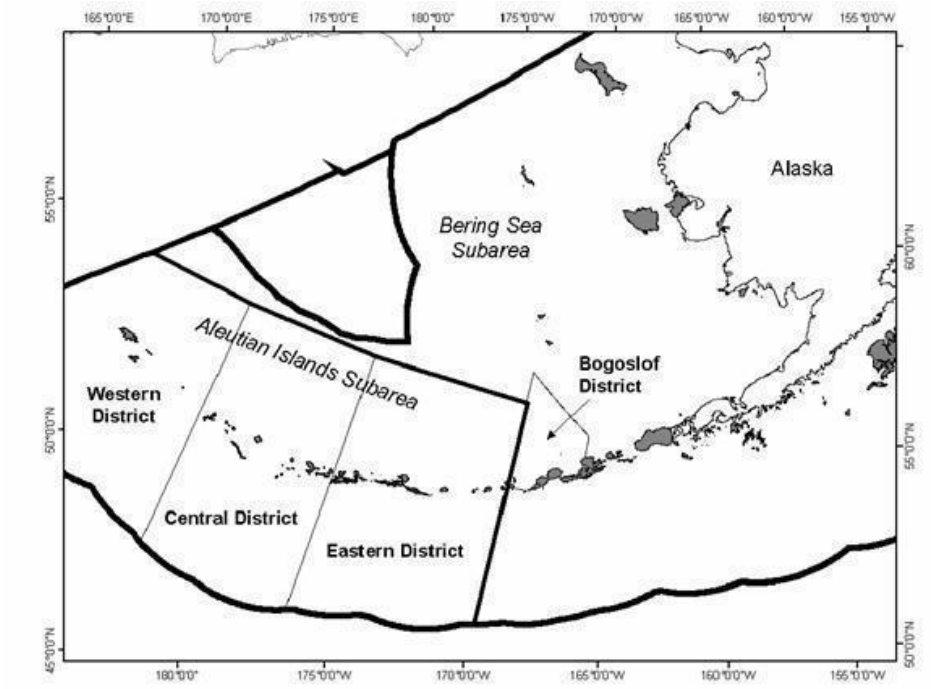
STOCK ASSESSMENT AND FISHERY EVALUATION REPORT

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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Summary

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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 usually previewed at the September Plan Team meeting, and considered again by the Team at its November meeting for recommending final specifications for the following two fishing years. This process is repeated annually.

Normally, full stock assessments are required for walleye pollock, Pacific cod, Atka mackerel, sablefish, and some flatfish stocks every year; while all rockfishes, some flatfishes, sharks, skates, octopus, squid, and sculpins require full stock assessment only during years in which the Aleutian Island bottom trawl survey is conducted (typically even-numbered 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 for the next two fishing years. This introductory section includes the recommendations of the Team (Table 1), along with a summary of each chapter, including the Ecosystems Considerations chapter and the Economic SAFE Report.

The OFL and ABC recommendations by the Plan Team are reviewed by the Scientific and Statistical Committee (SSC), which may confirm the Team recommendations or develop its own. The 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), Team, nor SSC typically recommends TACs.

Members of the BSAI Groundfish Plan Team who compiled this SAFE report were: Grant Thompson (co- chair), Dana Hanselman (co-chair), Diana Stram (BSAI Groundfish FMP coordinator), Kerim Aydin, David Barnard, Liz Chilton, Bill Clark, Lowell Fritz, Mary Furuness, Cindy Tribuzio, Alan Haynie, Brenda Norcross, and Chris Siddon.

Background Information

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.

Amendment 95 to the BSAI Groundfish FMP, which was implemented in 2010 for the start of the 2011 fishing year, defined three categories of species or species groups that are likely to be taken in the groundfish fishery. Species may be split or combined within the "target species" category according to procedures set forth in the FMP. The three categories of finfishes and invertebrates that have been designated for management purposes under two management classifications are listed below.

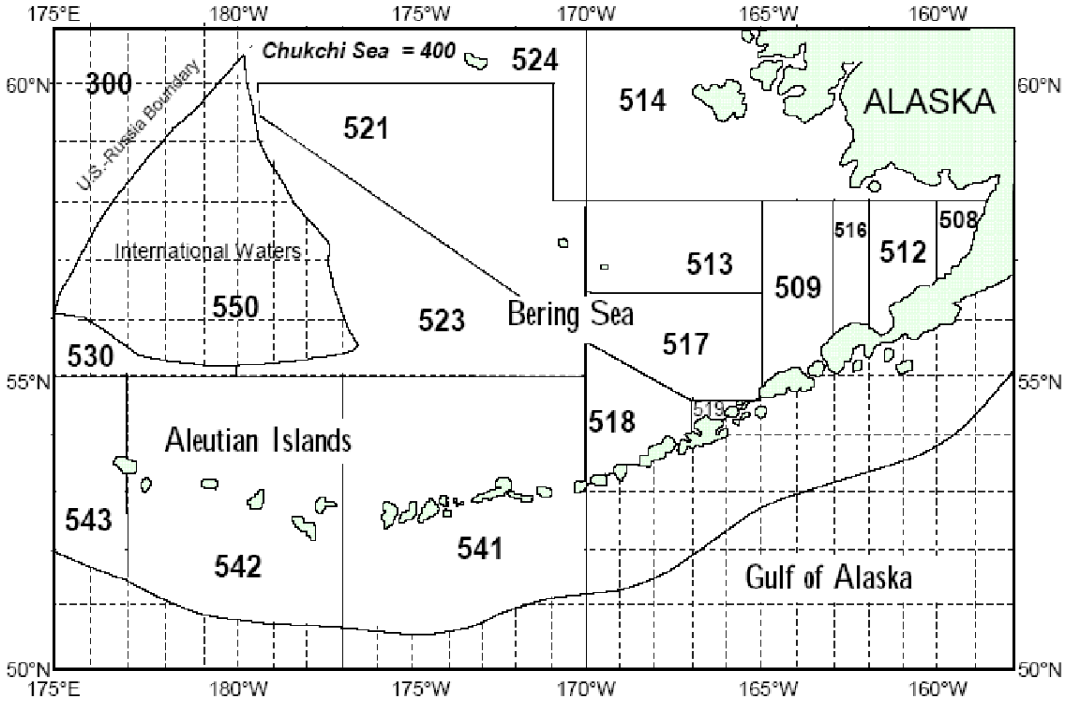

Figure 1. Bering Sea/Aleutian Islands statistical and reporting areas.

In the Fishery:

Target species–are those species that support either a single species or mixed species target fishery, are commercially important, and for which a sufficient data base exists that allows each to be managed on its own biological merits. Accordingly, a specific TAC is established annually for each target species or species assemblage. Catch of each species must be recorded and reported. Stocks/assemblages in the target category are listed below.

Ecosystem Component:

Prohibited Species–are those species and species groups the catch of which must be avoided while fishing for groundfish, and which must be immediately returned to sea with a minimum of injury except when their retention is authorized by other applicable law. Groundfish species and species groups under the FMP for which the ABCs have been achieved shall be treated in the same manner as prohibited species.

Forage fish species–are those species listed below, which are a critical food source for many marine mammal, seabird and fish species. The forage fish species category is established to allow for the

management of these species in a manner that prevents the development of a commercial directed fishery for forage fish. Management measures for this species category will be specified in regulations and may include such measures as prohibitions on directed fishing, limitations on allowable bycatch retention amounts, or limitations on the sale, barter, trade or any other commercial exchange, as well as the processing of forage fish in a commercial processing facility.

In the fishery	**Ecosystem component**	
Target species[1]	**Prohibited species**[2]	**Forage fish species**[3]
Walleye Pollock	Pacific halibut	Osmeridae family (eulachon, capelin,and other smelts)
Pacific cod	Pacific herring	Myctophidae family (laternfishes)
Sablefish	Pacific salmon	Bathylagidae (deep-sea smelts)
Yellowfin sole	Steelhead trout	Ammodytidae family (Pacific sandlance)
Greenland turbot	King crab	Trichodontidae family (Pacific sand fish)
Arrowtooth flounder	Tanner crab	Pholidae family (gunnels)
Kamchatka flounder		Stichaeidae family (pricklebacks warbonnets, eelblennys, cockscombs, shannys)
Northern rock sole		Gonostomatidae family (bristlemouths, lightfishes and anglemouths)
Flathead sole		Other euphausiacea (krill)
Alaska plaice		
Other flatfish		
Pacific Ocean perch		
Northern rockfish		
Blackspotted/Rougheye		
Shortraker rockfish		
Other rockfish*		
Atka mackerel		
Skates		
Sculpins		
Sharks		
Squids		
Octopus		

[1] TAC for each listing. Species and species groups may or may not be targets of directed fisheries.
[2] Must be immediately returned to the sea, except when retention is required or authorized.
[3] Management measures for forage fish are established in regulations implementing the FMP.

Historical Catch Statistics

Catch statistics since 1954 are shown for the Eastern Bering Sea (EBS) subarea in Table 2. The initial target species in the BSAI commercial fisheries was yellowfin sole. During this period, 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. Pollock is now the principal fishery, with catches peaking at 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, which had previously been a policy adopted by the Council. Total groundfish catches generally are well below the 2 million t optimal yield (OY) cap. Total groundfish catches in the EBS in 2014 totaled 1,846,290 t; catches through November 7, 2015 totaled 1,779,010 t. Pollock catches in the EBS totaled 1,297,846 t in 2014; catches through November 7, 2015 totaled 1,319,566 t.

Catches in the Aleutian Islands (AI) subarea always are much less than in the EBS (Table 3). Total AI catches peaked at 190,750 t in 1996. Total AI catches were 144,684 t in 2010, and dropped to 98,601 t in 2012 and to 84,619 in 2013. Total catch decreased again in 2014 to 82,089 but rose in 2015 with catch through November 7, 2015 at 99,872 t. This increase in 2015 is largely due to increased catch of Atka mackerel.

The predominance of target species in the AI has changed over the years. Pacific ocean perch (POP) was the initial target species. As POP abundance declined, the fishery diversified to target different species. POP was the second largest fishery at 26,311 t in 2013; 26,944 t in 2014 and catch totaled 24,944 t through November 7, 2015. Pacific ocean perch displaced Pacific cod as the second largest fishery beginning in 2011, as Pacific cod catch dropped from 29,001 t in 2010 to 10,595 in 2014 as a result of Steller sea lion protection measures; catch is 9,221 t through November 7, 2015. Atka mackerel was the largest fishery in the AI at 50,600 t in 2011 and 46,859 t in 2012 (down from 68,496 t in 2010); catch was catch in 2014 was 30,815 t and increased to 53,000 t as of November 7, 2015 due to modifications in the Steller sea lion protections measures for the 2015 fishery.

Total catches since 1954 for the BSAI, combined, are shown in Table 4. Total BSAI catches were 1,354,662 t in 2010 (81 percent of the total TAC and 67 percent of the OY) and rose to 1,817,774 t in 2011 (92 percent of total TACs (which equaled the OY)), 1,914,585 t (96 percent of OY) in 2013 and 1,928,379 t in 2014 (96 percent of OY). BSAI catches through November 7, 2015 totaled 1,878,882 t, which equaled 94% of OY.

Recent Total Allowable Catches

Amendment 1 to the BSAI Groundfish FMP provided the framework to manage the groundfish resources as a complex. Maximum sustainable yield (MSY) for the BSAI groundfish complex was estimated at 1.8 to 2.4 million t. The OY range was set at 85 percent of the MSY range, or 1.4 to 2.0 million t. The sum of the TACs equals OY for the groundfish complex, which is constrained by the 2.0 million t cap on OY. Recent total TACs have been set equal to the OY 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, the CDQ Program is allocated set portions of the TACs for certain species and species assemblages. 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 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 PSC limits.

The TAC specifications for the primary allocated species, and PSC limit specifications, are recommended by the Council at its December meetings. The State of Alaska (State) manages separate Pacific cod guideline harvest level (GHL) fisheries in the Bering Sea subarea (starting in 2006) and Aleutian Islands subarea (starting in 2014). The State's Pacific cod GHL fisheries are conducted independently of the Federal groundfish fisheries under direct regulation of the State. The GHL amounts for each subarea are derived as 3 percent of the combined Pacific cod Bering Sea subarea ABC and Aleutian Islands subarea ABC. The Council is expected to set the TAC for each subarea to account for the two State GHL fisheries. This is necessary to prevent harvest levels, GHL plus TAC, from exceeding the ABCs.

For the BSAI reserves, 15 percent of the TAC for each target species, except for pollock, the hook-and-line and pot gear allocation of sablefish, and the Amendment 80 species (Pacific cod, Atka mackerel, flathead sole, rock sole, yellowfin sole, and Aleutian Islands Pacific ocean perch), are automatically apportioned to a non-specified reserve. Apportionments to the non-specified reserve range from 4.3 to 15 percent of each species or species group's TAC. The non-specified reserve is used to (1) correct operational problems in the fishing fleets, (2) promote full and efficient use of groundfish resources, (3) adjust species TACs according to changing conditions of stocks during the fishing year, and (4) make apportionments and Community Development Quota allocations. The initial TAC (ITAC) for each species is the remainder of the TAC after the subtraction of the reserve.

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 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 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 as shown in the text box 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 percent 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 harvest scenarios 6 and 7 described in the next section (for Tier 3 stocks, the MSY level is defined as $B_{35\%}$). 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.

Standard Harvest and Recruitment Scenarios and Projection Methodology

A standard set of projections is required for each stock managed under Tiers 1, 2, or 3 of Amendment 56. This set of projections encompasses seven harvest scenarios designed to satisfy the requirements of Amendment 56, the National Environmental Policy Act, and the MSFCMA.

For each scenario, the projections begin with an estimated vector of 2014 or 2015 numbers at age. In each subsequent year, the fishing mortality rate is prescribed on the basis of the spawning biomass in that year and the respective harvest scenario. In each year, recruitment is drawn from an inverse Gaussian distribution whose parameters consist of maximum likelihood estimates determined from recruitments estimated in the assessment. Spawning biomass is computed in each year based on the time of peak spawning and the maturity and weight schedules described in the assessment. Total catch is assumed to equal the catch associated with the respective harvest scenario in all years, except that in the first two years of the projection, a lower catch may be specified for stocks where catch is typically below ABC. This projection scheme is run 1000 times to obtain distributions of possible future stock sizes, fishing mortality rates, and catches.

Five of the seven standard scenarios are designed to provide a range of harvest alternatives that are likely to bracket the final TACs for 2016 and 2017, are as follow ("*max* F_{ABC}" refers to the maximum permissible value of F_{ABC} under Amendment 56):

Scenario 1: In all future years, *F* is set equal to *max* F_{ABC}. (Rationale: Historically, TAC has been constrained by ABC, so this scenario provides a likely upper limit on future TACs.)

Scenario 2: In all future years, *F* is set equal to a constant fraction of *max* F_{ABC}, where this fraction is equal to the ratio of the F_{ABC} value for 2016 recommended in the assessment to the *max* F_{ABC} for 2016. (Rationale: When F_{ABC} is set at a value below *max* F_{ABC}, it is often set at the value recommended in the stock assessment.)

Scenario 3: In all future years, *F* is set equal to the average of the five most recent years. (Rationale: For some stocks, TAC can be well below ABC, and recent average *F* may provide a better indicator of F_{TAC} than F_{ABC}.)

Scenario 4: In all future years, the upper bound on F_{ABC} is set at $F_{60\%}$. (Rationale: This scenario provides a likely lower bound on F_{ABC} that still allows future harvest rates to be adjusted downward when stocks fall below reference levels.)

Scenario 5: In all future years, *F* is set equal to zero. (Rationale: In extreme cases, TAC may be set at a level close to zero.)

Two other scenarios are needed to satisfy the MSFCMA's requirement to determine whether a stock is currently in an overfished condition or is approaching an overfished condition. These two scenarios are as follow (for Tier 3 stocks, the MSY level is defined as $B_{35\%}$):

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 1) above its MSY level in 2016 or 2) above 1/2 of its MSY level in 2016 and expected to be above its MSY level in 2026 under this scenario, then the stock is not overfished.)

Scenario 7: In 2016 and 2017, *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 1) above its MSY level in 2017 or 2) above 1/2 of its MSY level in 2017 and expected to be above its MSY level in 2027 under this scenario, then the stock is not approaching an overfished condition.)

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 2016 and 2017 ABCs and OFLs are summarized in Tables 1, 5, and 6.

The sum of the recommended ABCs for 2016 and 2017 are 3,236,762 t and 3,128,135 t, respectively. These compare with the sums of the 2015 ABCs (2,842,543 t) and 2014 ABCS (2,572,819t). The primary increase from previous years is due to EBS pollock. The Team recommended maximum permissible ABCs for all stocks, except for EBS pollock, and EBS Pacific cod (Table 6).

Overall, the status of the stocks continues to appear favorable. Nearly all stocks are above B_{MSY} or the B_{MSY} proxy of $B_{35\%}$.(Figure 2) The abundances of EBS pollock, EBS Pacific cod, all rockfishes managed under Tier 3, and all flatfishes except Greenland turbot managed under Tiers 1 or 3 are projected to be above B_{MSY} or the B_{MSY} proxy of $B_{35\%}$ in 2016. The abundances of three stocks are projected to be below $B_{35\%}$ for 2016: AI pollock by about 2 percent, sablefish by about 4 percent, and Greenland turbot by about 30 percent.

