraker/rougheye in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through October 27, 2007.

Species	Area	Year	Survey Bio.	OFL	ABC	TAC	Catch
shortraker	BSAI	2006	20,500	774	580	580	208
		2007	18,900	564	424	424	318
		2008	18,900	564	424	n/a	n/a
		2009	n/a	564	424	n/a	n/a
rougheye	BSAI	2006	11,200	299	224	224	203
		2007	10,800	269	202	202	163
		2008	10,800	269	202	n/a	n/a
		2009	n/a	269	202	n/a	n/a

Changes from previous assessment
This was an “off-year” for a biennial assessment. This update was produced by updating the catch data and re-running the projection model using the results from the 2006 assessment model as a starting point.

Spawning biomass and stock status trends
The estimate of 2007 shortraker survey biomass is 18,900 t, down 8% from 2006. The estimate of 2007 rougheye survey biomass is 10,800 t, down 4% from 2006.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The SSC has previously determined that reliable estimates of biomass and natural mortality exist for shortraker and rougheye rockfish, qualifying the species for management under Tier 5. At the present time, the Plan Team recommends that the SSC retain Tier 5 management for these stocks. The Plan Team recommends setting F_{ABC} at the maximum permissible level under Tier 5, which is 75% of *M*. Accepted values for *M* for these stocks are 0.025 for rougheye rockfish and 0.030 for shortraker rockfish, resulting in F_{ABC} values of 0.019 and 0.023 for rougheye and shortraker, respectively.

The biomass estimates for 2007 are 18,900 t for shortraker rockfish and 10,800 t for rougheye rockfish, leading to BSAI OFLs of 564 t for shortraker and 269 t for rougheye, and ABCs of 424 t for shortraker and 202 t for rougheye. It is not possible to determine whether these species are overfished or whether they are approaching an overfished condition because they are managed under Tier 5.

14. Other Rockfish Complex

Status and catch specifications (t) of other rockfish (primarily thornyheads) in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2007 and 2008 are those recommended by the Plan Team. Catch data are current through 10/27/07. Values for 2009 reflect the removal of dark rockfish from the other rockfish complex per Amendment 77 to the BSAI FMP.

Area	Year	Survey Biomass	OFL	ABC	TAC	Catch
BSAI	2006	26,600	1,330			579
	2007	36,700	1,330	999	999	635
	2008	36,700	1,330	999	n/a	n/a
	2009	n/a	1,290	968	n/a	n/a
EBS	2006	15,400	n/a	414	414	157
	2007	18,100	n/a	414	414	205
	2008	18,100	n/a	414	414	n/a
	2009	n/a	n/a	414	414	n/a
AI	2006	11,200	n/a	585	585	422
	2007	18,600	n/a	585	585	430
	2008	18,600	n/a	585	585	n/a
	2009	n/a	n/a	554	554	n/a

Changes from previous assessment

This was an 'off-year' for a biennial assessment. Catches in 2006 have been revised and the 2007 catch through 10/27/07 has been included. The BSAI "other rockfish" assessment considers the 8 species that have been caught at least once during AFSC research surveys or appeared in more than 1% of observed fishery hauls between 1990 and 2001. Separate estimates of natural mortality (M) and biomass for shortspine thornyheads (SST; M=0.03), the most common species in the other rockfish complex, and the remaining species (M=0.09 based on dusky rockfish) in the complex were used. For 2009, dark rockfish will be removed from the other rockfish complex per Amendment 77.

Spawning biomass and stock status trends

Trends in spawning biomass are unknown. Stock biomass, as measured by trawl surveys of the EBS slope and in the Aleutian Islands, has increased since 1997.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The Plan Team agrees with the approach recommended by the author of setting F_{ABC} at the maximum allowable under Tier 5 (F_{ABC} = 0.75*M). Multiplying these rates by 0.75 and the best estimates of SST and other "other rockfish" biomass yields 2008 ABCs of 414 t in the EBS and 585 t in the AI. Plan Team recommends that OFL be set for the entire BSAI area, which under Tier 5 is calculated by multiplying the best estimates of total biomass for the area by the separate Ms and adding the results, which yields an OFL of 1,330 t for 2008.

For 2009, dark rockfish will be removed from the other rockfish complex. The 2009 ABC in the EBS is 414 t, while in the AI is 554 t. The 2009 OFL in the BSAI = 1,290 t. The complex is not currently overfished, nor is it approaching an overfished condition.

15. Atka mackerel

Status and catch specifications (t) of Atka mackerel in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 10/27/07.

Area	Year	Sub-Area	Age 3+ Biomass	OFL	ABC	TAC	Catch
BSAI	2006		446,000	130,000	110,000	63,000	61,878
BSAI	2007		364,000	86,900	74,000	63,000	56,620
BSAI	2008		323,000	71,400	60,700	n/a	n/a
		541&EBS			19,500	n/a	n/a
		542			24,300	n/a	n/a
		543			16,900	n/a	n/a
BSAI	2009		n/a	50,600	47,500	n/a	n/a
		541&EBS			15,300	n/a	n/a
		542			19,000	n/a	n/a
		543			13,200	n/a	n/a

Changes from previous assessment
There were no changes in the assessment model methodology from that reviewed in 2006.

New input data were included and updated in the 2007 assessment.

Spawning biomass and stock status trends
The projected female spawning biomass for 2008 under an $F_{40\%}$ harvest strategy is estimated at 110,200 t which is 47% of unfished spawning biomass and above $B_{40\%}$ (94,100 t). The 2008 estimate of spawning biomass is down about 15% from last year's estimate for 2007. These results are consistent with the recent trend in survey biomass (18% decline in 2006 relative to 2004).