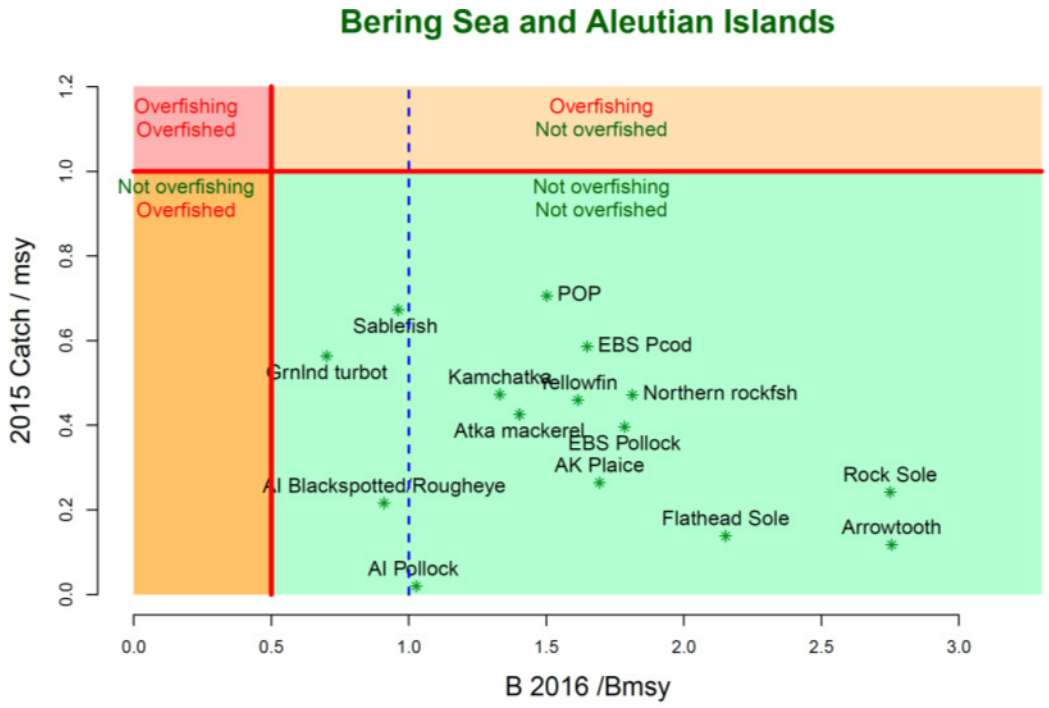

Figure 2. Summary of Bering Sea stock status next year (spawning biomass relative to B_{msy}; horizontal axis) and current year catch relative to fishing at F_{msy} (vertical axis).

The sum of the biomasses for 2016 listed in Table 5 represents a 16% increase from 2015. The 2015 value, in turn, was represented an increase of 7% from 2014 after stable biomasses from 2013. This stability and current relative increases follow periods of declines since 2010.

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 stocks managed under Tier 1 (EBS pollock, yellowfin sole, and northern rock sole). 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 yellowfin sole and northern rock sole 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 assumed to correspond 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.

The reported ABCs and OFLs for past years correspond to the values approved by the Council. Projected ABCs and OFLs listed for the next two years are the Team's recommendations.

Reported catches are as of November 7, 2015.

Two-Year OFL and ABC Projections

Proposed and final harvest specifications are adopted annually for a two year period. This requires the Team to provide OFLs and ABCs for the next two years in this cycle (Table 1). The 2016 harvest specifications (from Council recommendations in December 2014) are in place to start the fishery on January 1, 2016, but these will be replaced by final harvest specifications that will be recommended by the Council in December 2015. The final 2016 and 2017 harvest specifications will become effective when final rulemaking occurs in February or March 2016.This process allows the Council to use the most current survey and fishery data in stock assessment models for setting quotas for the next two years, while having no gap in harvest specifications.

The 2017 ABC and OFL values recommended in next year's SAFE report are likely to differ from this year's projections for 2017 because of new (e.g., survey) information that is incorporated into the assessments. In the case of stocks managed under Tier 3, ABC and OFL projections for the second year in the cycle are typically based on the output for Scenarios 1 or 2 from the standard projection model using assumed (best estimates) of actual catch levels. For stocks managed under Tiers 4-6, projections for the second year in the cycle are set equal to the Plan Team's recommended values for the first year in the cycle.

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
   $ABC \le 0.75 \times OFL$

Ecosystem Considerations

The eastern Bering Sea in 2015 was characterized by warm conditions, with a reduced extent of sea ice during winter and summer cold pool. Rough counts of zooplankton during spring indicated that small copepods were more prevalent than either lipid-rich large copepods or euphausiids. Survey biomass of motile epifauna has been above its long-term mean since 2010. Survey biomass of benthic foragers decreased substantially in 2015; recent declines could possibly be related to the consecutive years of springtime drift patterns that have been linked with poor recruitment of flatfish. Survey biomass of pelagic foragers is currently above its 30-year mean; while this is primarily driven by the increase in walleye pollock, it is also a result of increases in capelin during the cold years, which have remained high during the past two warm years. Fish apex predator survey biomass is currently above its 30-year mean. The multivariate seabird breeding index is below the long term mean, indicating that seabirds bred later and less successfully in 2015. This suggests that foraging conditions were not favorable for piscivorous seabirds, a hypothesis further supported by large numbers of dead, emaciated birds observed at sea. Northern fur seal pup production for St. Paul Island remained low in 2014, indicating that fewer pups were produced in 2014 than during the year of the last survey in 2012. The maximum potential area of seafloor habitat disturbed by trawl gear has remained stable since 2011.

Economic Summary of the BSAI commercial groundfish fisheries in 2013-14

The ex-vessel value of all Alaska domestic fish and shellfish catch, including the estimated value of fish caught almost exclusively by catcher/processors, decreased from $1950.6 million in 2013 to $1845.8 million in 2014. The first wholesale value of 2014 groundfish catch was $2345.6 million. The 2014 total groundfish catch increased by 4.2% and the total first-wholesale value increased by 7.6% relative to 2013.

The groundfish fisheries accounted for the largest share (50.8%) of the ex-vessel value of all commercial fisheries off Alaska, while the Pacific salmon (*Oncorhynchus spp*.) fishery was second with $546.0 million or 29.6% of the total Alaska ex-vessel value. The value of the shellfish fishery amounted to $244.1 million or 13.2% of the total for Alaska and exceeded the value of Pacific halibut (*Hippoglossus stenolepis*) with $106.7 million or 5.8% of the total for Alaska.

The Economic SAFE report (appendix bound separately) contains detailed information about economic aspects of the groundfish fisheries, including figures and tables, catch share fishery indicators, product price forecasts, a summary of the Alaskan community participation in fisheries, an Amendment 80 fishery economic data report (EDR) summary, market profiles for the most commercially valuable species, a summary of the relevant research being undertaken by the Economic and Social Sciences Research Program (ESSRP) at the Alaska Fisheries Science Center (AFSC) and a list of recent publications by ESSRP analysts. The figures and tables in the report provide estimates of total groundfish catch, groundfish discards and discard rates, prohibited species catch (PSC) and PSC rates, the ex-vessel value of the groundfish catch, the ex-vessel value of the catch in other Alaska fisheries, the gross product value of the resulting groundfish seafood products, the number and sizes of vessels that participated in the groundfish fisheries off Alaska, vessel activity, and employment on at-sea processors. Generally, the data presented in this report cover the years 2010 through 2014, but limited catch and ex-vessel value data are reported for earlier years in order to illustrate the rapid development of the domestic groundfish fishery in the 1980s and to provide a more complete historical perspective on catch. Several series were discontinued and new price/revenue tables from an alternative source are presented in Appendix A: Ex-vessel Economic Data Tables: alternative pricing based on CFEC fish tickets.

The Economic SAFE report updates the data associated with the market profiles for pollock, Pacific cod, sablefish, and yellowfin sole that display the markets for these species in terms of pricing, volume, supply and demand, and trade. In addition, the Economic SAFE contains links to data on some of the external factors that impact the economic status of the fisheries. Such factors include foreign exchange rates, the prices, and price indices, of products that compete with products from these fisheries, domestic per capita consumption of seafood products, and fishery imports.

The Economic SAFE report also updates a section that analyzes economic performance of the groundfish fisheries using indices. These indices are created for different sectors of the North Pacific, and relate changes in value, price, and quantity across species, product and gear types to aggregate changes in the market.

The data behind the tables from this and past Economic SAFE reports are available online at

http://www.afsc.noaa.gov/refm/Socioeconomics/SAFE/default.php

Decomposition of the change in first-wholesale revenues from 2013-14 in the BSAI

The following brief analysis summarizes the overall changes that occurred between 2013-14 in the quantity produced and revenue generated from BSAI groundfish. According to data reported in the 2015 Economic SAFE report, the ex-vessel value of BSAI groundfish increased from $689.4 million in 2013 to $726.3 million in 2014 (Figure 3), and first-wholesale revenues from the processing and production of groundfish in the BSAI fell from $1851.3 million in 2013 to $1,957.8 million in 2014, an increase of 5.6% (Figure 4).

The total quantity of groundfish products from the BSAI increased from 818.2 thousand metric tons in 2013 to 843.7 thousand metric tons in 2014, a difference of 25.5 thousand metric tons. These changes in the BSAI account for part of the change in first-wholesale revenues from Alaska groundfish fisheries overall which increased by $165.1 million, a relative difference of 7.6% in 2014 compared to 2013 levels.

By species group, a positive quantity effect of $79.8 million for pollock, and positive price effect of $47.3 million for cod, were the largest changes in first-wholesale revenues from the BSAI for 2013-14 (Figure 5). A negative quantity effect for pollock of $20.8 million partially offset the positive quantity effect for a net effect of $59.0 which was the largest change in first-wholesale revenues in the BSAI area. Other notable changes in the BSAI were negative price and quantity effects for flatfish that produced a negative net effect of $30.4 million, and positive price and quantity effects for Atka mackerel which implied a positive net effect of $23.9 million. By product group, positive quantity effects were distributed among surimi, whole head & gut and roe which were complemented by positive price effects for surimi and whole head & gut products. In contrast, fillets experienced a negative price effect of $29.3 million in the BSAI first-wholesale revenue decomposition for 2013-14.

In summary, first-wholesale revenues from the BSAI groundfish fisheries increased by $106.5 million from 2013-14. Major drivers were a positive quantity effect for pollock and a positive price effect for cod. In comparison, first-wholesale revenues increased by $58.6 million from 2013-14 in the GOA, due primarily to positive quantity effects for pollock, cod, and flatfish.

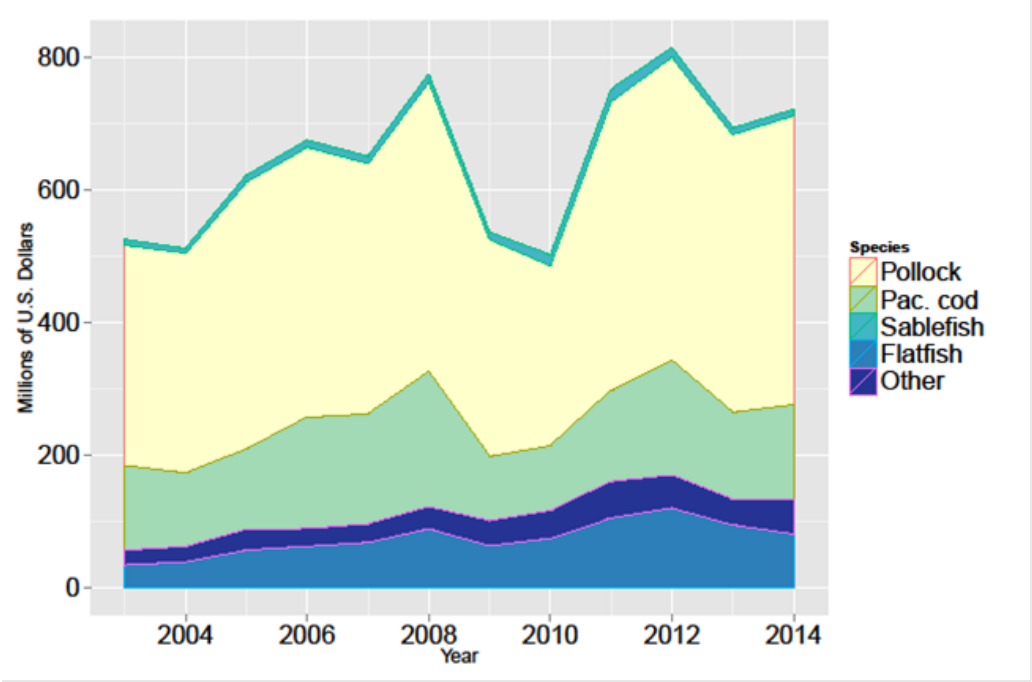

Figure 3. Real ex-vessel value of the groundfish catch in the domestic commercial fisheries in the BSAI area by species, 2003-2014 (base year = 2014).

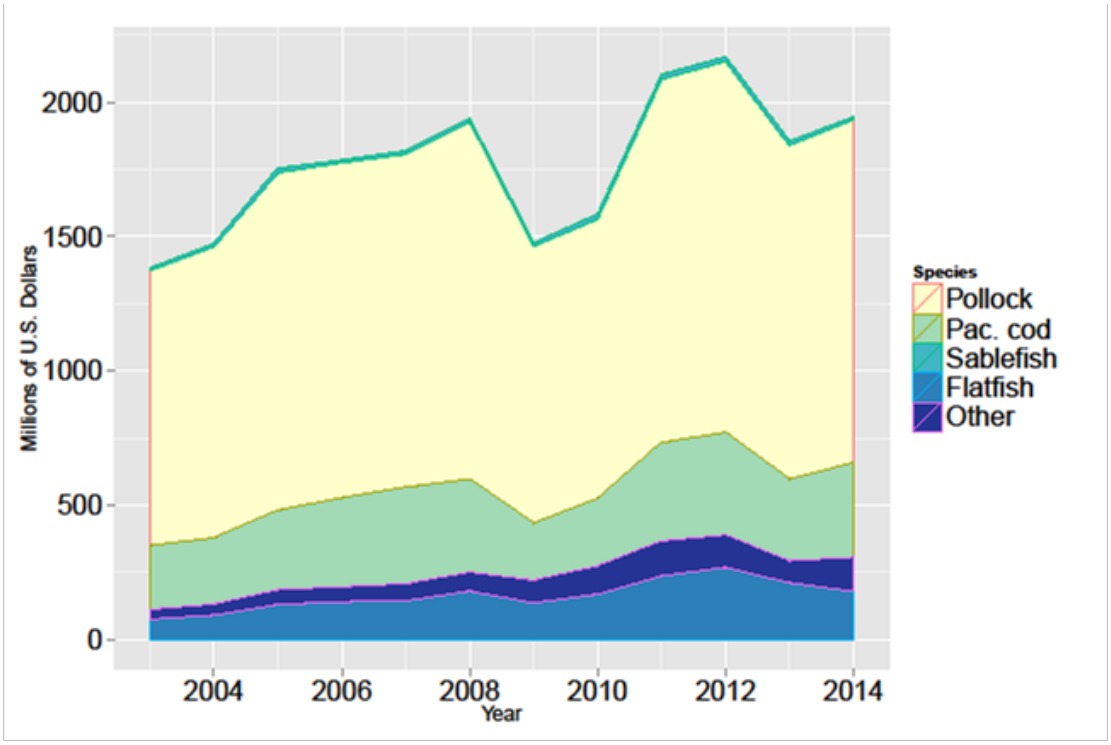

Figure 4. Real gross product value of the groundfish catch in the BSAI area by species, 2003-2014 (base year = 2014).

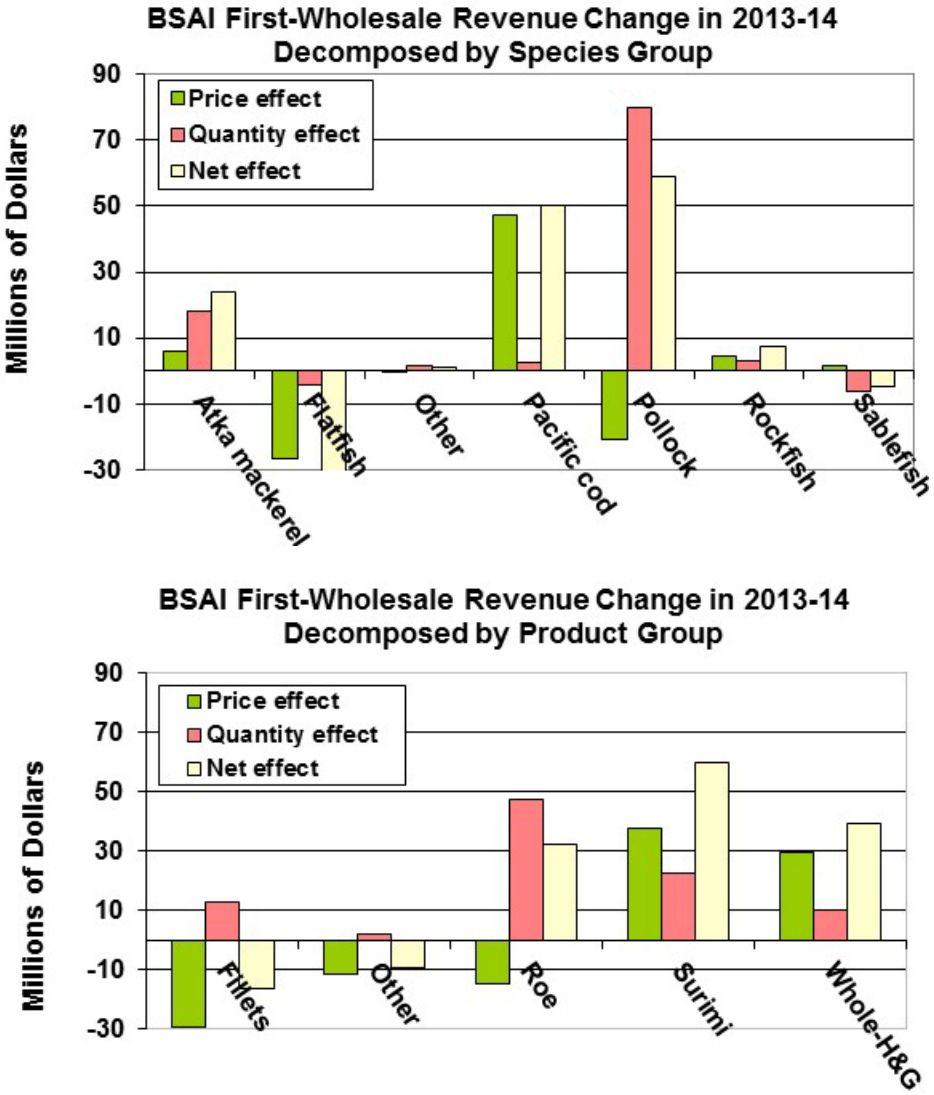

Figure 5. Decomposition of the change in first-wholesale revenues from 2013-14 in the BSAI area. The first decomposition is by the species groups used in the Economic SAFE report, and the second decomposition is by product group. The price effect refers to the change in revenues due to the change in the first-wholesale price index (current dollars per metric ton) for each group. The quantity effect refers to the change in revenues due to the change in production (in metric tons) for each group. The net effect is the sum of price and quantity effects. Year to year changes in the total quantity of first-wholesale groundfish products include changes in total catch and the mix of product types (e.g., fillet vs. surimi).

Stock Status Summaries

Except as otherwise noted, the Team's recommended ABCs are set at the maximum permissible levels under their respective tiers.

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 age grouping is 3+ for eastern Bering Sea, 2+ for the Aleutian Islands and the survey biomass for Bogoslof, as reported in the respective assessments. The OFL and ABC for 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Biomass	OFL	ABC	TAC	Catch
Eastern Bering Sea	2014	8,045,000	2,795,000	1,369,000	1,267,000	1,297,411
	2015	9,203,000	3,330,000	1,637,000	1,310,000	1,318,833
	2016	11,300,000	3,910,000	2,090,000	n/a	n/a
	2017	11,000,000	3,540,000	2,019,000	n/a	n/a
Aleutian Islands	2014	259,525	42,811	35,048	19,000	2,375
	2015	228,102	36,005	29,659	19,000	916
	2016	241,929	39,075	32,227	n/a	n/a
	2017	264,781	44,455	36,664	n/a	n/a
Bogoslof	2014	67,063	13,413	10,059	75	427
	2015	106,000	21,200	15,900	100	733
	2016	106,000	31,906	23,850	n/a	n/a
	2017	106,000	31,906	23,850	n/a	n/a

*In 2014, NMFS reallocated 13,650 t of pollock TAC from the Aleutian Islands to the Bering Sea, which increased the Bering Sea TAC to 1,280,650 t and decreased the Aleutian Islands TAC to 5,350 t. In 2015, NMFS reallocated 14,454 t of pollock TAC from the Aleutian Islands to the Bering Sea, which increased the Bering Sea TAC to 1,324,454 t and decreased the Aleutian Islands TAC to 4,546 t.

Eastern Bering Sea pollock

Changes from previous assessment

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

- A "corrected index" (formerly known as the Kotwicki index) for the summer bottom trawl survey (BTS) biomass and abundance at age time series (1982-2015) was included for the first time, after having been tested for several years
- 2014 and 2015 acoustic vessels-of-opportunity (AVO) data
- Age compositions from the 2014 NMFS summer acoustic-trawl survey (ATS) were updated
- Catch at age and average weight at age from the 2014 fishery
- Updated total catch, including a preliminary estimate for 2015

The only methodological change was the use of a new random effects model for projecting future weight at age.

Spawning biomass and stock trends

Spawning biomass in 2008 was at the lowest level since 1980, but has increased by 114% since then, with a 3% decrease projected for next year. The 2008 low was the result of extremely poor recruitments from the 2002-2005 year classes. Recent and projected increases are fueled by recruitment from the very strong 2008 year class and the above average 2012 year class, along with reductions in average fishing mortality (ages 3-8) from 2009-2010 and 2013-2015. Spawning biomass is projected to be 78% above B_{MSY} in 2016.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The SSC has determined that EBS pollock qualifies for management under Tier 1 because there are reliable estimates of B_{MSY} and the probability density function for F_{MSY}. The Team concurred with the SSC's conclusion that the Tier 1 reference points continue to be reliably estimated. The updated estimate of B_{MSY} from the present assessment is 1.984 million t, up 2% from last year's estimate of 1.948 million t. Projected spawning biomass for 2016 is 3.540 million t, placing EBS walleye pollock in sub-tier "a" 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 0.401, down 22% from last year's value of 0.512. The harvest ratio of 0.401 is multiplied by the geometric mean of the projected fishable biomass for 2016 (7.610 million t) to obtain the maximum permissible ABC for 2016, which is 3.050 million t, up 5% and almost identical to the maximum permissible ABCs for 2015 and 2016 projected in last year's assessment, respectively. However, as with other recent EBS pollock assessments, the authors recommend setting ABCs well below the maximum permissible levels. They list two reasons for doing so in the SAFE chapter, based on this year's experience with an ABC well below the maximum permissible level:

- The fleet was able to operate with reasonably good catch rates
- The fleet was able to maintain salmon bycatch at relatively low levels

During the period 2010-2013, the Team and SSC based ABC recommendations on the most recent 5-year average fishing mortality rate. Last year, the Team and SSC felt that stock conditions had improved sufficiently that an increase in the ABC harvest rate was appropriate. Specifically, the Team and SSC recommended basing the 2015 and 2016 ABCs on the harvest rate associated with Tier 3, the stock's Tier 1 classification notwithstanding. The Team recommends the same approach for setting the 2016 and 2017 ABCs, giving values of 2.090 million t and 2.019 million t, respectively.

The OFL harvest ratio under Tier 1a is 0.514, the arithmetic mean of the ratio between MSY and the equilibrium fishable biomass corresponding to MSY. The product of this ratio and the geometric mean of the projected fishable biomass for 2016 determines the OFL for 2016, which is 3.910 million t. The current projection for OFL in 2017 given a projected 2016 catch of 1.350 million t is 3.540 million t.

Status determination

The walleye pollock stock in the EBS is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

Aleutian Islands pollock

Changes from previous assessment

The new data in the model consist of updated catch information. There were no changes to the assessment model.

Spawning biomass and stock trends

This year's assessment estimates that spawning biomass reached a minimum level of about $B_{29\%}$ in 1999 and then has generally increased, with a projected value of $B_{36\%}$ for 2016. The increase in spawning biomass since 1999 has resulted more from a dramatic decrease in harvest than from good recruitment, as there have been no above-average year classes spawned since 1989. Spawning biomass for 2016 is projected to be 74,377 t.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The SSC has determined that this stock qualifies for management under Tier 3. The Team concurred and supported continued use of last year's model for evaluating stock status and recommending ABC. The model estimates $B_{40\%}$ at a value of 82,785 t, placing the AI pollock stock in sub-tier "b" of Tier 3. The

model estimates the values of $F_{35\%}$ as 0.40 and $F_{40\%}$ as 0.32. Under Tier 3b, with the adjusted value of $F_{40\%}$=0.27, the maximum permissible ABC is 32,227 t for 2016. The Team recommends setting the 2016 ABC at this level. Following the Tier 3b formula with the adjusted value of $F_{35\%}$=0.34, OFL for 2016 is 39,075 t. If the 2015 catch is 1,500 t and 1,188 for 2016 (i.e., equal to the five year average for 2010-2014), the 2017 maximum permissible ABC would be 36,664 t and the 2017 OFL would be 44,455 t. The Team recommends setting 2017 the ABC and OFL at these levels.

Status determination

The walleye pollock stock in the Aleutian Islands is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

Bogoslof pollock

Changes from previous assessment

Estimated catches for 2014 and 2015 were updated and 2014 survey age data were completed and included. The only change in assessment methodology was to accept the estimate of natural mortality from the age-structured assessment that was introduced in 2014. The new estimate is 0.3, up from the estimate of 0.2 used previously.

Spawning biomass and stock trends

Survey biomass estimates since 2000 have all been lower than estimates prior to 2000, ranging from a low of 67,063 t in 2012 to a high of 301,000 t in 2000. The estimate of current biomass from the random effects model is 106,000 t.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The SSC has determined that this stock qualifies for management under Tier 5. The maximum permissible ABC value for 2016 would be 23,850 t (assuming M = 0.3 and F_{ABC} = 0.75 x M = 0.225): ABC = B_{2014} x M x 0.75 = 106,000 x 0.3 x 0.75 = 23,850 t. The projected ABC for 2017 is the same.

Following the Tier 5 formula with M=0.301, OFL for 2016 is 31,906 t. The OFL for 2017 is the same.

The walleye pollock stock in the Bogoslof district is not being subjected to overfishing. It is not possible to determine whether this stock is overfished or whether it is approaching an overfished condition because it is managed under Tier 5.

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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 0+ biomass	OFL	ABC	TAC*	Catch
Eastern Bering Sea	2014	1,570,000	299,000	255,000	246,897	230,715
	2015	1,680,000	346,000	255,000	240,000	202,626
	2016	1,830,000	390,000	255,000	n/a	n/a
	2017	1,780,000	412,000	255,000	n/a	n/a
Aleutian Islands	2014	59,000**	20,100	15,100	6,997	6,145
	2015	68,900**	23,400	17,600	9,422	9,060
	2016	68,900**	23,400	17,600	n/a	n/a
	2017	68,900**	23,400	17,600	n/a	n/a

*In 2014 and 2015, the Council set the Federal TAC to account for the State of Alaska Aleutian Islands Guideline Harvest Level (GHL) fishery and the Bering Sea GHL fishery each of which is set equal to 3 percent of the BSAI ABC for a total of 6 percent of the BSAI ABC. Catch includes only that which accrues to the Federal TAC.

** Biomass shown for AI cod is survey biomass (Tier 5) not Age 0+ biomass.

Eastern Bering Sea Pacific cod

Changes from previous assessment

All survey and commercial data series on CPUE, catch at age, and catch at length were updated. There were no changes in the assessment model; the 2016 specifications were based on the same model used in 2011-2014. Last year the Team expressed serious reservations about this model's poor retrospective performance and continued reliance on a fixed value of survey catchability that is no longer very credible. The Team requested a different model for this year, and the author presented a version that has been in development for a few years, but he judged it not yet ready for use. It produces OFL/ABC estimates much lower than the present model. The EBS assessment will receive a CIE review in February 2016, and the Team looks forward to seeing an improved model next year.

Spawning biomass and stock trends

Survey biomass in 2015 was about the same as in 2014: just above a million tons, which is at the upper end of the range of values observed since 1977. As estimated in the present model, spawning biomass is well above $B_{40\%}$ and increasing briskly, driven by a number of strong year-classes beginning in 2006. This increasing trend can be counted on despite any weaknesses in the present assessment model because the relative year-class strengths are well determined even if the scale is not. That is, even if the recommended ABC is somewhat high, spawning biomass will be higher next year than it is this year.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

This stock is assigned to Tier 3a. The maximum 2016 ABC in this tier as calculated using the present model fit is 332,000 t, but the author and Team recommend that ABC be held at the 2014 level of 255,000 t, as it was last year, to compensate for the poor retrospective behavior of the present model and continuing concerns about the fixed survey catchability. The Team recommends the same value for the preliminary 2017 ABC. The corresponding OFLs (from the model) are 390,000 t and 412,000 t.

Status determination

EBS Pacific cod is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

Aleutian Islands Pacific cod

Changes from previous assessment

This stock has been assessed separately from Eastern Bering Sea cod since 2013, and managed separately since 2014. Both age-structured (Tier 3) and survey-based (Tier 5) assessments have been considered, but to date it has not been possible to obtain a usable fit from any of the age-structured models that have been attempted. This year's assessment is the same Tier 5 method used since the 2013 assessment: a simple random effects model of the trawl survey biomass trajectory. The Aleutians cod assessment will receive a CIE review in February 2016.

Spawning biomass and stock trends

After declining by more than half between 1991 and 2002, survey biomass has since stayed in the range of 50-100 kilotons. The last Aleutians survey was in 2014.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The author and Team recommend using the Tier 5 assessment again for 2016: ABC=17,600 t, OFL=23,400 t. These are the same as last year because there was no Aleutian Islands trawl survey in 2015.

Status determination

This stock is not being subjected to overfishing.

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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 4+ Biomass	OFL	ABC	TAC	Catch
Being Sea	2014	21,000	1,584	1,339	1,339	312
	2015	34,000	1,574	1,333	1,333	197
	2016	25,000	1,304	1,151	n/a	n/a
	2017	26,000	1,241	1,052	n/a	n/a
Aleutian Islands	2014	28,000	2,141	1,811	1,811	817
	2015	24,000	2,128	1,802	1,802	372
	2016	23,000	1,766	1,557	n/a	n/a
	2017	23,000	1,681	1,423	n/a	n/a

Changes from previous assessment

The assessment model incorporates the following new data into the model:

- relative abundance and length data from the 2015 longline survey
- relative abundance and length data from the 2014 longline fisheries
- length data from the 2014 trawl fisheries
- age data from the 2014 longline survey and 2014 fixed gear fishery
- the 2015 Gulf of Alaska trawl survey abundance and length compositions
- updated catch for 2014 and projected 2015-2017 catches.

There were no model changes.

Spawning biomass and stock trends

The longline survey abundance index decreased 21% from 2014 to 2015 following a 15% increase from 2013 to 2014 and is at the lowest point of the time series. The fishery abundance index increased 6% from 2013 to 2014 (the 2015 data are not available yet). The Gulf of Alaska trawl survey index was at its lowest point in 2013 but increased 12% in 2015. Spawning biomass is projected to decrease from 2016 to 2019, and then stabilize.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

Sablefish are managed under Tier 3 of NPFMC harvest rules. Reference points are calculated using recruitments from 1977-2012. The updated point estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ from this assessment are 102,807 t (combined across the EBS, AI, and GOA), 0.094, and 0.112, respectively. Projected female spawning biomass (combined areas) for 2016 is 86,471 t (84% of $B_{40\%}$), placing sablefish in sub-tier "b" of Tier 3. The maximum permissible value of F_{ABC} under Tier 3b is 0.078, which translates into a 2016 ABC (combined areas) of 11,795 t. The OFL fishing mortality rate is 0.093 which translates into a 2016 OFL (combined areas) of 13,397 t. If the stock were in Tier 3a (above the $B_{40\%}$ reference point), the 2016 ABC would be 14,164 t.

Area apportionment

Apportionments have been held constant since the 2013 fishery. The Teams recommend retaining these apportionments for another year while alternative strategies undergo evaluation.

Status determination

Sablefish is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 6+ Biomass	OFL	ABC	TAC	Catch
BSAI	2014	2,113,000	259,700	239,800	184,000	156,774
	2015	2,127,800	266,400	248,800	149,000	122,363
	2016	2,170,000	228,100	211,700	n/a	n/a
	2017	2,086,200	219,200	203,500	n/a	n/a

In 2015, the Flatfish Flexibility Exchange Program increased the TAC from 149,000 t to 157,448 t

Changes from previous assessment

Changes to the input data include:

- 2014 fishery age composition
- 2014 survey age composition
- 2015 trawl survey biomass point estimate and standard error
- Estimate of the discarded and retained portions of the 2014 catch
- New maturity schedule (average of 1991 and 2012 estimates)
- Estimate of total catch made through the end of 2015. Catch of 150,000 t assumed for 2016 and 2017 projection

Changes to the assessment methodology: Weights at ages from 11 to 20 were smoothed.

Spawning biomass and stock trends

The projected female spawning biomass estimate for 2016 is 702,200 t, which is a 9% increase from last year's 2015 estimate (644,200 t). Although there was an increase in projected spawning biomass for 2016, the overall trend continues to be a general decline that has prevailed since 1994. The total stock biomass was relatively stable through the early 2000s, but had been steadily approaching $B_{40\%}$ since 2007 (currently 11% above $B_{40\%}$).

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. The estimate of B_{MSY} from the present assessment is 435,000 t, and projected spawning biomass for 2016 is 702,200 t, meaning that yellowfin sole qualify for management under Tier 1a. Corresponding to the approach used in recent years, the 1978-2006 stock-recruitment data were used this year to determine the Tier 1 harvest recommendation. This provided a maximum permissible ABC harvest ratio (the harmonic mean of the F_{MSY} harvest ratio) of 0.098. The current value of the OFL harvest ratio (the arithmetic mean of the F_{MSY} ratio) is 0.105. The product of the maximum permissible ABC harvest ratio and the geometric mean of the 2016 biomass estimate produced the 2016 ABC of 211,700 t recommended by the author and Team, and the corresponding product using the OFL harvest ratio produces the 2016 OFL of 228,100 t. For 2017, the corresponding quantities are 203,500 t and 219,200 t, respectively.

Status determination

Yellowfin sole is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

Ecosystem considerations

Currently there are few ecosystem level concerns for Yellowfin sole. There is little information on food availability and predator impacts on the stock. While there is evidence that halibut and pacific cod are potential predators (based on gut contents), their distributions do not completely overlap. However, halibut bycatch mortality occurs in the directed fishery and may need further evaluation.