The projected age 3+ biomass at the beginning of 2008 is estimated at 323,400 t, down about 11% from last year's estimate for 2007. There is less of a decrease in projected biomass in this year's assessment relative to last year's projections. The addition of the 2006 fishery and survey age compositions changed the estimated magnitude of the 1999, 2003, and 2004 year-classes by 8, 46, and 68%, respectively; the magnitude of the 2001 and 2002 year-classes decreased 13, and 34%, respectively, relative to last year's assessment. However, year-classes spawned in 2002 through 2005 are all estimated to be below average in size. These follow the four above average 1998-2001 year-classes, which leads to short-term population declines.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The projected female spawning biomass under an $F_{40\%}$ harvest strategy is estimated to be 47% of unfished spawning biomass in 2008 and above $B_{40\%}$, thereby placing BSAI Atka mackerel in Tier 3a**.** The projected 2008 yield (ABC) at $F_{40\%}$= 0.331 is 60,700 t, down about 18% from last year's estimate for 2007. The projected 2008 overfishing level at $F_{35\%}$ (F = 0.40) is 71,400 t, down about 18% from last year's estimate for 2007. The species is not currently overfished, nor is it approaching an overfished condition.

Atka mackerel female spawning biomass in 2009 (89,900 t) is projected to fall below $B_{40\%}$, putting the fishery in Tier 3b. The projected 2009 yield (ABC) at $F_{40\%}$= 0.32 is 47,500 t; the projected 2009 overfishing level at $F_{35\%}$ (F = 0.36) is 50,600 t. The population is projected to remain below $B_{40\%}$ from 2009-2012.

Ecosystem Considerations
Food habits data (from analysis of scats) from the Aleutian Islands indicate that Atka mackerel is the most common prey item of the endangered western Steller sea lion throughout the year. Analyses of historic fishery CPUE revealed that the fishery may create temporary localized depletions of Atka mackerel, and fishery harvest rates in localized areas may have been high enough to affect prey availability of Steller sea lions.

Bottom contact fisheries could have direct negative impacts on Atka mackerel by destroying egg nests and/or removing the males that are guarding nests. When trawl exclusion zones near Steller sea lion rookeries were implemented beginning in 1992, it was thought that these eliminated much of the overlap between bottom trawl fisheries and Atka mackerel nesting areas. However, nesting sites may be widespread across the continental shelf and found over a much broader depth range than just in nearshore areas. The use of bottom contact fishing gear, such as bottom trawls, pot gear, and longline gear, utilized in July to January could, therefore, still potentially affect Atka mackerel nesting areas, despite trawl closures in nearshore areas around Steller sea lion rookeries.

Area apportionment
Amendment 28 of the Bering Sea/Aleutian Islands Fishery Management Plan divided the Aleutian subarea into 3 districts at 177° E and 177° W longitude, providing the mechanism to apportion the Aleutian Atka mackerel TACs. The Council used a 4-survey (2000, 2002, 2004, and 2006) weighted average to apportion the 2007 ABC, and the authors recommend using the same method to apportion the 2008 and 2009 ABCs. The recommended ABC apportionment by subarea for both 2008 and 2009 is 32.2% for Area 541, 40.0% for 542, and 27.8% for Area 543.

16 – 20. Squid and Other Species Complex

Status and catch specifications (t) of squid and other species in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2008 and 2009 are those recommended by the Plan Team. Catch data are current through 10/27/07.

Squid	Area	Year	Biomass	OFL	ABC	TAC	Catch
	BSAI	2006	n/a	2,620	1,970	1,275	1,416
		2007	n/a	2,620	1,970	1,970	1,193
		2008	n/a	2,620	1,970	n/a	n/a
		2009	n/a	2,620	1,970	n/a	n/a
Other species	**Area**	**Year**	**Biomass**	**OFL**	**ABC**	**TAC**	**Catch**
BSAI Council	Approved	2006	724,000	93,800	70,400	29,000	26,562
		2007	734,000	91,700	68,800	37,355	26,467
Plan Team	Recommend.:	2008					
	Sharks		18,100	617	463	n/a	n/a
	Skates		574,801	37,200	31,300	n/a	n/a
	Sculpins		228,995	53,100	39,800	n/a	n/a
	Octopus		n/a	324	243	n/a	n/a
	Total		n/a	91,300	71,800	n/a	n/a
		2009					
	Sharks		18,100	617	463	n/a	n/a
	Skates		567,134	36,800	30,900	n/a	n/a
	Sculpins		228,995	53,100	39,800	n/a	n/a
	Octopus		n/a	324	243	n/a	n/a
	Total		n/a	91,300	71,800	n/a	n/a

Changes from previous assessment
There were no changes in assessment methods for the squid and other species complex, except that the Stock Synthesis 2 assessment framework was used for Alaska skate within the skate component. Catch and survey data were updated in these assessments.

Spawning biomass and stock status trends
No spawning biomass trend is available.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Squid - Using Tier 6 criteria, the recommended ABC for BSAI squid for 2008-2009 is calculated as 0.75 times the average catch from 1978-1995, or 1,970 t; the recommended overfishing level for squid in 2008-2009 is calculated as the average catch from 1978-1995, or 2,620 t. The groundfish surveys do not provide a reliable biomass estimate. The authors reviewed some life history information and indicated that the predominant species in this group may experience multiple cohorts within a single year within the context of a discussion of whether this species group may more appropriately reside in the forage fish category.

Sharks – The Plan team recommended Tier 6 ABC (463 t) and OFL (617 t) for 2008 and 2009. The 2007 SAFE has been updated with life history information and length frequency information. In a departure from the November 2006 meeting the Plan Team agreed with the SSC that the survey information was not reliable enough to promote the Tier 5 assessment.

Sculpin – In contrast to the Tier 5 assessment in 2006, where a single M (0.19) and two biomass estimates (one for the EBS and one for the AI) were used, the 2007 assessment applies distinct M estimates from the literature and species or species group biomass estimates for the five most predominate sculpin species/species groups. The assessment authors noted that species composition differs among the BS shelf, BS slope, and the AI. The survey biomass is stable. The ratio of fishing mortality to total mortality is low. The Plan Team recommended the alternative approach, and the ABC and OFL for 2008 – 2009 to be 39,800 t and 53,100 t, respectively.