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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 1+ Biomass	OFL	ABC	TAC	Catch
BSAI	2014	84,546	2,647	2,124	2,124	1,656
	2015	122,298	3,903	3,172	2,648	2,199
	2016	114,438	4,194	3,462	n/a	n/a
	2017	123,494	7,416	6,132	n/a	n/a
Eastern Bering Sea	2014	n/a	n/a	1,659	1,659	1,479
	2015	n/a	n/a	2,448	2,448	2,086
	2016	n/a	n/a	2,673	n/a	n/a
	2017	n/a	n/a	4,734	n/a	n/a
Aleutian Islands	2014	n/a	n/a	465	465	177
	2015	n/a	n/a	724	200	113
	2016	n/a	n/a	789	n/a	n/a
	2017	n/a	n/a	1,398	n/a	n/a

Changes from previous assessment

This year's Greenland turbot assessment models included:

- Updated 2014 and projected 2015 catch data
- 2015 EBS shelf survey biomass
- 2015 ABL longline survey RPN
- 2015 EBS shelf survey and ABL longline length composition estimates
- 2013 and 2014 EBS shelf survey age composition and size at age data
- Updated fishery catch-at-length data for 2015

Changes to the assessment methodology:

Analyses of new data (namely size and age composition data for 2013 – 2015) made available in September 2015 revealed a data conflict with the NMFS EBS Shelf and Slope trawl surveys necessitating unexpected model configuration changes to resolve what are clear structural misspecifications. The assessment included three new models, in addition to last year's accepted model (Model 14.0):

Model 14.1. Used refined sample size estimates for the slope survey composition data and re-weighted other data. The shelf survey size composition data and size at age data were used but the age composition data were not.

Model 15.1. Same configuration as Model 14.1 except the selectivity for the fixed gear fishery was changed from logistic to the "double normal" to account for a perceived change in fishing behavior in 2008; also the 2006 and 2007 trawl fishery size composition data were excluded due to very small sample sizes.

Model 15.3. Same configuration and data as Model 15.1 except the fisheries and shelf and slope survey selectivities were allowed to vary using a penalized random walk process.

The authors and Team recommend use of Model 15.1 for harvest specification purposes.

Spawning biomass and stock trends

The projected 2016 female spawning biomass is 31,028 t, which is a 0.6% increase from last year's 2015 estimate of 30,853 t. Female spawning biomass is projected to increase to 41,015 t in 2017. While spawning biomass continues to be near historic lows (currently at $B_{18\%}$), increases have been estimated or

are projected for the years following 2013, and large 2008 and 2009 year classes are being observed in both the survey and fishery size composition data. These year classes are both estimated to be stronger than any other year class spawned since the 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 qualifies for management under Tier 3. Updated point estimates of $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$ from the present assessment are 50,577 t, 0.139, and 0.169, respectively. The stock remains in Tier 3b. The maximum permissible value of F_{ABC} under this tier translates into a maximum permissible ABC of 3,462 t for 2016 and 6,132 t for 2017, and an OFL of 4,194 t for 2016 and 7,416 t for 2016. These are the authors' and Team's ABC and OFL recommendations.

Area apportionment

As in previous assessments, apportionment recommendations are based on unweighted averages of EBS slope and AI survey biomass estimates from the four most recent years in which both areas were surveyed. The authors' and Team's recommended 2016 and 2017 ABCs in the EBS are 2,673 t and 4,734 t, respectively. The authors' and Team's recommended 2015 and 2016 ABCs in the AI are 789 t and 1,398 t, respectively. Area apportionment of OFL is not recommended.

Status determination

Greenland turbot is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 1+ Bio	OFL	ABC	TAC	Catch
BSAI	2014	1,036,960	125,642	106,599	25,000	19,109
	2015	908,379	93,856	80,547	22,000	11,005
	2016	910,012	94,035	80,701	n/a	n/a
	2017	920,920	84,156	72,216	n/a	n/a

Changes from previous assessment

Because this is an "off-year" for the BSAI ATF, new survey information is not incorporated into the assessment model for this update. Instead, a projection model is run with updated catch information. This projection model run incorporates the most recent catch information and provides estimates of 2016 and 2017 ABC and OFL without re-estimating the stock assessment model parameters and biological reference points. The projection model is based on last year's assessment model results.

The following new data were included in the projection model:

- Final 2014 catch and estimates of 2015 - 2017 catch

Spawning biomass and stock trends

The projected age 1+ total biomass for 2016 is 910,012 t, a slight decrease from the value of 911,652 t projected for 2016 in last year's assessment. The projected female spawning biomass for 2016 is 535,350 t which is an increase from last year's 2016 estimate of 528,020 t.

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. Arrowtooth flounder therefore qualifies for management under Tier 3. The point estimates of $B_{40\%}$ and $F_{40\%}$ from last year's assessment were 222,019 t and 0.153, and are carried over for this year. The projected 2016 spawning biomass is far above $B_{40\%}$, so ABC and OFL recommendations for 2016 were calculated under sub-tier "a" of Tier 3. The authors and Team recommend setting F_{ABC} at the $F_{40\%}$ level, which is the maximum permissible level under Tier 3a, resulting in 2016 and 2017 ABCs of 80,701 t and 72,216 t, respectively, and 2016 and 2017 OFLs of 94,035 t and 84,156 t.

Status determination

Arrowtooth flounder is a largely unexploited stock in the BSAI. Arrowtooth flounder is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

Ecosystem Considerations

In contrast to the Gulf of Alaska, arrowtooth flounder is not at the top of the food chain on the EBS shelf. Arrowtooth flounder in the EBS is an occasional prey in the diets of groundfish, being eaten by Pacific cod, walleye pollock, Alaska skates, and sleeper sharks. However, given the large biomass of most of the predator species in the EBS, these occasionally recorded events translate into considerable total mortality for the arrowtooth flounder population in the EBS ecosystem.

7. Kamchatka flounder

Status and catch specifications (t) of Kamchatka 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015

Area	Year	Age 1+ Bio	OFL	ABC	TAC	Catch
BSAI	2014	136,600	8,270	7,100	7,100	6,459
	2015	174,500	10,500	9,000	6,500	4,961
	2016	182,300	11,100	9,500	n/a	n/a
	2017	189,100	11,700	10,000	n/a	n/a

Changes from previous assessment

Because this is an off year for Kamchatka flounder the stock assessment model was not run for this update. New input data for the projection model included updating the 2015 catch and estimating the 2016 catch. The 2015 catch was 4,858 t as of mid- October. For the estimation of 2016 catch, the average of the 2014 and 2015 catches (5,658 t) was used.

Spawning biomass and stock trends

Kamchatka flounder has a widespread distribution along the deeper waters of the BSAI region. Spawning biomass increased continuously, at an average rate of about 5% per year, from the start of the model time series in 1991 to a peak of 62,963 t in 2009. Spawning biomasses from 2006 through 2014 have all been within 10% of the peak value. The 2000-2002, 2008-2010, and 2012 year classes are all estimated to be well above average, with the 2002, 2008, and 2010 year classes estimated to be at least twice average. Projected 2016 female spawning biomass is estimated at 61,700 t, above the $B_{40\%}$ level of 53,000 t, and is projected to remain above $B_{40\%}$.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

This stock was managed under Tier 3 for the first time in 2014. As noted above, projected spawning biomass for 2016 is above $B_{40\%}$, placing Kamchatka flounder in sub-tier "a" of Tier 3. For the 2016

fishery, the authors and Team recommend setting 2016 ABC at the maximum permissible value of 9,500 t from the projection model. This value is an increase of 500 t over the 2015 ABC (9,000 t). The 2016 OFL from the projection model is 11,100 t, up from 10,500 t for 2015.

Status Determination

Kamchatka flounder is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

8. Northern rock sole

Status and catch specifications (t) of northern 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 6+ Biomass	OFL	ABC	TAC	Catch
BSAI	2014	1,393,200	228,700	203,800	85,000	51,728
	2015	1,233,400	187,600	181,700	69,250	45,350
	2016	1,085,200	165,900	161,100	n/a	n/a
	2017	977,200	149,400	145,000	n/a	n/a

In 2015, the Flatfish Flexibility Exchange Program increased the TAC from 69,250 t to 67,265 t

Changes from previous assessment

The last full assessment was in November 2014, therefore changes to input data in this analysis include:

- Estimates of catch (t) and discards for 2014-2015
- 2014 fishery age composition
- 2014 survey age composition
- 2015 trawl survey biomass point estimates and standard errors

The chapter contains summaries for two assessment models. The Team recommends retaining Model 1, which is the model that has been used for the last several years.

Spawning biomass and stock trends

Spawning biomass increased almost continuously from the beginning of the model time series in 1975 to a peak in 2001. Spawning biomass then declined through 2009, but has increased continuously since then. The 1996-2001 year classes are all estimated to be above average, with the 1998 year class estimated to be at least twice average. The stock assessment model projects a 2016 spawning biomass of 584,400 t. This was slightly less than the 2016 value projected in last year's assessment. The projected spawning biomass for 2017 is 522,600 t.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The SSC has determined that northern rock sole qualifies for management under Tier 1. Spawning biomass for 2016 is projected to be well above the B_{MSY} estimate of 265,000, placing northern rock sole in sub-tier "a" of Tier 1. The Tier 1 2016 ABC harvest recommendation is 161,100 t (F_{ABC} = 0.148) and the 2016 OFL is 165,900 t (F_{OFL} = 0.153). The 2017 ABC and OFL values are 145,000 t and 149,400 t, respectively. Recommended ABCs correspond to the maximum permissible levels.

This is a stable fishery that lightly exploits the stock because it is constrained by PSC limits and the BSAI optimum yield cap. Usually the average catch/biomass ratio is about 3.5 percent of the northern rock sole stock.

Status determination

Northern rock sole is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

9. 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 3+ Biomass	OFL	ABC	TAC	Catch
BSAI	2014	745,237	79,633	66,293	24,500	16,514
	2015	736,947	79,419	66,130	24,250	10,955
	2016	737,777	79,562	66,250	n/a	n/a
	2017	747,389	77,544	64,580	n/a	n/a

In 2015, the Flatfish Flexibility Exchange Program increased the TAC from 24,250 t to 17,787 t

Changes from previous assessment

This assessment was changed to a bi-annual cycle beginning with the 2013 assessment; this is an off-cycle year and only a projection model was run. Changes to the input data in this analysis include:

- Updated 2014 fishery catch
- Estimated 2015 and 2016 fishery catch

Spawning biomass and stock trends

Age 3+ biomass is projected to increase through 2017, although spawning biomass is projected to decline. The 2015 survey biomass estimate was 25% below the 2014 estimate (22% below 2013 estimate).

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 flathead sole for management under Tier 3. The current values of these reference points are $B_{40\%}$=127,682 t, $F_{40\%}$=0.28, and $F_{35\%}$=0.35. Because projected spawning biomass for 2016 (240,427 t) is above $B_{40\%}$, flathead sole is in sub-tier "a" of Tier 3. The authors and Team recommend setting ABCs for 2016 and 2017 at the maximum permissible values under Tier 3a, which are 66,250 t and 64,580 t, respectively. The 2016 and 2017 OFLs under Tier 3a are 79,562 t and 77,544 t, respectively.

Status determination

Flathead sole is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

10. 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 3 + Bio	OFL	ABC	TAC	Catch
BSAI	2014	576,300	66,800	55,100	24,500	19,449
	2015	471,500	54,000	44,900	18,500	14,269
	2016	468,100	49,000	41,000	n/a	n/a
	2017	465,400	46,800	39,100	n/a	n/a

Changes from previous assessment

This assessment was changed to a bienniall cycle beginning with the 2013 assessment; this is an off-cycle year and only a projection model was run. Changes to the input data in this analysis include:

- Updated 2014 fishery catch
- Estimated 2015 and 2016 fishery catch

Spawning biomass and stock trends

Last year's assessment indicated that above average recruitment strength in 1998 and exceptionally strong recruitment in 2001 and 2002 have contributed to recent highs level of female spawning biomass. The spawning stock biomass is projected to decline as these year classes exit the population.

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 3. The current estimates are $B_{40\%}$ = 138,100 t, $F_{40\%}$ = 0.143, and $F_{35\%}$ = 0.175. Given that the projected 2016 spawning biomass of 204,600 t exceeds $B_{40\%}$, the ABC and OFL recommendations for 2016 were calculated under sub-tier "a" of Tier 3. Projected harvesting at the $F_{40\%}$ level gives a 2016 ABC of 41,000 t and a 2017 ABC of 39,100 t. The recommended Tier 3a OFLs are 49,000 t and 46,800 t for 2016 and 2017.

Status determination

Alaska plaice is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

11. 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Total Bio.	OFL	ABC	TAC	Catch
BSAI	2014	107,500	16,700	12,400	2,650	4,391
	2015	143,000	17,700	13,250	3,620	2,394
	2016	112,104	17,414	13,061	n/a	n/a
	2017	112,104	17,414	13,061	n/a	n/a

In 2014, the other flatfish TAC increased to 4,500 t after a reallocation of 1,850 t from the non-specified reserves.

Changes from previous assessment

The assessment incorporates 2015 total and discarded catch and 2015 EBS shelf trawl survey biomass.

Spawning biomass and stock trends

EBS shelf survey biomass estimates for this complex were all below 100,000 t from 1983-2003, and reached a high of 150,480 t in 2006. The EBS survey estimate for 2015 was 102,300 t, well below that of last year. Starry flounder, rex sole, and butter sole comprise the majority of the fishery catch with a negligible amount of other species caught in recent years. Starry flounder continues to dominate the shelf survey biomass in the EBS.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The SSC has classified "other flatfish" as a Tier 5 species complex with harvest recommendations calculated from estimates of biomass and natural mortality. Natural mortality rates for rex (0.17) and Dover sole (0.085) borrowed from the Gulf of Alaska are used, along with a value of 0.15 for all other species in the complex. Projected harvesting at the 0.75 *M* level (average F_{ABC} = 0.117) gives a 2015 ABC of 13,061 t for the "other flatfish" complex. The corresponding 2015 OFL (average F_{OFL} = 0.155) is 17,414 t.

Status determination

This assemblage is not being subjected to overfishing. It is not possible to determine whether this assemblage is overfished or whether it is approaching an overfished condition because it is managed under Tier 5.

12. Pacific ocean perch

Status and catch specifications (t) of Pacific ocean perch 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 2016 and 2017 are those recommended by the Team. Catch data are current through November 7, 2015.

Area	Year	Age 3+ Bio	OFL	ABC	TAC	Catch
BSAI	2014	639,505	39,585	33,122	33,122	32,383
	2015	577,967	42,558	34,988	32,021	30,034
	2016	557,886	40,529	33,320	n/a	n/a
	2017	542,162	35,589	31,724	n/a	n/a
Eastern Bering Sea	2014	n/a	n/a	7,684	7,684	7,437
	2015	n/a	n/a	8,771	8,021	6,588
	2016	n/a	n/a	8,353	n/a	n/a
	2017	n/a	n/a	7,953	n/a	n/a
Eastern Aleutian Islands	2014	n/a	n/a	9,246	9,246	9,024
	2015	n/a	n/a	8,312	8,000	7,861
	2016	n/a	n/a	7,916	n/a	n/a
	2017	n/a	n/a	7,537	n/a	n/a
Central Aleutian Islands	2014	n/a	n/a	6,594	6,594	6,439
	2015	n/a	n/a	7,723	7,000	6,777
	2016	n/a	n/a	7,355	n/a	n/a
	2017	n/a	n/a	7,002	n/a	n/a
Western Aleutian Islands	2014	n/a	n/a	9,598	9,598	9,485
	2015	n/a	n/a	10,182	9,000	8,808
	2016	n/a	n/a	9,696	n/a	n/a
	2017	n/a	n/a	9,232	n/a	n/a

Changes from previous assessment

This chapter was presented in executive summary format, as a scheduled "off-year" assessment. Therefore, only the projection model was run, with updated catches. New data in the 2015 assessment included updated 2014 catch and estimated 2015 and 2016 catches. No changes were made to the assessment model.

Spawning biomass and stock trends

The survey biomass estimates in the Aleutian Islands were high in 2014. New projections were very similar to last year's projections because observed catches were very similar to the estimated catches used last year. Spawning biomass is projected to be 222,369 t in 2016 and to decline to 211,339 t in 2017.

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 169,203 t, 0.089, and 0.109, respectively. Spawning biomass for 2016 (222,369 t) is projected to exceed $B_{40\%}$, thereby placing POP in sub-tier "a" of Tier 3. The 2016 and 2017 catches associated with the $F_{40\%}$ level of 0.089 are 33,320 t and 31,724 t, respectively, and are the authors' and Team's recommended ABCs. The 2016 and 2017 OFLs are 40,529 t and 38,589 t.

Area apportionment

The Team agreed with the author's recommendation that ABCs be set regionally based on the proportions in combined survey biomass as follows (values are for 2016): EBS = 8,353 t, Eastern Aleutians (Area 541) = 7,916 t, Central Aleutians (Area 542) = 7,355 t, and Western Aleutians (Area 543) = 9,696 t. The recommended OFL for 2016 and 2017 is not regionally apportioned.

Status determination

Pacific ocean perch is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

13. Northern rockfish

Status and catch specifications (t) of northern rockfish 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 3+ Biomass	OFL	ABC	TAC	Catch
BSAI	2014	197,541	12,077	9,761	2,594	2,342
	2015	218,901	15,337	12,488	3,250	7,230
	2016	213,674	14,689	11,960	n/a	n/a
	2017	209,369	14,085	11,468	n/a	n/a

In 2015, the northern rockfish TAC increased to 6,263 t after a reallocation of 3,013 t from the non-specified reserves.

Changes from previous assessment

This chapter was presented in executive summary format, as a scheduled "off-year" assessment. Therefore, only the projection model was run, with updated catches. New data in the 2015 assessment included updated 2014 catch and estimated 2015 and 2016 catches. No changes were made to the assessment model.

Spawning biomass and stock trends

The 1980s cooperative surveys in the Aleutian Islands had low biomass estimates relative to the remainder of the time series, and removal of these data in last year's assessment increased the estimated population size. Spawning biomass has been increasing slowly and almost continuously since 1977 until recent years, when it appears to be leveling off. Female spawning biomass is projected to be 91,648 t and 88,326 t in 2016 and 2017, respectively. Recent recruitment has generally been below average. The catch of northern rockfish more than tripled from 2014 to 2015 because of changes in management measures and increased retention, although 2015 catch is still well below the ABC.

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 $B_{40\%}$ (57,768 t), $F_{40\%}$ (0.070), and $F_{35\%}$ (0.087). Because the projected female spawning biomass of 91,648 t is greater than $B_{40\%}$, sub-tier "a" is applicable, with maximum permissible $F_{ABC} = F_{40\%}$ and $F_{OFL} = F_{35\%}$. Under Tier 3a, the maximum permissible ABC for 2016 is 11,960 t, which is the authors' and Team's recommendation for the 2016 ABC. Under Tier 3a, the 2016 OFL is 14,689 t for the Bering Sea/Aleutian Islands combined. The Team continues to recommend setting a combined BSAI OFL and ABC. The Team recommendation for 2017 ABC is 11,468 t and the 2016 OFL is 14,085 t.

Status determination

Northern rockfish is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

14. Blackspotted and rougheye rockfish

Status and catch specifications (t) of blackspotted and rougheye rockfish complex 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 2016 and 2017 are those recommended by the Team. Catch data are current through November 7, 2015.

Area/subarea	Year	Total Biomass (t)	OFL	ABC	TAC	Catch
BSAI	2014	30,400	505	416	416	196
	2015	41,730	560	453	453	180
	2016	43,944	693	561	n/a	n/a
	2017		855	694	n/a	n/a
Western/Central Aleutian Islands	2014			239	239	98
	2015			304	200	115
	2016			382	n/a	n/a
	2017			478	n/a	n/a
Eastern AI/ Eastern Bering Sea	2014			177	177	98
	2015			149	149	65
	2016			179	n/a	n/a
	2017			216	n/a	n/a

[1] Total biomass from AI age-structured projection model and survey biomass estimates from EBS.

Changes from previous assessment

This chapter was presented in executive summary format, as a scheduled "off-year" assessment. New data included updated catch for 2014 and estimated catches for 2015 and 2016. The projection model for the Tier 3 component of the assessment was re-run using the results from last year's full assessment. The complex is assessed by combining results from the age-structured population model applied to the fishery

and survey data from the AI management area with a Tier 5 approach of smoothing recent survey biomass estimates in the EBS management area using a random effects model.

Spawning biomass and stock trends

Total biomass for the AI component of the stock in 2015 is projected to be 42,605 t. The available survey biomass estimates for EBS blackspotted/rougheye rockfish include the southern Bering Sea (SBS) portion of the AI survey and the EBS slope survey estimates. There are no new survey data from these two subareas; thus, the EBS biomass estimate is identical to last year at 1,339 t.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

For the Aleutian Islands, this stock qualifies for management under Tier 3 due to the availability of reliable estimates for $B_{40\%}$, $F_{40\%}$, and $F_{35\%}$. Because the projected female spawning biomass for 2016 of 9,076 t is less than $B_{40\%}$, (11,403 t) the stock qualifies as Tier 3b and the adjusted $F_{ABC} = F_{40\%}$values for 2016 and 2017 are 0.037 and 0.042, respectively. The maximum permissible ABC for the Aleutian Islands is 528 t, which is the authors' and Team's recommendation for the AI portion of the 2016 ABC. The apportionment of 2016 ABC to subareas is 382 t for the Western and Central Aleutian Islands and 179 t for the Eastern Aleutian Islands and Eastern Bering Sea. The Team recommends an overall 2016 ABC of 561 t and a 2016 OFL of 693 t.

Area apportionment

Given on-going concerns about fishing pressure relative to biomass in the Western Aleutians, the SSC requested that the apportionment by sub-area be calculated and presented. The maximum subarea species catch (MSSC) levels within the WAI/CAI, based on the random effects model, are as follow:

	WAI	CAI
MSSC (2016)	58	324
MSSC (2017)	73	405

Status determination

The blackspotted and rougheye rockfish complex is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

15. Shortraker rockfish

Status and catch specifications (t) of shortraker rockfish 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Survey Biomass	OFL	ABC	TAC	Catch
BSAI	2014	16,447	493	370	370	197
	2015	23,009	690	518	250	149
	2016	23,009	690	518	n/a	n/a
	2017	23,009	690	518	n/a	n/a

Changes from previous assessment

2015 is an off year for this Tier 5 assessment; specifications are unchanged. The remainder of this section is last year's description of last year's assessment.

The 2014 biomass estimate is based on the Aleutian Island survey data through 2014 as well as the 2002-2012 eastern Bering Sea slope survey data. The EBS slope survey data had not been included in previous biomass estimates for this species. For estimation of biomass, the assessment methodology was changed from a Kalman filter version of the Gompertz-Fox surplus production model to a simple random effects model.

Spawning biomass and stock trends

The 2015 estimated shortraker rockfish biomass is 23,009 t, increasing from the previous estimate of 16,447 t primarily due to the inclusion of the 2002-2012 EBS slope survey biomass estimates. The modern EBS slope survey time series began in 2002. For the period 2002-2014, EBS slope survey biomass estimates ranged from a low of 2,570 t in 2004 to a high of 9,299 in 2012 (which was the year of the most recent EBS slope survey). For the period 1991-2014, the AI survey biomass estimates ranged from a low of 12,961 t in 2006 to a high of 38,497 t in 1997. According to the random effects model, total biomass (AI and EBS slope combined) from 2002-2014 has been very stable, ranging from a low of 20,896 t in 2006 to a high of 23,938 t in 2002. The time series from the random effects model is much smoother than the time series for the raw data, due to large standard errors associated with the data.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The SSC has previously determined that reliable estimates of only biomass and natural mortality exist for shortraker rockfish, qualifying the species for management under Tier 5. The Team recommends basing the biomass estimate on the random effects model. The Team recommended setting F_{ABC} at the maximum permissible level under Tier 5, which is 75 percent of M. The accepted value of M for this stock is 0.03 for shortraker rockfish, resulting in a $maxF_{ABC}$ value of 0.0225. The ABC is 518 t for 2015 and 2016 and the OFL is 690 t for 2015 and 2016.

Status determination

Shortraker rockfish is not being subjected to overfishing. It is not possible to determine whether this stock is overfished or whether it is approaching an overfished condition because it is managed under Tier 5.

16. Other Rockfish complex

Status and catch specifications (t) of other rockfish 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Survey Biomass	OFL	ABC	TAC	Catch
BSAI	2014	47,767	1,550	1,163	773	945
	2015	49,630	1,667	1,250	880	683
	2016	49,630	1,667	1,250	n/a	n/a
	2017	49,630	1,667	1,250	n/a	n/a
Eastern Bering Sea	2014	29,885	n/a	690	300	323
	2015	n/a	n/a	695	325	184
	2016	n/a	n/a	695	n/a	n/a
	2017	n/a	n/a	695	n/a	n/a
Aleutian Islands	2014	17,878	n/a	473	473	621
	2015	n/a	n/a	555	555	499
	2016	n/a	n/a	555	n/a	n/a
	2017	n/a	n/a	555	n/a	n/a

For 2014, NMFS increased the Bering Sea TAC to 400 t with a reallocation of 100 t from the non-specified reserves.

Changes from previous assessment

This chapter was presented in executive summary format, as a scheduled "off-year" assessment. New data in the 2015 assessment included updated catches for 2014 and 2015. There were no changes in the assessment methodology.

Spawning biomass and stock trends

Trends in spawning biomass *per se* are unknown. However, the 2014 assessment reported that biomass of other rockfish was at an all-time high in both the most recent EBS slope survey (2012) and the 2014 AI survey.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The Team agrees with the approach recommended by the author of setting F_{ABC} at the maximum allowable under Tier 5 ($F_{ABC} = 0.75M$). The accepted values of M for species in this complex are 0.03 for shortspine thornyheads and 0.09 for all other species. Multiplying these rates by the best biomass estimates of shortspine thornyhead and other rockfish species in the "other rockfish" complex yields 2015 and 2016 ABCs of 695 t in the EBS and 555 t in the AI. The 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 natural mortality values and adding the results, which yields an OFL of 1,667 t for 2015 and 2016.

Status determination

The "other rockfish" complex is not being subjected to overfishing. It is not possible to determine whether this complex is overfished or whether it is approaching an overfished condition because it is managed under Tier 5.

17. 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 1+ Biomass	OFL	ABC	TAC	Catch
BSAI	2014	456,620	74,492	64,131	32,322	30,947
	2015	694,421	125,297	106,000	54,500	53,265
	2016	672,184	104.749	90,340	n/a	n/a
	2017	664,208	99,490	85,840	n/a	n/a
E Aleutian Islands / EBS	2014	n/a	n/a	21,652	21,652	21,185
	2015	n/a	n/a	38,493	27,000	26,342
	2016	n/a	n/a	30,832	n/a	n/a
	2017	n/a	n/a	29,296	n/a	n/a
Central Aleutian Islands	2014	n/a	n/a	20,574	9,670	9,520
	2015	n/a	n/a	33,108	17,000	16,669
	2016	n/a	n/a	27,216	n/a	n/a
	2017	n/a	n/a	25,860	n/a	n/a
Western Aleutian Islands	2014	n/a	n/a	21,905	1,000	242
	2015	n/a	n/a	34,400	10,500	10,253
	2016	n/a	n/a	32,292	n/a	n/a
	2017	n/a	n/a	30,684	n/a	n/a

Changes from previous assessment

The following new data were included in this year's assessment:

- The 2014 fishery and survey age composition data were added.
- Total 2014 year-end catch was updated, and the projected total catch for 2015 was set equal to the 2015 TAC.
- The estimated average selectivity for 2011-2015 was used for projections.

It was assumed that 80% of the BSAI-wide ABC is likely to be taken under the revised Steller Sea Lion Reasonable and Prudent Alternatives (SSL RPAs) implemented in 2015. This percentage was applied to the 2016 maximum permissible ABC, and that amount was assumed to be caught in order to estimate the 2017 ABCs and OFL values. Catch in 2017 is assumed equal to the 2017 maximum permissible ABC.

There were no changes to the assessment methodology.

Spawning biomass and stock trends

Spawning biomass reached an all-time high in 2005, decreased by 55% through 2015, and is projected to increase through 2028 under Scenario 3 (average 2011-15 *F,* a reasonable scenario to choose since recent TACs have been lower than ABCs). Addition of new data in 2015 increased the estimated abundances of the 2006, 2007, and 2011 year classes, all of which are above the long-term mean. The projected female spawning biomass for 2016 is 166,407 t, which is above $B_{40\%}$ (135,654 t). The stock is projected to remain above $B_{40\%}$ through 2018 at the recommended harvest levels.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The projected female spawning biomass under the recommended harvest strategy is estimated to be above $B_{40\%}$, thereby placing BSAI Atka mackerel in Tier 3a**.** The projected 2016 yield (ABC) at $F_{40\%}$= 0.30 is 90,340 t, down 15% from the 2015 ABC and 8% from last year's projected ABC for 2016. The projected 2016 overfishing level at $F_{35\%}$ = 0.35 is 104,749 t, down 16% from the 2015 OFL and 10% from last year's projected OFL for 2016. The decreases in ABC and OFL are due primarily to drops in the $F_{40\%}$ and F_{OFL} reference fishing mortality rates (last year's $F_{40\%}$= 0.40 and $F_{35\%}$ = 0.49) which resulted from increased selectivity of younger fish (primarily age 3 in the 2014 fishery).

Area apportionment

The random effects model was used in this assessment to apportion the ABC among areas, replacing the weighted average of the four most recent surveys used previously. The recommended ABC apportionments by subarea for 2016 are 30,832 t for Area 541 and the southern Bering Sea region, 27,216 t for Area 542, and 32,292 t for Area 543.

Status determination

Atka mackerel is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

Ecosystem Considerations

Atka mackerel is the most common prey item of the endangered western Steller sea lion throughout the year in the Aleutian Islands. Analysis 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 for Steller sea lions. The objectives of having areas closed to Atka mackerel fishing around Steller sea lion haulouts and rookeries, and time-area ABC/TAC allocations, are to maintain sufficient prey for the recovery of Steller sea lions in the Aleutian Islands while also providing opportunities to harvest Atka mackerel. Steller sea lion surveys indicate that counts of adults, juveniles, and pups continue to decline in the Aleutian Islands, particularly in the western Aleutians (area 543) where counts of pups and non-pups declined 9%/year and 7%/year, respectively,

between 2000 and 2014. This contrasts with Steller sea lion counts in the eastern Aleutian Islands and southern Bering Sea (between Samalga and False Passes), which are increasing. New regulations implemented in 2015 re-opened area 543 to directed fishing for Atka mackerel (but with a maximum TAC of 65% of the area ABC), removed the TAC reduction in area 542, and re-opened areas in 541 and 542 that were previously closed to directed Atka mackerel fishing.

18. Skates

Status and catch specifications (t) of skates 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Age 0+ Biomass	OFL	ABC	TAC	Catch
BSAI	2014	726,561	41,849	35,383	26,000	27,510
	2015	625,314	49,575	35,551	25,700	24,886
	2016	631,614	50,215	42,134	n/a	n/a
	2017	602,228	47,674	39,943	n/a	

For 2014, NMFS increased the TAC to 26,600 t with a reallocation of 600 t from the non-specified reserves.

Changes from previous assessment

This chapter was presented in executive summary format, as a scheduled "off-year" assessment. The following new data were included in this year's assessment:

- updated 2014 and preliminary 2015 catch
- 2015 EBS shelf survey data

No changes were made to the assessment model. The projection model for Alaska skate was re-run with the most recent catch data. The 2015 EBS shelf survey data were presented in the chapter, and the Tier 5 random effects model was re-run for the other sharks component of the assemblage.

Spawning biomass and stock trends

The 2015 biomass estimates from the shelf survey increased slightly from 2014. In the case of Alaska skates, survey biomass estimates, though variable, are basically trendless since species identification began in 1999. Model estimates of spawning biomass are also basically trendless over the 1992-2014 period covered by the model.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

Since 2011, the Alaska skate portions of the ABC and OFL have been specified under Tier 3, while the "other skates" portions have been specified under Tier 5.

Because projected spawning biomass for 2016 (115,378 t) exceeds $B_{40\%}$ (74,769 t), Alaska skates are managed in sub-tier "a" of Tier 3. Other reference points are $maxF_{ABC} = F_{40\%} = 0.077$ and $F_{OFL} = F_{35\%} = 0.090$. The Alaska skate portions of the 2016 and 2017 ABCs are 34,358 t and 32,167 t, respectively, and the Alaska skate portions of the 2016 and 2017 OFLs are 39,847 t and 37,306 t. The "other skates" component is assessed under Tier 5, based on a natural mortality rate of 0.10 and a biomass estimated using the random effects model. The "other skates" portion of the 2016 and 2017 ABCs is 7,776 t for both years and the "other skates" portion of the 2016 and 2017 OFLs is 10,368 t for both years.

For the skate complex as a whole, OFLs for 2016 and 2017 total 50,215 t and 47,674 t, respectively, and ABCs for 2016 and 2017 total 42,134 t and 39,943 t, respectively.

Status determination

Alaska skate, which may be viewed as an indicator stock for the complex, is not overfished and is not approaching an overfished condition. The skate complex is not being subjected to overfishing.

19. Sculpins

Status and catch specifications (t) of sculpins 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Biomass	OFL	ABC	TAC	Catch
BSAI	2014	215,713	56,424	42,318	5,750	4,861
	2015	180,570	52,365	39,725	4,700	4,612
	2016	180,570	52,365	39,725	n/a	n/a
	2017	180,570	52,365	39,725		

Changes from previous assessment

2015 is an off year for this assessment; specifications are unchanged. The remainder of this section is last year's description of last year's assessment.

Biomass estimates and length compositions were included from the 2014 Aleutian Island trawl survey, and the 2013 and 2014 eastern Bering Sea shelf survey. Of these, only the survey biomass estimates have an impact on ABC and OFL. In this assessment, the average of the three most recent survey estimates for each region (Aleutian Islands, Bering Sea shelf and Bering Sea slope) has been used to calculate the BSAI sculpin complex biomass estimate. To remain consistent with other Tier 5 assessments, the Team recommends using the random effects model for each region to calculate the biomass estimate for the entire BSAI area.

Spawning biomass and stock trends

Biomass estimates for 6 of the most abundant sculpin species on the EBS shelf seem to be relatively stable and comprise 95% of the total sculpin biomass. EBS slope trawl surveys, conducted since 2002, show a different sculpin community than seen on the EBS shelf and AI.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The Team supported the authors' recommendation to use an average *M* rate using a biomass-weighted average of the instantaneous natural mortality rates for the six most abundant sculpin species in the BSAI. The complex mortality rate may change as new survey data become available. The Team recommended using the random effects model to estimate the biomass for the entire BSAI area. The total (Tier 5) sculpin recommended ABCs and OFLs for 2015 and 2016 are 39,725 t and 52,365 t, respectively.

Status determination

The sculpin complex is not being subjected to overfishing. It is not possible to determine whether the sculpin complex is overfished or whether it is approaching an overfished condition because it is managed under Tier 5.

20. Sharks

Status and catch specifications (t) of sharks 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Biomass	OFL	ABC	TAC	Catch
BSAI	2014	n/a	1,363	1,022	125	137
	2015	n/a	1,363	1,022	125	96
	2016	n/a	1,363	1,022	n/a	n/a
	2017	n/a	1,363	1,022	n/a	n/a

For 2014, NMFS increased the BSAI TAC to 225 t with a reallocation of 100 t from the non-specified reserves.