Octopus – The author thinks the octopus biomass estimate is not reliable and therefore does not support a Tier 5 assessment. The author also noted the Tier 6 estimate based on average catch likely underestimates the population and would unnecessarily constrain primarily the pot fishery for Pacific cod if octopus were managed as a single species group or if it were broken out into two groups external from the ‘other species’ category. The author recommended a revised Tier 6 based on recent maximum catch. On going research includes species identification discard mortality estimates. The Plan Team recommended Tier 6 average for ABC 243 t and OFL 324 t calculation.

Skate – The 2007 assessment differs from the 2006 estimate. The Alaska skate component is estimated within Tier 3 rather than Tier 5. The ‘other skate’ component of the estimate continues to be estimated within Tier 5. Plan Team agreed with the author’s recommendation to assess Alaska skate within Tier 3 and other skate stay within Tier 5. The authors presented several Tier 3 Alaska skate models based on historic biomass and catch estimates. Their recommended Tier 3 ‘base’ model utilized data that began in 1992. The team looks forward to the author’s review of a discrepancy between increasing survey biomass estimate in recent years relative to the model projections of declining biomass.

Appendix A: Pacific Halibut Discard Mortality Rates

Halibut discard mortality rates (DMRs) are set by the Council on a 3-year cycle for non-CDQ fisheries based on an average of the past 10 years and annually for CDQ fisheries based on available data. Rates for non-CDQ fisheries for 2008 are included in rates previously adopted by the Council for use in 2007-2009. International Pacific Halibut Commission staff recommendations for DMRs for the BSAI CDQ fisheries for 2008 were reviewed by the BSAI Plan Team during its September meeting. The Team endorsed the IPHC recommendations for revised halibut DMRs for the CDQ fisheries. The rates were adopted by the Council in October 2007 and are shown in the summary table below. It is anticipated that the rates for CDQ fisheries will likely be set on a 3-year cycle when the next 3-year cycle commences for the non-CDQ fisheries in 2009 for 2010-2012.

CDQ Fisheries	
Gear/Target	**Recommended DMR**
Trawl	
Atka mackerel	85
Bottom pollock	86
Rockfish	82
Flathead sole	87
Pelagic pollock	90
Rock sole	86
Yellowfin sole	86
Pot	
Sablefish	34
Longline	
Pacific cod	10
Turbot	4

Table 1. Bering Sea Aleutian Islands Groundfish Plan Team OFL, ABC, and TAC Recommendations for the 2008-2009 Fisheries.

Species	Area	2007				2008			2009		
		OFL	ABC	TAC	Catch	OFL	ABC	TAC	OFL	ABC	TAC
Pollock	EBS	1,640,000	1,394,000	1,394,000	1,350,000	1,440,000	1,000,000		1,320,000	1,000,000	
	Aleutian Islands	54,500	44,500	19,000	2,488	34,000	28,200		26,100	22,700	
	Bogoslof District	48,000	5,220	10	0	58,400	7,970		58,400	7,970	
Pacific cod	BSAI	207,000	176,000	171,000	172,000	176,000	150,000		190,000	162,000	
Sablefish	BS	3,520	2,980	2,980	1,090	3,380	2,860		2,910	2,610	
	AI	3,320	2,810	2,810	1,080	2,890	2,440		2,510	2,230	
Yellowfin sole	BSAI	240,000	225,000	136,000	119,332	265,000	248,000		296,000	276,000	
Greenland turbot	Total	15,600	2,440	2,440	1,946	15,600	2,540		16,000	2,540	
	BS		1,680	1,680	1,435		1,750			1,750	
	AI		760	760	511		787			787	
Arrowtooth flounder	BSAI	193,000	158,000	20,000	11,700	297,000	244,000		300,000	246,000	
Northern rock sole	BSAI	200,000	198,000	55,000	37,013	304,000	301,000		379,000	375,000	
Flathead sole	BSAI	95,300	79,200	30,000	19,500	86,000	71,700		83,700	69,700	
Alaska plaice	BSAI	241,000	190,000	25,000	19,411	248,000	194,000		277,000	217,000	
Other flatfish	BSAI	28,500	21,400	10,000	25,176	28,800	21,600		28,800	21,600	
Pacific Ocean perch	BSAI	26,100	21,900	19,900	17,800	25,700	21,700		25,400	21,300	
	BS		4,160	2,160			4,200			4,130	
	AI total		15,390	17,740			17,500			17,200	
	WAI		5,370	7,720			7,590			7,490	
	CAI		5,050	5,050			4,970			4,900	
	EAI		4,970	4,970			4,890			4,820	
Northern rockfish	BSAI	9,750	8,190	8,190	3,940	9,740	8,180		9,680	8,130	
Shortraker	BSAI	564	424	424	318	564	424		564	424	
Rougheye	BSAI	269	202	202	163	269	202		269	202	
Other rockfish	BSAI	1,330	999	999	635	1,330	999		1,290	968	
	BS		414	414			414			414	
	AI		585	585			585			554	
Atka mackerel	Total	86,900	74,000	63,000	56,620	71,400	60,700		50,600	47,500	
	WAI		20,600	9,600			16,900			13,200	
	CAI		29,600	29,600			24,300			19,000	
	EAI/BS		23,800	23,800			19,500			15,300	
Squid	BSAI	2,620	1,970	1,970	1,190	2,620	1,970		2,620	1,970	
Other species	BSAI	91,700	68,800	37,400	26,500	91,200	71,800		91,200	71,800	
Sharks						617	463		617	463	
Skates						37,200	31,300		36,800	30,900	
Sculpins						53,100	39,800		53,100	39,800	
Octopus						324	243		324	243	
Total	BSAI	3,188,973	2,676,035	2,000,000	1,867,902	3,161,893	2,440,285		3,162,043	2,557,644	

Table 2. Groundfish catches (metric tons) in the eastern Bering Sea, 1954-2007.