Changes from previous assessment

There were no changes made to the assessment inputs since this was an off-cycle year. OFL and ABC are based on 1997-2007 catches, so there are no new data that would impact ABC or OFL.

Spawning biomass and stock trends

The main shark species taken in the BSAI fisheries (mainly pollock and Pacific cod) are Pacific sleeper sharks and salmon sharks. Beginning around 2000, catch rates of sleeper sharks in both the IPHC longline survey and the bycatch fisheries declined steeply for several years, causing possible concern about depletion. However, all sleeper sharks taken in the survey and fisheries are juveniles, so it is impossible to know what effect those catches have on spawning stock biomass. Recent catch levels have been well below ABC. The authors plan to continue studies to investigate stock structure of Pacific sleeper sharks and further investigate methods for assessing size and maturity for sharks caught in both survey and commercial fishing operations. Recent catch levels have been well below ABC.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The SSC has placed sharks in Tier 6, where OFL and ABC are typically based on historical catches. Consistent with past policy, the Team recommended setting OFL at the maximum catch during the period 1997-2007 (1,363 t, taken in 2002), and ABC at 75 percent of OFL, which continues to be 1,022 t.

Status determination

The shark complex is not being subjected to overfishing. It is not possible to determine whether this species complex is overfished or whether it is approaching an overfished condition because it is managed under Tier 6.

21. Squids

Status and catch specifications (t) of squid 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Biomass	OFL	ABC	TAC	Catch
BSAI	2014	n/a	2,624	1,970	310	1,678
	2015	n/a	2,624	1,970	400	2,360
	2016	n/a	6,912	5,184	n/a	n/a
	2017	n/a	6,912	5,184	n/a	n/a

In 2014, the squids TAC increased to 1,764 t after a reallocation of 1,454 t from the non-specified reserves.
In 2015, the squids TAC increased to 1,970 t after a reallocation of 1,570 t from the non-specified reserves.

Changes from previous assessment

The author presented several alternative approaches for harvest recommendations for squid. These approaches include alternative ranges of years over which to estimate average catch (1978-1986 and 1978-1995), consideration of maximum catch over two time periods (1978-1995 and 1997-2007), biomass-based approaches using three different considerations of survey data (random effects model, long-term average, catchability-corrected random effects estimate) and two approaches to calculate an OFL based on this range of biomass estimates (Tier 5 calculation using a Baranov equation to account for mortality during the year and a spawning escapement approach where the OFL is set at 60% of the biomass estimate to allow 40% of spawning squid to escape).

Spawning biomass and stock trends

Survey biomass is not considered a reliable indicator of stock trends for squid.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

Squids are managed under Tier 6 because the groundfish bottom trawl surveys do not provide reliable biomass estimates. The Team discussed the various approaches considered in the assessment this year for calculating OFL and ABC. All of the approaches lead to OFL and ABC estimates that are greater than the previous harvest recommendations which is considered an improvement over unnecessarily constraining harvest specifications, particularly in recent years. While still based on average catch, the Team recommends an OFL based on the use of an alternative time period (1977-1981) which may be more representative of incidental catch levels. This leads to an OFL = 6,912 t and an ABC of 5,184.

Status determination

The squid complex is not being subjected to overfishing. It is not possible to determine whether this species complex is overfished or whether it is approaching an overfished condition because it is managed under Tier 6.

22. Octopus

Status and catch specifications (t) of octopus 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 2016 and 2017 are those recommended by the Plan Team. Catch data are current through November 7, 2015.

Area	Year	Biomass	OFL	ABC	TAC	Catch
BSAI	2014	n/a	3,450	2,590	225	428
	2015	n/a	3,452	2,589	400	370
	2016	n/a	3,452	2,589	n/a	n/a
	2017	n/a	3,452	2,589	n/a	n/a

For 2014, NMFS increased the TAC to 425 t with a reallocation of 200 t from the non-specified reserves.

Changes from previous assessment

This chapter was presented as an executive summary. No changes were made in the methodology for assessing octopus based on consumption of octopus by Pacific cod. The consumption estimate using Pacific cod predation of octopus as an estimator of biomass lost due to natural mortality first was accepted in 2011; a large number of cod stomach samples are scheduled to be processed in 2015 and the consumption estimator will be re-calculated for the 2016 full assessment.

The following new data were included in this year's assessment:

- updated 2014 and preliminary 2015 catch
- 2015 EBS shelf survey biomass estimate

These data do not impact ABC or OFL.

Spawning biomass and stock trends

Estimated survey biomass was higher in 2015 than in the survey in 2014 for the Bering Sea shelf. Species composition and size frequencies from the surveys were similar to previous years.

On the EBS shelf and in the commercial catch, giant Pacific octopus is the most abundant of at least seven octopus species found in the BSAI. Octopuses are commonly caught in pot and trawl fisheries, especially in the Pacific cod pot fishery. Trawl surveys sample octopus poorly, and biomass estimates from trawl surveys are not considered reliable.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

The ABC and OFL values were determined under Tier 6. Usually, Tier 6 specifications are based on average catch, but starting in 2012, the assessment authors recommended setting harvest specifications using an alternative mortality estimate based on species composition of Bering Sea Pacific cod diet from 1984-2008 survey data and weight-at-age data. This method is also recommended for 2016 and 2017. The recommended ABCs and OFLs for 2016 and 2017 are unchanged from the 2015 values.

Status determination

The octopus complex is not being subjected to overfishing. It is not possible to determine whether the octopus complex is overfished or whether it is approaching an overfished condition because it is managed under Tier 6.

Appendix 1: Forage Fish

A report on the status of forage species in the Bering Sea and Aleutian Islands is prepared on a biennial basis. While not a formal stock assessment, forage populations are analyzed if data are available. The forage fish category in the BSAI Groundfish FMP includes the following species or groups of species: 1) more than 50 species in the "forage fish group" that are listed in an appendix of the assessment; 2) Pacific herring *Clupea pallasiii*; 3) juvenile groundfishes and salmon; 4) shrimps; 5) squids; and 6) Arctic cod *Boreogadus saida*. Species in the forage fish category have been identified as having ecological importance as prey, and directed fishing is prohibited for the group. As of 2011, the forage fish category in the BSAI Groundfish FMP is managed within the "ecosystem component" of the FMP. The report has been expanded and enhanced since the previous version to include an analysis of temporal and spatial trends in three of the most important forage species (capelin, eulachon, Pacific herring), a more detailed bycatch section particularly on Pacific herring and a 'data gaps and research priorities' section .

Table 1. BSAI Groundfish Plan Team Recommended OFLs, and ABCs for 2016 and 2017; OFL, ABC, TAC and catch through November 7th 2015.

		2015			2015 Catch	2016		2017	
Species	**Area**	**OFL**	**ABC**	**TAC**	**as of 11/7/15**	**OFL**	**ABC**	**OFL**	**ABC**
Pollock	EBS	3,330,000	1,637,000	1,310,000	1,318,833	3,910,000	2,090,000	3,540,000	2,019,000
	AI	36,005	29,659	19,000	916	39,075	32,227	44,455	36,664
	Bogoslof	21,200	15,900	100	733	31,906	23,850	31,906	23,850
Pacific cod	BS	346,000	255,000	240,000	202,626	390,000	255,000	412,000	255,000
	AI	23,400	17,600	9,422	9,060	23,400	17,600	23,400	17,600
Sablefish	BS	1,575	1,333	1,333	209	1,304	1,151	1,241	1,052
	AI	2,128	1,802	1,802	431	1,766	1,557	1,681	1,423
Yellowfin sole	BSAI	266,400	248,800	149,000	122,363	228,100	211,700	219,200	203,500
Greenland turbot	BSAI	3,903	3,172	2,648	2,199	4,194	3,462	7,416	6,132
	BS	n/a	2,448	2,448	2,086	n/a	2,673	n/a	4,734
	AI	n/a	724	200	113	n/a	789	n/a	1,398
Arrowtooth flounder	BSAI	93,856	80,547	22,000	11,005	94,035	80,701	84,156	72,216
Kamchatka flounder	BSAI	10,500	9,000	6,500	4,961	11,100	9,500	11,700	10,000
Northern rock sole	BSAI	187,600	181,700	69,250	45,350	165,900	161,100	149,400	145,000
Flathead sole	BSAI	79,419	66,130	24,250	10,955	79,562	66,250	77,544	64,580
Alaska plaice	BSAI	54,000	44,900	18,500	14,269	49,000	41,000	46,800	39,100
Other flatfish	BSAI	17,700	13,250	3,620	2,394	17,414	13,061	17,414	13,061
Pacific Ocean perch	BSAI	42,558	34,988	32,021	30,034	40,529	33,320	38,589	31,724
	BS	n/a	8,771	8,021	6,588	n/a	8,353	n/a	7,953
	EAI	n/a	8,312	8,000	7,861	n/a	7,916	n/a	7,537
	CAI	n/a	7,723	7,000	6,777	n/a	7,355	n/a	7,002
	WAI	n/a	10,182	9,000	8,808	n/a	9,696	n/a	9,232
Northern rockfish	BSAI	15,337	12,488	3,250	7,230	14,689	11,960	14,085	11,468
Blackspotted/Rougheye	BSAI	560	453	349	180	693	561	855	694
Rockfish	EBS/EAI	n/a	149	149	65	n/a	179	n/a	216
	CAI/WAI	n/a	304	200	115	n/a	382	n/a	478
Shortraker rockfish	BSAI	690	518	250	149	690	518	690	518
Other rockfish	BSAI	1,667	1,250	880	683	1,667	1,250	1,667	1,250
	BS	n/a	695	325	184	n/a	695	n/a	695
	AI	n/a	555	555	499	n/a	555	n/a	555
Atka mackerel	BSAI	125,297	106,000	54,500	53,265	104,749	90,340	99,490	85,840
	EAI/BS	n/a	38,492	27,000	26,342	n/a	30,832	n/a	29,296
	CAI	n/a	33,108	17,000	16,669	n/a	27,216	n/a	25,860
	WAI	n/a	34,400	10,500	10253	n/a	32,292	n/a	30,684
Skates	BSAI	49,575	41,658	25,700	24,886	50,215	42,134	47,674	39,943
Sculpins	BSAI	52,365	39,725	4,700	4,612	52,365	39,725	52,365	39,725
Sharks	BSAI	1,363	1,022	125	96	1,363	1,022	1,363	1,022
Squids	BSAI	2,624	1,970	400	2,360	6,912	5,184	6,912	5,184
Octopuses	BSAI	3,452	2,589	400	370	3,452	2,589	3,452	2,589
Total	BSAI	4,769,174	2,848,454	2,000,000	1,870,168	5,324,080	3,236,762	4,935,455	3,128,135

Table 2. Groundfish catches (metric tons) in the eastern Bering Sea, 1954-2015.

Year	Pollock	Pacific Cod	Sable Fish	Yellowfin Sole	Greenland Turbot	Arrowtooth Flounder/a	Kamchatka Flounder/d	Rock Sole/c	Flathead sole	Alaska Plaice	Other Flatfish
1954				12,562							
1955				14,690							
1956				24,697							
1957				24,145							
1958	6,924	171	6	44,153							
1959	32,793	2,864	289	185,321							
1960			1,861	456,103	36,843						
1961			15,627	553,742	57,348						
1962			25,989	420,703	58,226						
1963			13,706	85,810	31,565						35,643
1964	174,792	13,408	3,545	111,177	33,729						30,604
1965	230,551	14,719	4,838	53,810	9,747						11,686
1966	261,678	18,200	9,505	102,353	13,042						24,864
1967	550,362	32,064	11,698	162,228	23,869						32,109
1968	702,181	57,902	4,374	84,189	35,232						29,647
1969	862,789	50,351	16,009	167,134	36,029						34,749
1970	1,256,565	70,094	11,737	133,079	19,691	12,598					64,690
1971	1,743,763	43,054	15,106	160,399	40,464	18,792					92,452
1972	1,874,534	42,905	12,758	47,856	64,510	13,123					76,813
1973	1,758,919	53,386	5,957	78,240	55,280	9,217					43,919
1974	1,588,390	62,462	4,258	42,235	69,654	21,473					37,357
1975	1,356,736	51,551	2,766	64,690	64,819	20,832					20,393
1976	1,177,822	50,481	2,923	56,221	60,523	17,806					21,746
1977	978,370	33,335	2,718	58,373	27,708	9,454					14,393
1978	979,431	42,543	1,192	138,433	37,423	8,358					21,040
1979	913,881	33,761	1,376	99,017	34,998	7,921					19,724
1980	958,279	45,861	2,206	87,391	48,856	13,761					20,406
1981	973,505	51,996	2,604	97,301	52,921	13,473					23,428
1982	955,964	55,040	3,184	95,712	45,805	9,103					23,809
1983	982,363	83,212	2,695	108,385	43,443	10,216					30,454
1984	1,098,783	110,944	2,329	159,526	21,317	7,980					44,286
1985	1,179,759	132,736	2,348	227,107	14,698	7,288					71,179
1986	1,188,449	130,555	3,518	208,597	7,710	6,761					76,328
1987	1,237,597	144,539	4,178	181,429	6,533	4,380					50,372
1988	1,228,000	192,726	3,193	223,156	6,064	5,477					137,418
1989	1,230,000	164,800	1,252	153,165	4,061	3,024					63,452
1990	1,353,000	162,927	2,329	80,584	7,267	2,773					22,568
1991	1,268,360	165,444	1,128	94,755	3,704	12,748		46,681			30,401
1992	1,384,376	163,240	558	146,942	1,875	11,080		51,720			34,757
1993	1,301,574	133,156	669	105,809	6,330	7,950		63,942			28,812
1994	1,362,694	174,151	699	144,544	7,211	13,043		60,276			29,720
1995	1,264,578	228,496	929	124,746	5,855	8,282		54,672	14,699		20,165
1996	1,189,296	209,201	629	129,509	4,699	13,280		46,775	17,334		18,529
1997	1,115,268	209,475	547	166,681	6,589	8,580		67,249	20,656		22,957
1998	1,101,428	160,681	586	101,310	8,303	14,985		33,221	24,550		15,355
1999	988,703	146,738	678	69,275	5,401	10,585		40,505	18,534		15,515
2000	1,132,736	151,372	742	84,057	5,888	12,071		49,186	20,342		16,453
2001	1,387,452	142,452	863	63,563	4,252	12,836		28,949	17,757		9,930
2002	1,481,815	166,552	1,143	74,956	3,150	10,821		40,700	15,464		2,588
2003	1,492,039	174,687	1,039	81,050	2,565	13,667		36,375	14,132	10,118	2,922
2004	1,480,552	183,745	1,041	75,502	1,825	17,367		47,862	17,361	7,888	4,755
2005	1,483,022	182,936	1,070	94,383	2,140	13,409		36,814	16,074	11,194	4,566
2006	1,488,031	168,814	1,079	99,156	1,453	11,966		35,878	17,942	17,318	3,123
2007	1,354,502	140,129	1,182	120,962	1,481	11,082		36,364	18,929	19,522	5,699
2008	990,587	139,802	1,141	148,893	2,089	18,897		50,934	24,521	17,377	3,578
2009	810,857	147,174	916	107,512	2,252	19,212		48,145	19,535	13,944	2,133
2010	810,390	142,868	755	118,624	2,273	14,782		52,644	20,097	16,165	2,158
2011	1,199,216	209,222	705	151,166	3,136	16,864	4,478	60,353	13,546	23,655	3,121
2012	1,205,276	232,674	743	147,186	3,058	18,978	2,510	75,777	11,355	16,612	3,501
2013	1,270,823	236,700	634	164,944	1,449	14,056	2,110	59,590	17,344	23,522	1,501
2014	1,297,846	238,735	315	156,772	1,479	14,928	3,268	51,569	16,505	19,447	4,340
2015/e	1,319,566	211,179	209	122,363	2,086	10,068	3,353	45,230	10,941	14,269	2,364

a/ Arrowtooth flounder included in Greenland turbot catch statistics, 1960-69.

b/ Includes POP shortraker, rougheye, northern, and sharpchin.

c/ Rock sole prior to 1991 and flathead sole prior to 1995 are included in other flatfish catch statistics.

Table 2. (continued) Groundfish catches (metric tons) in the eastern Bering Sea, 1954-2015.

Year	POP Complx/b	POP	N Rockfish	BS/RE Rockfish	Shortrkr Rockfish	Other Rockfish	Atka Mackerel	Other	Skates	Sculpins	Sharks	Squids	Octopus	Total (All Species)
1954														12,562
1955														14,690
1956														24,697
1957														24,145
1958								147						51,401
1959								380						221,647
1960	6,100													500,907
1961	47,000													673,717
1962	19,900													524,818
1963	24,500													191,224
1964	25,900							736						393,891
1965	16,800							2,218						344,369
1966	20,200							2,239						452,081
1967	19,600							4,378						836,308
1968	31,500							22,058						967,083
1969	14,500							10,459						1,192,020
1970	9,900							15,295						1,593,649
1971	9,800							13,496						2,137,326
1972	5,700							10,893						2,149,092
1973	3,700							55,826						2,064,444
1974	14,000							60,263						1,900,092
1975	8,600							54,845						1,645,232
1976	14,900							26,143						1,428,565
1977	2,654					311		35,902				4,926		1,168,144
1978	2,221					2,614	831	61,537				6,886		1,302,509
1979	1,723					2,108	1,985	38,767				4,286		1,159,547
1980	1,097					459	4,955	34,633				4,040		1,221,944
1981	1,222					356	3,027	35,651				4,182		1,259,666
1982	224					276	328	18,200				3,838		1,211,483
1983	221					220	141	15,465				3,470		1,280,285
1984	1,569					176	57	8,508				2,824		1,458,299
1985	784					92	4	11,503				1,611		1,649,109
1986	560					102	12	10,471				848		1,633,911
1987	930					474	12	8,569				108		1,639,121
1988	1,047					341	428	12,206				414		1,810,470
1989	2,017					192	3,126	4,993				300		1,630,382
1990	5,639					384	480	5,698				460		1,644,109
1991	4,744					396	2,265	16,285				544		1,647,455
1992	3,309					675	2,610	29,993				819		1,831,954
1993	3,763					190	201	21,413				597		1,674,406
1994	1,907					261	190	23,430				502		1,818,628
1995	1,210					629	340	20,928				364		1,745,893
1996	2,635					364	780	19,717				1,080		1,653,828
1997	1,060					161	171	20,997				1,438		1,641,829
1998	1,134					203	901	23,156				891		1,486,704
1999	654					141	2,267	18,916				392		1,318,304
2000	704					239	239	23,098				375		1,497,502
2001	1,148					296	264	23,148				1,761		1,694,671
2002	858					401	572	26,639				1,334		1,826,993
2003	1,391					336	6,362	26,986				1,246		1,864,915
2004		731	116	24	119	318	7,159	27,588				1,000		1,874,953
2005		879	112	12	108	178	3,540	28,066				1,170		1,879,673
2006		1,041	246	7	47	157	3,176	25,077				1,403		1,875,914
2007		870	70	10	114	220	3,005	24,746				1,175		1,740,061
2008		513	22	22	41	222	392	27,152				1,494		1,427,678
2009		623	48	13	69	208	244	25,369				269		1,198,523
2010		3,547	299	30	161	268	151	20,697				305		1,206,215
2011		5,601	196	36	106	328	1,217		22,422	4,872	103	237	576	1,721,158
2012		5,589	91	17	117	211	966		23,740	4,991	94	560	126	1,754,172
2013		5,051	137	26	104	191	147		25,972	5,222	99	158	185	1,829,966
2014		7,437	147	23	96	323	136		26,326	4,487	134	1,568	410	1,846,290
2015/e		6,588	170	31	71	184	264		23,651	3,704	92	2,277	350	1,779,010

d/ Kamchatka flounder included in Arrowtooth flounder prior to 2011.
e/ Data through November 7, 2015.
f/ Octopus, sculpin, sharks, skates included in Other species prior to 2011.
Note: Numbers exclude fish taken for research.

Table 3. Groundfish catches (metric tons) in the Aleutian Islands, 1954-2015.

Year	Pollock	Pacific Cod	Sable Fish	Yellowfin Sole	Greenland Turbot	Arrowtooth Flounder/a	Kamchatka Flounder/d	Rock Sole/c	Flathead sole	Alaska Plaice	Other Flatfish
1954											
1955											
1956											
1957											
1958											
1959											
1960											
1961											
1962											
1963			664		7						
1964		241	1,541		504						
1965		451	1,249		300						
1966		154	1,341		63						
1967		293	1,652		394						
1968		289	1,673		213						
1969		220	1,673		228						
1970		283	1,248		285	274					
1971		2,078	2,936		1,750	581					
1972		435	3,531		12,874	1,323					
1973		977	2,902		8,666	3,705					
1974		1,379	2,477		8,788	3,195					
1975		2,838	1,747		2,970	784					
1976		4,190	1,659		2,067	1,370					
1977	7,625	3,262	1,897		2,453	2,035					
1978	6,282	3,295	821		4,766	1,782					
1979	9,504	5,593	782		6,411	6,436					
1980	58,156	5,788	274		3,697	4,603					
1981	55,516	10,462	533		4,400	3,640					
1982	57,978	1,526	955		6,317	2,415					
1983	59,026	9,955	673		4,115	3,753					
1984	81,834	22,216	999		1,803	1,472					
1985	58,730	12,690	1,448		33	87					
1986	46,641	10,332	3,028		2,154	142					
1987	28,720	13,207	3,834		3,066	159					
1988	43,000	5,165	3,415		1,044	406					
1989	156,000	4,118	3,248		4,761	198					
1990	73,000	8,081	2,116		2,353	1,459					
1991	78,104	6,714	2,071	1,380	3,174	938					88
1992	54,036	42,889	1,546	4	895	900		236			68
1993	57,184	34,234	2,078	0	2,138	1,348		318			59
1994	58,708	22,421	1,771	0	3,168	1,334		308			55
1995	64,925	16,534	1,119	6	2,338	1,001		356	16		31
1996	28,933	31,389	720	654	1,677	1,330		371	10		51
1997	26,872	25,166	779	234	1,077	1,071		271	32		7
1998	23,821	34,964	595	5	821	694		446	19		35
1999	981	28,117	671	13	460	774		580	34		20
2000	1,244	39,684	1,070	13	1,086	1,157		480	80		32
2001	824	34,207	1,074	15	1,060	1,220		526	54		43
2002	1,177	30,801	1,118	29	485	1,032		1,165	111		39
2003	1,653	32,459	1,009	0	965	913		964	49		32
2004	1,158	28,873	955	9	434	818		818	38	0	33
2005	1,621	22,699	1,481	2	468	834		549	34	0	26
2006	1,745	24,211	1,151	4	537	1,476		578	39	0	36
2007	2,519	34,356	1,168	2	523	834		762	29	0	25
2008	1,278	31,229	899	0	822	2,473		342	18	0	46
2009	1,662	28,582	1,100	1	2,263	10,688		570	23	0	45
2010	1,235	29,001	1,097	0	1,873	24,098		577	29		41
2011	1,208	10,858	1,024	1	532	3,269	5,493	279	7		56
2012	975	18,220	1,205	1	1,658	3,400	6,995	322	12	0	42
2013	2,964	13,607	1,062	0	296	6,485	5,656	210	10	0	35
2014	2,375	10,595	818	0	177	4,181	3,190	155	9	0	51
2015/e	916	9,221	431	0	113	938	1,609	120	14	0	29

a/ Arrowtooth flounder included in Greenland turbot catch statistics, 1960-69.
b/ Includes POP shortraker, rougheye, northern, and sharpchin.
c/ Rock sole prior to 1991 and flathead sole prior to 1995 are included in other flatfish catch statistics.

Table 3. (continued) Groundfish catches (metric tons) in the Aleutian Islands, 1954-2015.

Year	POP Complx/b	POP	N Rockfish	BS/RE Rockfish	Shortrkr Rockfish	Other Rockfish	Atka Mackerel	Other	Skates	Sculpins	Sharks	Squids	Octopus	Total (All Species)
1954														0
1955														0
1956														0
1957														0
1958														0
1959														0
1960														0
1961														0
1962	200													200
1963	20,800													21,471
1964	90,300							66						92,652
1965	109,100							768						111,868
1966	85,900							131						87,589
1967	55,900							8,542						66,781
1968	44,900							8,948						56,023
1969	38,800							3,088						44,009
1970	66,900						949	10,671						80,610
1971	21,800							2,973						32,118
1972	33,200						5,907	22,447						79,717
1973	11,800						1,712	4,244						34,006
1974	22,400						1,377	9,724						49,340
1975	16,600						13,326	8,288						46,553
1976	14,000						13,126	7,053						43,465
1977	8,080					3,043	20,975	16,170				1,808		67,348
1978	5,286					921	23,418	12,436				2,085		61,092
1979	5,487					4,517	21,279	12,934				2,252		75,195
1980	4,700					420	15,533	13,028				2,332		108,531
1981	3,622					328	16,661	7,274				1,763		104,199
1982	1,014					2,114	19,546	5,167				1,201		98,233
1983	280					1,045	11,585	3,675				510		94,617
1984	631					56	35,998	1,670				343		147,022
1985	308					99	37,856	2,050				9		113,310
1986	286					169	31,978	1,509				20		96,259
1987	1,004					147	30,049	1,155				23		81,364
1988	1,979					278	21,656	437				3		77,383
1989	2,706					481	14,868	108				6		186,494
1990	14,650					864	21,725	627				11		124,886
1991	2,545					549	22,258	91				30		117,942
1992	10,277					3,689	46,831	3,081				61		164,513
1993	13,375					495	65,805	2,540				85		179,659
1994	16,959					301	69,401	1,102				86		175,614
1995	14,734					220	81,214	1,273				95		183,862
1996	20,443					278	103,087	1,720				87		190,750
1997	15,687					307	65,668	1,555				323		139,049
1998	13,729					385	56,195	2,448				25		134,182
1999	18,501					657	53,966	1,670				9		106,453
2000	14,893					601	46,990	3,010				8		110,348
2001	15,587					610	61,296	4,029				5		120,550
2002	14,996					551	44,722	1,980				10		98,216
2003	18,765					401	52,988	1,326				36		111,560
2004		11,165	4,567	185	123	337	53,405	1,866				14		104,798
2005		9,548	3,852	78	62	286	58,474	1,417				17		101,446
2006		11,826	3,582	196	165	426	58,719	1,943				15		106,650
2007		17,581	3,946	157	210	435	55,742	2,053				13		120,357
2008		16,923	3,265	171	91	390	57,690	2,322				49		118,010
2009		14,725	3,064	184	116	403	72,563	2,514				91		138,594
2010		14,304	4,033	202	139	503	68,496	2,713				105		148,446
2011		18,403	2,566	129	227	616	50,600		732	502	4	99	11	96,616
2012		18,554	2,388	174	227	736	46,863		1,083	808	2	128	11	103,804
2013		26,311	1,900	296	267	623	23,034		1,058	606	17	141	39	84,619
2014		24,944	2,195	173	101	621	30,815		1,185	373	3	110	18	82,089
2015/e		23,446	7,060	149	78	499	53,000		1,235	907	3	83	21	99,872

d/ Kamchatka flounder included in Arrowtooth flounder prior to 2011.
e/ Data through November 7, 2015.
f/ Octopus, sculpin, sharks, skates included in Other species prior to 2011.
Note: Numbers exclude fish taken for research.

Table 4. Groundfish catches (metric tons) in the Bering Sea and Aleutian Islands, 1954-2015.

Year	Pollock	Pacific Cod	Sable Fish	Yellowfin Sole	Greenland Turbot	Arrowtooth Flounder/a	Kamchatka Flounder/d	Rock Sole/c	Flathead sole	Alaska Plaice	Other Flatfish
1954	0	0	0	12,562	0	0	0	0		0	0
1955	0	0	0	14,690	0	0	0	0		0	0
1956	0	0	0	24,697	0	0	0	0		0	0
1957	0	0	0	24,145	0	0	0	0		0	0
1958	6,924	171	6	44,153	0	0	0	0		0	0
1959	32,793	2,864	289	185,321	0	0	0	0		0	0
1960	0	0	1,861	456,103	36,843	0	0	0		0	0
1961	0	0	15,627	553,742	57,348	0	0	0		0	0
1962	0	0	25,989	420,703	58,226	0	0	0		0	0
1963	0	0	14,370	85,810	31,572	0	0	0		0	35,643
1964	174,792	13,649	5,086	111,177	34,233	0	0	0		0	30,604
1965	230,551	15,170	6,087	53,810	10,047	0	0	0		0	11,686
1966	261,678	18,354	10,846	102,353	13,105	0	0	0		0	24,864
1967	550,362	32,357	13,350	162,228	24,263	0	0	0		0	32,109
1968	702,181	58,191	6,047	84,189	35,445	0	0	0		0	29,647
1969	862,789	50,571	17,682	167,134	36,257	0	0	0		0	34,749
1970	1,256,565	70,377	12,985	133,079	19,976	12,872	0	0		0	64,690
1971	1,743,763	45,132	18,042	160,399	42,214	19,373	0	0		0	92,452
1972	1,874,534	43,340	16,289	47,856	77,384	14,446	0	0		0	76,813
1973	1,758,919	54,363	8,859	78,240	63,946	12,922	0	0		0	43,919
1974	1,588,390	63,841	6,735	42,235	78,442	24,668	0	0		0	37,357
1975	1,356,736	54,389	4,513	64,690	67,789	21,616	0	0		0	20,393
1976	1,177,822	54,671	4,582	56,221	62,590	19,176	0	0		0	21,746
1977	985,995	36,597	4,615	58,373	30,161	11,489	0	0		0	14,393
1978	985,713	45,838	2,013	138,433	42,189	10,140	0	0		0	21,040
1979	923,385	39,354	2,158	99,017	41,409	14,357	0	0		0	19,724
1980	1,016,435	51,649	2,480	87,391	52,553	18,364	0	0		0	20,406
1981	1,029,021	62,458	3,137	97,301	57,321	17,113	0	0		0	23,428
1982	1,013,942	56,566	4,139	95,712	52,122	11,518	0	0		0	23,809
1983	1,041,389	93,167	3,368	108,385	47,558	13,969	0	0		0	30,454
1984	1,180,617	133,160	3,328	159,526	23,120	9,452	0	0		0	44,286
1985	1,238,489	145,426	3,796	227,107	14,731	7,375	0	0		0	71,179
1986	1,235,090	140,887	6,546	208,597	9,864	6,903	0	0		0	76,328
1987	1,266,317	157,746	8,012	181,429	9,599	4,539	0	0		0	50,372
1988	1,271,000	197,891	6,608	223,156	7,108	5,883	0	0		0	137,418
1989	1,386,000	168,918	4,500	153,165	8,822	3,222	0	0		0	63,452
1990	1,426,000	171,008	4,445	80,584	9,620	4,232	0	0		0	22,568
1991	1,346,464	172,158	3,199	96,135	6,878	13,686	0	46,681		0	30,489
1992	1,438,412	206,129	2,104	146,946	2,770	11,980	0	51,956		0	34,825
1993	1,358,758	167,390	2,747	105,809	8,468	9,298	0	64,260		0	28,871
1994	1,421,402	196,572	2,470	144,544	10,379	14,377	0	60,584		0	29,775
1995	1,329,503	245,030	2,048	124,752	8,193	9,283	0	55,028	14,715	0	20,196
1996	1,218,229	240,590	1,349	130,163	6,376	14,610	0	47,146	17,344	0	18,580
1997	1,142,140	234,641	1,326	166,915	7,666	9,651	0	67,520	20,688	0	22,964
1998	1,125,249	195,645	1,181	101,315	9,124	15,679	0	33,667	24,569	0	15,390
1999	989,684	174,855	1,349	69,288	5,861	11,359	0	41,085	18,568	0	15,535
2000	1,133,980	191,056	1,812	84,070	6,974	13,228	0	49,666	20,422	0	16,485
2001	1,388,276	176,659	1,937	63,578	5,312	14,056	0	29,475	17,811	0	9,973
2002	1,482,992	197,353	2,261	74,985	3,635	11,853	0	41,865	15,575	0	2,627
2003	1,493,692	207,146	2,048	81,050	3,530	14,580	0	37,339	14,181	10,118	2,954
2004	1,481,710	212,618	1,996	75,511	2,259	18,185	0	48,681	17,398	7,888	4,788
2005	1,484,643	205,635	2,551	94,385	2,608	14,243	0	37,362	16,108	11,194	4,592
2006	1,489,776	193,025	2,229	99,160	1,989	13,442	0	36,456	17,981	17,318	3,160
2007	1,357,021	174,485	2,350	120,964	2,004	11,916	0	37,126	18,958	19,522	5,724
2008	991,865	171,030	2,040	148,894	2,911	21,370	0	51,276	24,540	17,377	3,624
2009	812,520	175,756	2,016	107,513	4,515	29,900	0	48,716	19,558	13,944	2,178
2010	811,625	171,869	1,852	118,624	4,146	38,880	0	53,221	20,127	16,165	2,199
2011	1,200,424	220,080	1,730	151,168	3,668	20,133	9,971	60,632	13,553	23,655	3,177
2012	1,206,252	250,894	1,948	147,187	4,716	22,378	9,505	76,099	11,366	16,612	3,543
2013	1,273,787	250,307	1,697	164,944	1,745	20,541	7,766	59,800	17,354	23,522	1,535
2014	1,300,221	249,330	1,133	156,772	1,656	19,109	6,458	51,724	16,514	19,447	4,391
2015/e	1,320,482	220,400	640	122,363	2,199	11,006	4,962	45,350	10,955	14,269	2,393

a/ Arrowtooth flounder included in Greenland turbot catch statistics, 1960-69.

b/ Includes POP shortraker, rougheye, northern, and sharpchin.

c/ Rock sole prior to 1991 and flathead sole prior to 1995 are included in other flatfish catch statistics.

Table 4. (continued) Groundfish catches in the Bering Sea and Aleutian Islands, 1954-2015.