Year	Pollock	Pacific Cod	Sable Fish	Yellowfin Sole	Greenland Turbot	Arrowtooth Flounder/a	Rock Sole/c	Other Flatfish	Alaska Plaice	Pacific Ocean Perch Complex/b	Pacific Ocean Perch	Northern Rockfish	Shortraker Rockfish	Rougheye Rockfish	Other Rockfish	Atka Mackerel	Squid	Other Species	Total (All Species)
1954				12,562															12,562
1955				14,690															14,690
1956				24,697															24,697
1957				24,145															24,145
1958	6,924	171	6	44,153														147	51,401
1959	32,793	2,864	289	185,321														380	221,647
1960			1,861	456,103	36,843					6,100									500,907
1961			15,627	553,742	57,348					47,000									673,717
1962			25,989	420,703	58,226					19,900									524,818
1963			13,706	85,810	31,565			35,643		24,500									191,224
1964	174,792	13,408	3,545	111,177	33,729			30,604		25,900								736	393,891
1965	230,551	14,719	4,838	53,810	9,747			11,686		16,800								2,218	344,369
1966	261,678	18,200	9,505	102,353	13,042			24,864		20,200								2,239	452,081
1967	550,362	32,064	11,698	162,228	23,869			32,109		19,600								4,378	836,308
1968	702,181	57,902	4,374	84,189	35,232			29,647		31,500								22,058	967,083
1969	862,789	50,351	16,009	167,134	36,029			34,749		14,500								10,459	1,192,020
1970	1,256,565	70,094	11,737	133,079	19,691	12,598		64,690		9,900								15,295	1,593,649
1971	1,743,763	43,054	15,106	160,399	40,464	18,792		92,452		9,800								13,496	2,137,326
1972	1,874,534	42,905	12,758	47,856	64,510	13,123		76,813		5,700								10,893	2,149,092
1973	1,758,919	53,386	5,957	78,240	55,280	9,217		43,919		3,700								55,826	2,064,444
1974	1,588,390	62,462	4,258	42,235	69,654	21,473		37,357		14,000								60,263	1,900,092
1975	1,356,736	51,551	2,766	64,690	64,819	20,832		20,393		8,600								54,845	1,645,232
1976	1,177,822	50,481	2,923	56,221	60,523	17,806		21,746		14,900								26,143	1,428,565
1977	978,370	33,335	2,718	58,373	27,708	9,454		14,393		2,654					311		4,926	35,902	1,168,144
1978	979,431	42,543	1,192	138,433	37,423	8,358		21,040		2,221					2,614	831	6,886	61,537	1,302,509
1979	913,881	33,761	1,376	99,017	34,998	7,921		19,724		1,723					2,108	1,985	4,286	38,767	1,159,547
1980	958,279	45,861	2,206	87,391	48,856	13,761		20,406		1,097					459	4,955	4,040	34,633	1,221,944
1981	973,505	51,996	2,604	97,301	52,921	13,473		23,428		1,222					356	3,027	4,182	35,651	1,259,666
1982	955,964	55,040	3,184	95,712	45,805	9,103		23,809		224					276	328	3,838	18,200	1,211,483
1983	982,363	83,212	2,695	108,385	43,443	10,216		30,454		221					220	141	3,470	15,465	1,280,285
1984	1,098,783	110,944	2,329	159,526	21,317	7,980		44,286		1,569					176	57	2,824	8,508	1,458,299
1985	1,179,759	132,736	2,348	227,107	14,698	7,288		71,179		784					92	4	1,611	11,503	1,649,109
1986	1,188,449	130,555	3,518	208,597	7,710	6,761		76,328		560					102	12	848	10,471	1,633,911
1987	1,237,597	144,539	4,178	181,429	6,533	4,380		50,372		930					474	12	108	8,569	1,639,121
1988	1,228,000	192,726	3,193	223,156	6,064	5,477		137,418		1,047					341	428	414	12,206	1,810,470
1989	1,230,000	164,800	1,252	153,165	4,061	3,024		63,452		2,017					192	3,126	300	4,993	1,630,382
1990	1,353,000	162,927	2,329	80,584	7,267	2,773		22,568		5,639					384	480	460	5,698	1,644,109
1991	1,268,360	165,444	1,128	94,755	3,704	12,748	46,681	30,401		4,744					396	2,265	544	16,285	1,647,455
1992	1,384,376	163,240	558	146,942	1,875	11,080	51,720	34,757		3,309					675	2,610	819	29,993	1,831,954
1993	1,301,574	133,156	669	105,809	6,330	7,950	63,942	28,812		3,763					190	201	597	21,413	1,674,406
1994	1,362,694	174,151	699	144,544	7,211	13,043	60,276	29,720		1,907					261	190	502	23,430	1,818,628
1995	1,264,578	228,496	929	124,746	5,855	8,282	54,672	34,861		1,210					629	340	364	20,928	1,745,890
1996	1,189,296	209,201	629	129,509	4,699	13,280	46,775	35,390		2,635					364	780	1,080	19,717	1,653,355
1997	1,115,268	209,475	547	166,681	6,589	8,580	67,249	42,374		1,060					161	171	1,438	20,997	1,640,590
1998	1,101,428	160,681	586	101,310	8,303	14,985	33,221	39,940		1,134					203	901	891	23,156	1,486,739
1999	889,589	134,647	646	67,307	5,205	9,827	39,934	33,042		609					135	2,008	393	17,045	1,200,387
2000	1,132,736	151,372	742	84,057	5,888	12,071	49,186	36,813		704					239	239	375	23,098	1,497,520
2001	1,387,452	142,452	863	63,563	4,252	12,836	28,949	27,693		1,148					296	264	1,761	23,148	1,694,677
2002	1,481,815	166,552	1,143	74,956	3,150	10,821	40,700	30,229		858					401	572	1,334	26,639	1,839,170
2003	1,492,039	180,592	1,039	81,050	2,565	13,667	36,375	17,507	10,118	1,391					336	6,362	1,246	26,986	1,871,273
2004	1,480,543	183,283	1,038	75,501	1,805	17,327	47,862	22,109	7,888		731	116	119	24	318	7,157	1,000	27,493	1,874,315
2005	1,483,274	182,797	1,075	94,382	2,120	13,404	36,814	20,640	11,194		879	112	108	12	178	3,538	1,168	28,041	1,879,735
2006	1,486,413	167,725	1,055	99,064	1,440	11,852	35,874	21,029	17,309		1,039	246	46	7	157	3,170	1,401	24,627	1,872,455
2007/d	1,350,530	138,456	1,088	119,329	1,435	10,902	36,261	25,117	19,411		811	69	109	9	205	2,961	1,182	24,516	1,732,391

a/ Arrowtooth flounder included in Greenland turbot catch statistics, 1960-69. c/ Rock sole prior to 1991 is included in other flatfish catch statistics.
b/ Includes POP shortraker, rougheye, northern and sharpchin. d/ Data through October 27, 2007. Note: Numbers don't include fish taken for research.