Year	POP Complx/b	POP	N Rockfish	BS/RE Rockfish	Shortrkr Rockfish	Other Rockfish	Atka Mackerel	Other	Skates	Sculpins	Sharks	Squids	Octopus	Total (All Species)
1954	0	0	0	0	0	0	0	0				0		12,562
1955	0	0	0	0	0	0	0	0				0		14,690
1956	0	0	0	0	0	0	0	0				0		24,697
1957	0	0	0	0	0	0	0	0				0		24,145
1958	0	0	0	0	0	0	0	147				0		51,401
1959	0	0	0	0	0	0	0	380				0		221,647
1960	6,100	0	0	0	0	0	0	0				0		500,907
1961	47,000	0	0	0	0	0	0	0				0		673,717
1962	20,100	0	0	0	0	0	0	0				0		525,018
1963	45,300	0	0	0	0	0	0	0				0		212,695
1964	116,200	0	0	0	0	0	0	802				0		486,543
1965	125,900	0	0	0	0	0	0	2,986				0		456,237
1966	106,100	0	0	0	0	0	0	2,370				0		539,670
1967	75,500	0	0	0	0	0	0	12,920				0		903,089
1968	76,400	0	0	0	0	0	0	31,006				0		1,023,106
1969	53,300	0	0	0	0	0	0	13,547				0		1,236,029
1970	76,800	0	0	0	0	0	949	25,966				0		1,674,259
1971	31,600	0	0	0	0	0	0	16,469				0		2,169,444
1972	38,900	0	0	0	0	0	5,907	33,340				0		2,228,809
1973	15,500	0	0	0	0	0	1,712	60,070				0		2,098,450
1974	36,400	0	0	0	0	0	1,377	69,987				0		1,949,432
1975	25,200	0	0	0	0	0	13,326	63,133				0		1,691,785
1976	28,900	0	0	0	0	0	13,126	33,196				0		1,472,030
1977	10,734	0	0	0	0	3,354	20,975	52,072				6,734		1,235,492
1978	7,507	0	0	0	0	3,535	24,249	73,973				8,971		1,363,601
1979	7,210	0	0	0	0	6,625	23,264	51,701				6,538		1,234,742
1980	5,797	0	0	0	0	879	20,488	47,661				6,372		1,330,475
1981	4,844	0	0	0	0	684	19,688	42,925				5,945		1,363,865
1982	1,238	0	0	0	0	2,390	19,874	23,367				5,039		1,309,716
1983	501	0	0	0	0	1,265	11,726	19,140				3,980		1,374,902
1984	2,200	0	0	0	0	232	36,055	10,178				3,167		1,605,321
1985	1,092	0	0	0	0	191	37,860	13,553				1,620		1,762,419
1986	846	0	0	0	0	271	31,990	11,980				868		1,730,170
1987	1,934	0	0	0	0	621	30,061	9,724				131		1,720,485
1988	3,026	0	0	0	0	619	22,084	12,643				417		1,887,853
1989	4,723	0	0	0	0	673	17,994	5,101				306		1,816,876
1990	20,289	0	0	0	0	1,248	22,205	6,325				471		1,768,995
1991	7,289	0	0	0	0	945	24,523	16,376				574		1,765,397
1992	13,586	0	0	0	0	4,364	49,441	33,074				880		1,996,467
1993	17,138	0	0	0	0	685	66,006	23,953				682		1,854,065
1994	18,866	0	0	0	0	562	69,591	24,532				588		1,994,242
1995	15,944	0	0	0	0	849	81,554	22,201				459		1,929,755
1996	23,078	0	0	0	0	642	103,867	21,437				1,167		1,844,578
1997	16,747	0	0	0	0	468	65,839	22,552				1,761		1,780,878
1998	14,863	0	0	0	0	588	57,096	25,604				916		1,620,886
1999	19,155	0	0	0	0	798	56,233	20,586				401		1,424,757
2000	15,597	0	0	0	0	840	47,229	26,108				383		1,607,850
2001	16,735	0	0	0	0	906	61,560	27,177				1,766		1,815,221
2002	15,854	0	0	0	0	952	45,294	28,619				1,344		1,925,209
2003	20,156	0	0	0	0	737	59,350	28,312				1,282		1,976,475
2004		11,896	4,684	209	242	656	60,564	29,454				1,014		1,979,752
2005		10,427	3,964	90	170	465	62,014	29,482				1,186		1,981,119
2006		12,867	3,828	203	212	583	61,895	27,021				1,418		1,982,564
2007		18,451	4,016	168	323	655	58,747	26,799				1,188		1,860,418
2008		17,436	3,287	193	133	612	58,082	29,474				1,542		1,545,687
2009		15,347	3,111	197	184	611	72,807	27,883				360		1,337,116
2010		17,852	4,332	232	300	771	68,647	23,410				410		1,354,662
2011		24,004	2,762	165	333	944	51,817	0	23,154	5,374	107	336	587	1,817,774
2012	0	24,143	2,479	191	344	947	47,829	0	24,823	5,799	96	688	137	1,857,977
2013	0	31,362	2,038	322	371	815	23,181	0	27,030	5,828	116	300	224	1,914,585
2014	0	32,381	2,342	196	197	944	30,951	0	27,511	4,860	137	1,678	428	1,928,379
2015/e	0	30,034	7,230	180	149	683	53,264	0	24,886	4,611	95	2,360	371	1,878,882

d/ Kamchatka flounder included in Arrowtooth flounder prior to 2011.
e/ Data through November 7, 2015.
f/ Octopus, sculpin, sharks, skates included in Other species prior to 2011.
Note: Numbers exclude 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 (F_{ABC}), and the fishing mortality rate corresponding to OFL (F_{OFL}) for the eastern Bering Sea (EBS), Aleutian Islands (AI), and Bogoslof district as projected for 2016 and 2017. "Biomass" corresponds to projected January abundance for the age+ range reported in the summary. Stock-specific biomass, OFL, and ABC are in metric tons.

Species or complex	Tier	Area	2016 Biomass	2016 OFL	2016 ABC	2016 FOFL	2016 FABC	2017 OFL	2017 ABC	2017 FOFL	2017 FABC
Pollock	1a	EBS	11,300,000	3,910,000	2,090,000	0.514	0.27	3,540,000	2,019,000	0.514	0.26
	3b	Aleutian Is.	241,929	39,075	32,227	0.34	0.27	44,455	36,664	0.37	0.29
	5	Bogoslof District	106,000	31,906	23,850	0.301	0.226	31,906	23,850	0.301	0.226
Pacific cod	3a	BS	1,830,000	390,000	255,000	0.35	0.22	412,000	255,000	0.35	0.22
	5	AI	68,900	23,400	17,600	0.34	0.26	23,400	17,600	0.34	0.26
Sablefish	3b	BS	25,000	1,304	1,151	0.093	0.078	1,241	1,052	0.086	0.073
	3b	AI	23,000	1,766	1,557	0.093	0.078	1,681	1,423	0.086	0.073
Yellowfin sole	1a	BSAI	2,170,000	228,100	211,700	0.105	0.098	219,200	203,500	0.105	0.098
Greenland turbot	3b	BSAI	114,438	4,194	3,462	0.1	0.08	7,416	6,132	0.14	0.11
Arrowtooth flounder	3a	BSAI	910,012	94,035	80,701	0.18	0.153	84,156	72,216	0.18	0.153
Kamchatka flounder	3a	BSAI	182,300	11,100	9,500	0.076	0.065	11,700	10,000	0.076	0.065
North rock Sole	1a	BSAI	1,085,200	165,900	161,100	0.153	0.148	149,400	145,000	0.153	0.148
Flathead sole	3a	BSAI	737,777	79,562	66,250	0.35	0.28	77,544	64,580	0.35	0.28
Alaska plaice	3a	BSAI	468,100	49,000	41,000	0.175	0.143	46,800	39,100	0.175	0.143
Other flatfish	5	BSAI	102,300	17,414	13,061	0.17/.085 /.15	.113/.064 /.113	17,414	13,061	0.17/.085 /.15	.113/.064 /.113
Pacific ocean perch	3a	BSAI	557,886	40,529	33,320	0.109	0.089	38,589	31,724	0.109	0.089
Northern rockfish	3a	BSAI	213,674	14,689	11,960	0.087	0.07	14,085	11,468	0.087	0.07
Shortraker rockfish	5	BSAI	23,009	690	518	0	0	690	518	0	0
Rougheye/ Blackspotted	3a	BSAI	42,605	693	561	0.045	0.037	855	694	0.051	0.042
Other rockfish	5	BSAI	50,050	1,667	1,250	.03/.09	0.0225 /.0675	1,667	1,250	.03/.09	0.0225 /.0675
Atka mackerel	3a	BSAI	672,184	104,749	90,340	0.35	0.3	99,490	85,840	0.35	0.3
Skate	3a/5	BSAI	219,060	50,215	42,134	0.09 /.100	0.077 /.075	47,674	39,943	0.09 /.100	0.077 /.075
Sculpin	5	BSAI	194,783	52,365	39,725	0.29	0.22	52,365	39,725	0.29	0.22
Shark	6	BSAI	n/a	1,363	1,022	n/a	n/a	1,363	1,022	n/a	n/a
Squid	6	BSAI	n/a	6,912	5,184	n/a	n/a	6,912	5,184	n/a	n/a
Octopus	6	BSAI	n/a	3,452	2,589	n/a	n/a	3,452	2,589	n/a	n/a
Total		BSAI	21,338,207	5,324,080	3,236,762	0	0	4,935,455	3,128,135		0

Table 6. Summary of groundfish tier designations under Amendment 56, maximum permissible ABC fishing mortality rate (max F_{ABC}), the Plan Team's recommended tier designation, ABC fishing mortality rate (F_{ABC}), 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 2016-2017. Stock-specific max ABC and ABC are in metric tons, reported to three significant digits (four significant digits are used EBS pollock and when a stock-specific ABC is apportioned among areas on a percentage basis). Fishing mortality rates are reported to two significant digits.

		2016					
Species or Complex	**Area**	**Tier**	**max F_{ABC}**	**F_{ABC}**	**max ABC**	**ABC**	**% Red.**
Pollock	EBS	1a	0.401	0.270	3,050,000	2,090,000	31%
Pacific cod	EBS	3a	0.3	0.22	332,000	255,000	23%
		2017					
Species or Complex	**Area**	**Tier**	**max F_{ABC}**	**F_{ABC}**	**max ABC**	**ABC**	**% Red.**
Pollock	EBS	1a	0.401	0.260	2,760,000	2,019,000	27%
Pacific cod	EBS	3a	0.3	0.22	329,000	255,000	22%

Table 7. Species included in assessments for the 2014 BSAI SAFE Report (extends over several pages).

Chapter	Common name	Scientific name	Count
1	**Walleye Pollock**	*Gadus chalcogrammus*	1
2	**Pacific cod**	*Gadus macrocephalus*	1
3	**Sablefish**	*Anoplopoma fimbria*	1
4	**Yellowfin sole**	*Limanda aspera*	1
5	**Greenland turbot**	*Reinhardtius hippoglossoides*	1
6	**Arrowtooth flounder**	*Atherestes stomias*	2
7	**Kamchatka flounder**	*Atherestes evermanni*	
8	**Northern rock sole**	*Lepidopsetta polyxystra n. sp.*	2
	Southern rock sole	*Lepidopsetta bilineata*	
9	**Flathead sole**	*Hippoglossoides classodon*	2
	Bering flounder	*Hippoglossoides robustus*	
10	**Alaska plaice**	*Pleuronectes quadrituberculatus*	1
11	**Other flatfish**		15
	Arctic flounder	*Liopsetta glacialis*	
	butter sole	*Isopsetta isolepis*	
	curlfin sole	*Pleuronectes decurrens*	
	deepsea sole	*Embassichths bathybius*	
	Dover sole	*Microstomus pacificus*	
	English sole	*Parophrys vetulus*	
	longhead dab	*Limanda proboscidea*	
	Pacific sanddab	*Citharichthys sordidus*	
	petrale sole	*Eopsetta jordani*	
	rex sole	*Glyptocephalus zachirus*	
	roughscale sole	*Clidodoerma asperrimum*	
	sand sole	*Psettichthys melanostictus*	
	slender sole	*Lyopsetta exilis*	
	starry flounder	*Platichthys stellatus*	
	Sakhalin sole	*Pleuronectes sakhalinensis*	
12	**Pacific Ocean perch**	*Sebastes alutus*	1
13	**Northern rockfish**	*Sebastes polyspinus*	1
14	**Blackspotted/Rougheye**		2
	Blackspotted rockfish	*Sebastes melanostictus*	
	Rougheye rockfish	*Sebastes aleutianus*	
15	**Shortraker rockfish**	*Sebastes borealis*	1
16	**Other rockfish***		
	Shortspine thornyhead	*Sebastolobus alascanus*	7
	Dusky rockfish	*Sebastes variabilis*	
	Red banded rockfish	*Sebastes babcocki*	
	Redstripe rockfish	*Sebastes proriger*	
	Harlequin rockfish	*Sebastes variegatus*	
	Sharpchin rockfish	*Sebastes zacentrus*	
	Yelloweye rockfish	*Sebastes ruberrimus*	
17	**Atka mackerel**	*Pleurogrammus monopterygius*	1
18	**Skates**		15
	deepsea skate	*Bathyraja abyssicola*	
	Aleutian skate	*Bathyraja aleutica*	
	Bering skate (complex?)	*Bathyraja interrupta*	
	Commander skate	*Bathyraja lindbergi*	
	whiteblotched skate	*Bathyraja maculata*	
	butterfly skate	*Bathyraja mariposa*	
	whitebrow skate	*Bathyraja minispinosa*	
	Alaska skate	*Bathyraja parmifera*	
	“Leopard” parmifera	*Bathyraja sp. cf. parmifera*	
	mud skate	*Bathyraja taranetzi*	
	roughtail skate	*Bathyraja trachura*	
	Okhotsk skate	*Bathyraja violacea*	
	big skate	*Raja binoculata*	
	roughshoulder skate	*Amblyraja badia*	
	longnose skate	*Raja rhina*	

Table 7. Species included in assessments for the 2014 BSAI SAFE Report (extends over several pages).

Chapter	Common name	Scientific name	Count
19	**Sculpins**		48
	Scaled sculpin	*Archistes biseriatus*	
	Bride sculpin	*Artediellus miacanthus*	
	Pacific hookear sculpin	*Artediellus pacificus*	
	Broadfin sculpin	*Bolinia euryptera*	
	Antlered sculpin	*Enophrys diceraus*	
	Leister sculpin	*Enophrys lucasi*	
	Purplegray sculpin	*Gymnocanthus detrisus*	
	Armorhead sculpin	*Gymnocanthus galeatus*	
	threaded sculpin	*Gymnocanthus pistilliger*	
	Arctic staghorn sculpin	*Gymnocanthus tricuspis*	
	Banded Irish lord	*Hemilepidotus gilberti*	
	Red Irish Lord	*Hemilepidotus hemilepidotus*	
	Yellow Irish Lord	*Hemilepidotus jordani*	
	Butterfly sculpin	*Hemilepidotus papilio*	
	Longfin Irish lord	*Hemilepidotus zapus*	
	Northern sculpin	*Icelinus borealis*	
	Blacknose sculpin	*Icelus canaliculatus*	
	Wide-eye sculpin	*Icelus euryops*	
	Spatulate sculpin	*Icelus spatula*	
	thorny sculpin	*Icelus spiniger*	
	Uncinate sculpin	*Icelus uncinalis*	
	Longfin sculpin	*Jordania zonope*	
	Pacific staghorn sculpin	*Leptocottus armatus*	
	Plain sculpin	*Myoxocephalus jaok*	
	Great sculpin	*Myoxocephalus polyacanthocephalus*	
	Fourhorn sculpin	*Myoxocephalus quadricornis*	
	Warty sculpin	*Myoxocephalus verrucocus*	
	Slim sculpin	*Radulinus asprellus*	
	Roughskin sculpin	*Rastrinus scutiger*	
	Sponge sculpin	*thyriscus anoplus*	
	Scissortail sculpin	*Triglops forficatus*	
	Roughspine sculpin	*Triglops macellus*	
	Crescent-tail sculpin	*Triglops metopias*	
	Ribbed sculpin	*Triglops pingelii*	
	Spectacled sculpin	*Triglops septicus*	
	Scalybreasted sculpin	*Triglops xenostethus*	
	Flabby sculpin	*Zesticelus profundorum*	
	Crested sculpin	*Blepsias bilobus*	
	Bigmouth sculpin	*Hemitripterus bolini*	
	Sailfin sculpin	*Nautichthys oculofasciatus*	
	Eyeshade sculpin	*Nautichthys pribilovius*	
	Spinyhead sculpin	*Dasycottus setiger*	
	Smoothcheek sculpin	*Eurymen gyrinus*	
	Darkfin sculpin	*Malacoccottus zonurus*	
	Blackfin sculpin	*Malacocottus kincaidi*	
	Tadpole sculpin	*Psychrolutes paradoxus*	
	Blob sculpin	*Psychrolutes phrictus*	
	Grunt sculpin	*Rhamphocottus richardsoni*	
20	**Sharks**		8
	brown cat shark	*Apristurus brunneus*	
	White shark	*Carcharodon carcharias*	
	basking shark	*Cetorhinus maximus*	
	sixgill shark	*Hexanchus griseus*	
	salmon shark	*Lamna ditropis*	
	blue shark	*Prionace glauca*	
	Pacific sleeper shark	*Somniosus pacificus*	
	Spiny dogfish	*Squalus acanthias*	
21	**Squids**		14

Table 7. Species included in assessments for the 2014 BSAI SAFE Report (extends over several pages).

Chapter	Common name	Scientific name	Count
		Chiroteuthis calyx	
	"glass squids"	*Belonella borealis*	
		Galiteuthis phyllura	
	minimal armhook squid	*Berryteuthis anonychus*	
	magistrate armhook squid	*Berryteuthis magister*	
		Eogonatus tinro	
	boreopacific armhook squid	*Gonatopsis borealis*	
	Berry armhook squid	*Gonatus berryi*	
		Gonatus madokai	
		Gonatus middendorffi	
	clawed armhook squid	*Gonatus onyx*	
	robust clubhook squid	*Moroteuthis robusta*	
	boreal clubhook squid	*Onychoteuthis borealijaponicus*	
	North Pacific bobtail squid	*Rossia pacifica*	
22	**Octopus**		8
	flapjack devilfish	*Opisthoteuthis cf californiana*	
	pelagic octopus	*Japetella diaphana*	
	smooth octopus	*Benthoctopus leioderma*	
		Benthoctopus oregonensis	
		Benthoctopus salebrosus	
	giant octopus	*Enteroctopus dofleini*	
		Granelodone boreopacifica	
	stubby octopus	*Sasakiopus salebrosus*	
Total number of species			**133**

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