'Table 3. Groundfish catches (metric tons) in the Aleutian Islands, 1962-2007 (no catches were recorded from this region prior to 1962).

Year	Pollock	Pacific Cod	Sable Fish	Yellowfin Sole	Greenland Turbot	Arrowtooth Flounder/a	Rock Sole/c	Other Flatfish	Alaska Plaice	Pacific Ocean Perch Complex/b	Pacific Ocean Perch	Northern Rockfish	Shortraker Rockfish	Rougheye Rockfish	Other Rockfish	Atka Mackerel	Squid	Other Species	Total (All Species)
1962										200									200
1963			664		7					20,800									21,471
1964		241	1,541		504					90,300								66	92,652
1965		451	1,249		300					109,100								768	111,868
1966		154	1,341		63					85,900								131	87,589
1967		293	1,652		394					55,900								8,542	66,781
1968		289	1,673		213					44,900								8,948	56,023
1969		220	1,673		228					38,800								3,088	44,009
1970		283	1,248		285	274				66,900						949		10,671	80,610
1971		2,078	2,936		1,750	581				21,800								2,973	32,118
1972		435	3,531		12,874	1,323				33,200						5,907		22,447	79,717
1973		977	2,902		8,666	3,705				11,800						1,712		4,244	34,006
1974		1,379	2,477		8,788	3,195				22,400						1,377		9,724	49,340
1975		2,838	1,747		2,970	784				16,600						13,326		8,288	46,553
1976		4,190	1,659		2,067	1,370				14,000						13,126		7,053	43,465
1977	7,625	3,262	1,897		2,453	2,035				8,080					3,043	20,975	1,808	16,170	67,348
1978	6,282	3,295	821		4,766	1,782				5,286					921	23,418	2,085	12,436	61,092
1979	9,504	5,593	782		6,411	6,436				5,487					4,517	21,279	2,252	12,934	75,195
1980	58,156	5,788	274		3,697	4,603				4,700					420	15,533	2,332	13,028	108,531
1981	55,516	10,462	533		4,400	3,640				3,622					328	16,661	1,763	7,274	104,199
1982	57,978	1,526	955		6,317	2,415				1,014					2,114	19,546	1,201	5,167	98,233
1983	59,026	9,955	673		4,115	3,753				280					1,045	11,585	510	3,675	94,617
1984	81,834	22,216	999		1,803	1,472				631					56	35,998	343	1,670	147,022
1985	58,730	12,690	1,448		33	87				308					99	37,856	9	2,050	113,310
1986	46,641	10,332	3,028		2,154	142				286					169	31,978	20	1,509	96,259
1987	28,720	13,207	3,834		3,066	159				1,004					147	30,049	23	1,155	81,364
1988	43,000	5,165	3,415		1,044	406				1,979					278	21,656	3	437	77,383
1989	156,000	4,118	3,248		4,761	198				2,706					481	14,868	6	108	186,494
1990	73,000	8,081	2,116		2,353	1,459				14,650					864	21,725	11	627	124,886
1991	78,104	6,714	2,071	1,380	3,174	938		88		2,545					549	22,258	30	91	117,942
1992	54,036	42,889	1,546	4	895	900	236	68		10,277					3,689	46,831	61	3,081	164,513
1993	57,184	34,234	2,078	0	2,138	1,348	318	59		13,375					495	65,805	85	2,540	179,659
1994	58,708	22,421	1,771	0	3,168	1,334	308	55		16,959					301	69,401	86	1,102	175,614
1995	64,925	16,534	1,119	6	2,338	1,001	356	47		14,734					220	81,214	95	1,273	183,862
1996	28,933	31,389	720	654	1,677	1,330	371	61		20,443					278	103,087	87	1,720	190,750
1997	26,872	25,166	779	234	1,077	1,071	271	39		15,687					307	65,668	323	1,555	139,049
1998	23,821	34,964	595	5	821	694	446	54		13,729					385	56,195	25	2,448	134,182
1999	965	27,714	565	13	422	746	577	53		17,619					630	51,636	9	1,633	102,582
2000	1,244	39,684	1,048	13	1,086	1,157	480	113		14,893					601	46,990	8	3,010	110,327
2001	824	34,207	1,074	15	1,060	1,220	526	97		15,587					610	61,296	5	4,029	120,550
2002	1,177	30,801	1,118	29	485	1,032	1,165	150		14,996					551	44,722	10	1,980	98,216
2003	1,653	32,193	1,009	0	965	913	964	76		18,765					401	52,988	36	1,326	111,289
2004	1,158	28,869	955	9	414	806	818	71	0		11,165	4,567	121	184	337	53,405	14	1,851	104,744
2005	1,621	22,627	1,475	2	439	829	548	59	0		9,548	3,852	61	78	286	58,474	17	1,401	101,315
2006	1,735	24,181	1,130	4	525	1,450	578	75	0		11,817	3,577	162	196	422	58,708	15	1,935	106,510
2007/d	2,488	33,951	1,078	3	511	799	752	59	0		16,961	3,867	209	154	430	53,659	11	1,951	116,883

a/ Arrowtooth flounder included in Greenland turbot catch statistics, 1964-69.
b/ Includes POP shortraker, rougheye, northern and sharpchin rockfish until 2004.
c/ Rocksole prior to 1991 is included in other flatfish catch statistics.
d/ Data through October 27, 2007. Note: Numbers don't include fish taken for research.

Table 4. Groundfish catches (metric tons) in the Bering Sea and Aleutian Islands, 1954-2007.

Year	Pollock	Pacific Cod	Sable Fish	Yellowfin Sole	Greenland Turbot	Arrowtooth Flounder/a	Rock Sole/c	Other Flatfish	Alaska Plaice	Pacific Ocean Perch Complex/b	Pacific Ocean Perch	Northern Rockfish	Shortraker Rockfish	Rougheye Rockfish	Other Rockfish	Atka Mackerel	Squid	Other Species	Total (All Species)
1954	0	0	0	12,562	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,562
1955	0	0	0	14,690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,690
1956	0	0	0	24,697	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,697
1957	0	0	0	24,145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,145
1958	6,924	171	6	44,153	0	0	0	0	0	0	0	0	0	0	0	0	0	147	51,401
1959	32,793	2,864	289	185,321	0	0	0	0	0	0	0	0	0	0	0	0	0	380	221,647
1960	0	0	1,861	456,103	36,843	0	0	0	0	6,100	0	0	0	0	0	0	0	0	500,907
1961	0	0	15,627	553,742	57,348	0	0	0	0	47,000	0	0	0	0	0	0	0	0	673,717
1962	0	0	25,989	420,703	58,226	0	0	0	0	20,100	0	0	0	0	0	0	0	0	525,018
1963	0	0	14,370	85,810	31,572	0	0	35,643	0	45,300	0	0	0	0	0	0	0	0	212,695
1964	174,792	13,649	5,086	111,177	34,233	0	0	30,604	0	116,200	0	0	0	0	0	0	0	802	486,543
1965	230,551	15,170	6,087	53,810	10,047	0	0	11,686	0	125,900	0	0	0	0	0	0	0	2,986	456,237
1966	261,678	18,354	10,846	102,353	13,105	0	0	24,864	0	106,100	0	0	0	0	0	0	0	2,370	539,670
1967	550,362	32,357	13,350	162,228	24,263	0	0	32,109	0	75,500	0	0	0	0	0	0	0	12,920	903,089
1968	702,181	58,191	6,047	84,189	35,445	0	0	29,647	0	76,400	0	0	0	0	0	0	0	31,006	1,023,106
1969	862,789	50,571	17,682	167,134	36,257	0	0	34,749	0	53,300	0	0	0	0	0	0	0	13,547	1,236,029
1970	1,256,565	70,377	12,985	133,079	19,976	12,872	0	64,690	0	76,800	0	0	0	0	0	949	0	25,966	1,674,259
1971	1,743,763	45,132	18,042	160,399	42,214	19,373	0	92,452	0	31,600	0	0	0	0	0	0	0	16,469	2,169,444
1972	1,874,534	43,340	16,289	47,856	77,384	14,446	0	76,813	0	38,900	0	0	0	0	0	5,907	0	33,340	2,228,809
1973	1,758,919	54,363	8,859	78,240	63,946	12,922	0	43,919	0	15,500	0	0	0	0	0	1,712	0	60,070	2,098,450
1974	1,588,390	63,841	6,735	42,235	78,442	24,668	0	37,357	0	36,400	0	0	0	0	0	1,377	0	69,987	1,949,432
1975	1,356,736	54,389	4,513	64,690	67,789	21,616	0	20,393	0	25,200	0	0	0	0	0	13,326	0	63,133	1,691,785
1976	1,177,822	54,671	4,582	56,221	62,590	19,176	0	21,746	0	28,900	0	0	0	0	0	13,126	0	33,196	1,472,030
1977	985,995	36,597	4,615	58,373	30,161	11,489	0	14,393	0	10,734	0	0	0	0	3,354	20,975	6,734	52,072	1,235,492
1978	985,713	45,838	2,013	138,433	42,189	10,140	0	21,040	0	7,507	0	0	0	0	3,535	24,249	8,971	73,973	1,363,601
1979	923,385	39,354	2,158	99,017	41,409	14,357	0	19,724	0	7,210	0	0	0	0	6,625	23,264	6,538	51,701	1,234,742
1980	1,016,435	51,649	2,480	87,391	52,553	18,364	0	20,406	0	5,797	0	0	0	0	879	20,488	6,372	47,661	1,330,475
1981	1,029,021	62,458	3,137	97,301	57,321	17,113	0	23,428	0	4,844	0	0	0	0	684	19,688	5,945	42,925	1,363,865
1982	1,013,942	56,566	4,139	95,712	52,122	11,518	0	23,809	0	1,238	0	0	0	0	2,390	19,874	5,039	23,367	1,309,716
1983	1,041,389	93,167	3,368	108,385	47,558	13,969	0	30,454	0	501	0	0	0	0	1,265	11,726	3,980	19,140	1,374,902
1984	1,180,617	133,160	3,328	159,526	23,120	9,452	0	44,286	0	2,200	0	0	0	0	232	36,055	3,167	10,178	1,605,321
1985	1,238,489	145,426	3,796	227,107	14,731	7,375	0	71,179	0	1,092	0	0	0	0	191	37,860	1,620	13,553	1,762,419
1986	1,235,090	140,887	6,546	208,597	9,864	6,903	0	76,328	0	846	0	0	0	0	271	31,990	868	11,980	1,730,170
1987	1,266,317	157,746	8,012	181,429	9,599	4,539	0	50,372	0	1,934	0	0	0	0	621	30,061	131	9,724	1,720,485
1988	1,271,000	197,891	6,608	223,156	7,108	5,883	0	137,418	0	3,026	0	0	0	0	619	22,084	417	12,643	1,887,853
1989	1,386,000	168,918	4,500	153,165	8,822	3,222	0	63,452	0	4,723	0	0	0	0	673	17,994	306	5,101	1,816,876
1990	1,426,000	171,008	4,445	80,584	9,620	4,232	0	22,568	0	20,289	0	0	0	0	1,248	22,205	471	6,325	1,768,995
1991	1,346,464	172,158	3,199	96,135	6,878	13,686	46,681	30,489	0	7,289	0	0	0	0	945	24,523	574	16,376	1,765,397
1992	1,438,412	206,129	2,104	146,946	2,770	11,980	51,956	34,825	0	13,586	0	0	0	0	4,364	49,441	880	33,074	1,996,467
1993	1,358,758	167,390	2,747	105,809	8,468	9,298	64,260	28,871	0	17,138	0	0	0	0	685	66,006	682	23,953	1,854,065
1994	1,421,402	196,572	2,470	144,544	10,379	14,377	60,584	29,775	0	18,866	0	0	0	0	562	69,591	588	24,532	1,994,242
1995	1,329,503	245,030	2,048	124,752	8,193	9,283	55,028	34,908	0	15,944	0	0	0	0	849	81,554	459	22,201	1,929,752
1996	1,218,229	240,590	1,349	130,163	6,376	14,610	47,146	35,451	0	23,078	0	0	0	0	642	103,867	1,167	21,437	1,844,105
1997	1,142,140	234,641	1,326	166,915	7,666	9,651	67,520	42,413	0	16,747	0	0	0	0	468	65,839	1,761	22,552	1,779,639
1998	1,125,249	195,645	1,181	101,315	9,124	15,679	33,667	39,994	0	14,863	0	0	0	0	588	57,096	916	25,604	1,620,921
1999	890,554	162,361	1,211	67,320	5,627	10,573	40,511	33,095	0	18,228	0	0	0	0	765	53,644	402	18,678	1,302,969
2000	1,133,980	191,056	1,790	84,070	6,974	13,228	49,666	36,926	0	15,597	0	0	0	0	840	47,229	383	26,108	1,607,847
2001	1,388,276	176,659	1,937	63,578	5,312	14,056	29,475	27,790	0	16,735	0	0	0	0	906	61,560	1,766	27,177	1,815,227
2002	1,482,992	197,353	2,261	74,985	3,635	11,853	41,865	30,379	0	15,854	0	0	0	0	952	45,294	1,344	28,619	1,937,386
2003	1,493,692	212,785	2,048	81,050	3,530	14,580	37,339	17,583	10,118	20,156	0	0	0	0	737	59,350	1,282	28,312	1,982,562
2004	1,481,701	212,152	1,993	75,510	2,219	18,133	48,680	22,180	7,888		11,896	4,684	240	208	655	60,562	1,014	29,344	1,979,058
2005	1,484,895	205,424	2,550	94,384	2,559	14,233	37,361	20,699	11,194		10,426	3,964	169	90	464	62,012	1,185	29,442	1,981,050
2006	1,488,148	191,906	2,185	99,068	1,965	13,302	36,452	21,104	17,309		12,856	3,823	208	203	579	61,878	1,416	26,562	1,978,964
2007/d	1,353,018	172,407	2,166	119,332	1,946	11,701	37,013	25,176	19,411		17,772	3,936	318	163	635	56,620	1,193	26,467	1,849,274

a/ Arrowtooth flounder included in Greenland turbot catch statistics, 1964-69.
b/ Includes POP shortraker, rougheye, northern and sharpchin rockfish until 2004.
c/ Rocksole prior to 1991 is included in other flatfish catch statistics.
d/ Data through October 27, 2007.
Note: Numbers don't include fish taken for research.

Table 5. Summary of stock abundance (biomass), overfishing level (OFL), acceptable biological catch (ABC), the fishing mortality rate corresponding to ABC (FABC), and the fishing mortality rate corresponding to OFL (FOFL) for the eastern Bering Sea (EBS), Aleutian Islands (AI), and Bogoslof district as projected for 2008 and 2009. "Biomass" corresponds to projected January abundance for the age+ range reported in the summary. Stock-specific biomass, OFL, and ABC are in metric tons, reported to three significant digits (four digits are used when a stock-specific ABC is apportioned among areas on a percentage basis). Fishing mortality rates are reported to two.

				2008				2009			
			Biomass	OFL	ABC	FOFL	F_{ABC}	OFL	ABC	FOFL	FABC
Pollock	EBS*		4,360,000	1,440,000	1,000,000	0.30	0.21	1,320,000	1,000,000	0.35	0.27
	Aleutian Islands		197,000	34,000	28,200	0.24	0.2	26,100	22,700	0.24	0.2
	Bogoslof District		292,000	58,400	7,970	0.20	0.027	58,400	7,970	0.20	0.027
Pacific cod	BSAI		1,080,000	176,000	150,000	0.26	0.22	190,000	162,000	0.26	0.22
Sablefish	BS		41,000	3,380	2,860	0.101	0.084	2,910	2,610	0.101	0.084
	AI		34,000	2,890	2,440	0.101	0.084	2,510	2,230	0.101	0.084
Yellowfin sole	BSAI		2,200,000	265,000	248,000	0.2	0.19	296,000	276,000	0.2	0.19
Greenland turbot	Total		104,000	15,600	2,540	0.67	0.51	16,000	2,540	0.67	0.51
		BS			1,750			0	1,750		
		AI			787			0	787		
Arrowtooth flounder	BSAI		1,780,000	297,000	244,000	0.3	0.24	300,000	246,000	0.3	0.24
Northern rock sole	BSAI		1,880,000	304,000	301,000	0.22	0.19	379,000	375,000	0.22	0.19
Flathead sole	BSAI		820,000	86,000	71,700	0.34	0.28	83,700	69,700	0.34	0.28
Alaska plaice	BSAI		1,850,000	248,000	194,000	0.81	0.59	277,000	217,000	0.81	0.59
Other flatfish	BSAI		150,000	28,800	21,600	.17/.09/.15	.13/.06/.2	28,800	21,600	.17/.09/.15	.13/.06/.2
Pacific Ocean perch	BSAI		453,000	25,700	21,700	0.07	0.059	25,400	21,300	0.07	0.059
	BS				4,200				4,140		
	AI total				17,500				17,200		
		WAI			7,600				7,490		
		CAI			4,990				4,900		
		EAI			4,900				4,820		
Northern rockfish	BSAI		212,000	9,740	8,180	0.053	0.045	9,680	8,130	0.053	0.045
Shortraker	BSAI		18,900	564	424	0.030	0.023	564	424	0.03	0.023
Rougheye	BSAI		10,800	269	202	0.025	0.019	269	202	0.025	0.019
Other rockfish	BSAI		36,700	1,330	999	.03/.09	.023/.068	1,290	968	.03/.09	.023/.068
		BS			414			0	414		
		AI			585			0	554		
Atka mackerel	Total		323,000	71,400	60,700	0.4	0.33	50,600	47,500	0.36	0.32
		WAI			16,900				13,200		
		CAI			24,300				19,000		
		EAI/BS			19,500				15,300		
Squid	BSAI		n/a	2,620	1,970	n/a	n/a	2,620	1,970	n/a	n/a
Other species	BSAI		725,600	91,200	71,800			91,200	71,800		
Sharks	BSAI		17,600	617	463			617	463		
Skates	BSAI		491,000	37,200	31,300	0.10	0.075	36,800	30,900	0.1	0.075
Sculpins	BSAI		217,000	53,100	39,800	0.19	0.14	53,100	39,800	0.19	0.14
Octopus	BSAI			324	243			324	243		
Total	BSAI		16,565,000	3,161,893	2,440,285			3,162,043	2,557,644		

*spawning biomass

Table 6. Summary of groundfish tier designations under Amendment 56, maximum permissible ABC fishing mortality rate (max FABC), the Plan Team's recommended tier designation, ABC fishing mortality rate (FABC), the maximum permissible value of ABC (max ABC), the Plan Team's recommended ABC, and the percentage reduction (% Red.) between max ABC and the Plan Team's recommended ABC for 2008-2009. Stock-specific max ABC and ABC are in metric tons, reported to three significant digits (four significant digits are used when a stock-specific ABC is apportioned among areas on a percentage basis). Fishing mortality rates are reported to two significant digits.

		2008						2009					
Species or Complex	**Area**	**Tier**	**max FABC**	**FABC**	**max ABC**	**ABC**	**% Red.**	**Tier**	**max FABC**	**FABC**	**max ABC**	**ABC**	**% Red.**
Pollock	EBS	1b	0.22	0.22	1,170,000	1,000,000	15%	1b	0.22	0.22	1,070,000	1,000,000	7%
	Aleutian Islands	3a	0.2	0.2	28,200	28,200		3a	0.2	0.2	22,700	22,700	
	Bogoslof District	5	0.017	0.017	43,800	7,970	82%	5	0.017	0.017	43,800	7,970	82%
Pacific cod	BSAI	3b	0.22	0.22	150,000	150,000		3b	0.22	0.22	162,000	162,000	
Sablefish	BS	3b	0.084	0.084	2,860	2,860		3b	0.084	0.084	2,610	2,610	
	AI	3b	0.084	0.084	2,440	2,440		3b	0.084	0.084	2,230	2,230	
Yellowfin sole	BSAI	1	0.19	0.19	248,000	248,000		1	0.19	0.19	276,000	276,000	
Greenland turbot	Total	3a	0.51	0.51	2,540	2,540		3a	0.51	0.51	2,540	2,540	
	BS												
	AI												
Arrowtooth flounder	BSAI	3a	0.24	0.24	244,000	244,000		3a	0.24	0.24	246,000	246,000	
Northern rock sole	BSAI	1	0.19	0.19	301,000	301,000		1	0.19	0.19	375,000	375,000	
Flathead sole	BSAI	3a	0.28	0.28	71,700	71,700		3a	0.28	0.28	69,700	69,700	
Alaska plaice	BSAI	3a	0.59	0.59	194,000	194,000		3a	0.59	0.59	217,000	217,000	
Other flatfish	BSAI	5	.13/.06/.2	.13/.06/.2	21,600	21,600		5	.13/.06/.2	.13/.06/.2	21,600	21,600	
Pacific Ocean perch	BSAI	3a	0.059	0.059	21,700	21,700		3a	0.059	0.059	21,300	21,300	
	BS				4,200	4,200		0	0	0	4,130	4,130	
	AI total				17,500	17,500		0	0	0	17,200	17,200	
	WAI				7,600	7,590		0	0	0	7,490	7,490	
	CAI				4,990	4,970		0	0	0	4,900	4,900	
	EAI				4,900	4,890		0	0	0	4,820	4,820	
Northern rockfish	BSAI	3a	0.045	0.045	8,180	8,180		3a	0.045	0.045	8,130	8,130	
Shortraker	BSAI	5	0.023	0.023	424	424		5	0.023	0.023	424	424	
Rougheye	BSAI	5	0.019	0.019	202	202		5	0.019	0.019	202	202	
Other rockfish	BSAI	5	.023/.068	.023/.068	999	999		5	.023/.068	.023/.068	968	968	
	BS				414	414		0			414	414	
	AI				585	585		0			554	554	
Atka mackerel	Total	3a	0.33	0.33	60,700	60,700		3b	0.33	0.33	47,500	47,500	
	WAI		0		16,900	16,900		0	0	0	13,200	13,200	
	CAI		0		24,300	24,300		0	0	0	19,000	19,000	
	EAI/BS		0		19,500	19,500		0	0	0	15,300	15,300	
Squid	BSAI	6	n/a	n/a	1,970	1,970		6	n/a	n/a	1,970	1,970	
Other Species		5	n/a	n/a	71,800	71,800		5	n/a	n/a	71,800	71,800	
Sharks	BSAI	5			463	463		5			463	463	
Skates	BSAI	3	0.075	0.075	31,300	31,300		3	0.075	0.075	30,900	30,900	
Sculpins	BSAI	5	0.14	0.14	39,800	39,800		5	0.14	0.14	39,800	39,800	
Octopus	BSAI	6			243	243		6			243	243	
Total	BSAI				2,646,115	2,440,285					2,663,474	2,557,644	