STOCK ASSESSMENT AND FISHERY EVALUATION REPORT FOR THE GROUNDFISH RESOURCES OF THE GULF OF ALASKA

Compiled by

The Plan Team for the Groundfish Fisheries of the Gulf of Alaska

with contributions by

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Summary

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 reports are intended to summarize the best available scientific information concerning the past, present, and possible future condition of the stocks and fisheries under federal management. The FMPs for the groundfish fisheries managed by the North Pacific Fishery Management Council (Council) require that drafts of the SAFE reports be produced each year in time for the December Council meetings.

The SAFE report for the Gulf of Alaska (GOA) groundfish fisheries is compiled by the Plan Team for the GOA FMP from chapters contributed by scientists at NMFS Alaska Fisheries Science Center (AFSC) and the Alaska Department of Fish and Game (ADF&G). The stock assessment section includes recommended acceptable biological catch (ABC) levels for each stock and stock complex managed under the FMP. The ABC recommendations, together with social and economic factors, are considered by the Council in determining total allowable catches (TACs) and other management strategies for the fisheries.

The GOA Groundfish Plan Team met at the Alaska Fisheries Science Center in Seattle on November 12-15, 2024, to review the status of stocks of twenty species or species groups that are managed under the FMP. The Plan Team review was based on presentations by ADF&G and NMFS AFSC scientists with opportunity for public comment and input. Members of the Plan Team who compiled the SAFE report were James Ianelli (co-chair), Chris Lunsford (co-chair), Sara Cleaver (coordinator), Craig Faunce, Sandra Lowe, Pete Hulson, Janet Rumble, Nat Nichols, Paul Spencer, Abby Jahn, Sophia Wasserman, Ben Williams, and James Thorsen.

Management Areas and Species

The GOA management area lies within the 200-mile U.S. Exclusive Economic Zone (EEZ) of the United States (Fig. 1). Formerly, five categories of finfishes and invertebrates were designated for management purposes: target species, other species, prohibited species, forage fish species and non-specified species. Effective in 2011, these categories were revised in Amendments 96 and 87 to the FMPs for Groundfish of the Bering Sea/Aleutian Islands (BSAI) and GOA, respectively. This action was necessary to comply with requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSFMCA) to prevent overfishing, achieve optimum yield, and to comply with statutory requirements for annual catch limits (ACLs) and accountability measures (AMs). Species and species groups must be identified "in the fishery" for which ACLs and AMs are required. An ecosystem component (EC) category is also included in the FMPs for species and species groups that are not:

1) targeted for harvest
2) likely to become overfished or subjected to overfishing, and
3) generally retained for sale or personal use.

The effects of the 2011 action amended the GOA and BSAI groundfish FMPs to

1) identify and manage target groundfish stocks "in the fishery";
2) eliminate the "other species" category and manage (GOA) squids, (BSAI and GOA) sculpins; (BSAI and GOA) sharks, and (BSAI and GOA) octopuses separately "in the fishery";
3) manage prohibited species and forage fish species in the ecosystem component category; and
4) remove the non-specified species outside of the FMPs.

Amendments 91/100 added grenadiers to the GOA and BSAI FMPs as an Ecosystem Component in 2014. Amendments 106/117 moved squid to the Ecosystem Component category of the FMP in GOA and BSAI FMPs in 2018. Amendments 110/121 moved sculpins to the Ecosystem Component category of the FMPs in 2020.
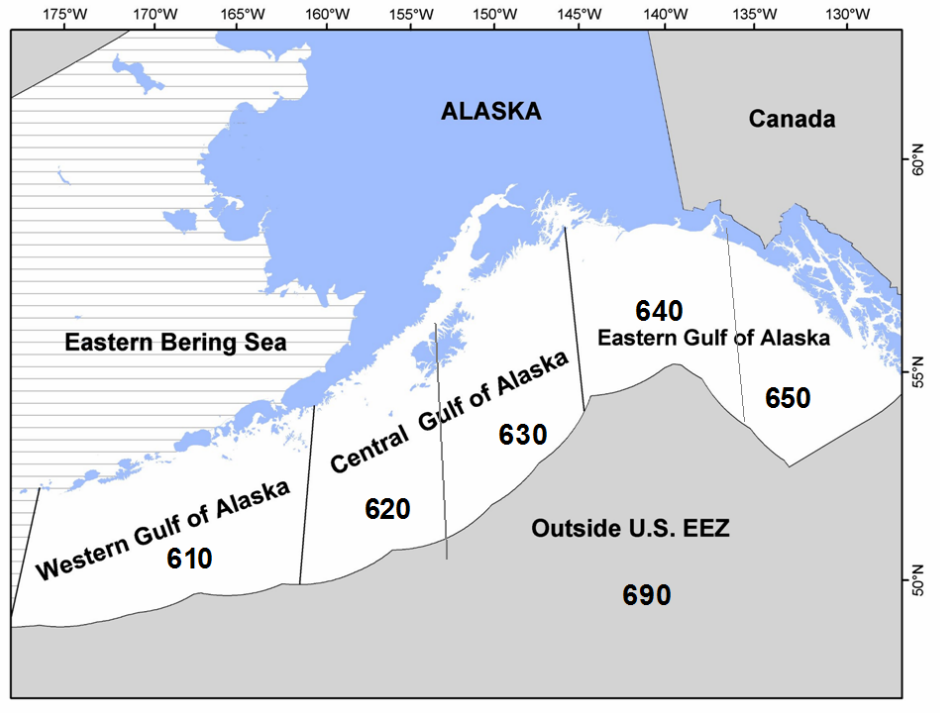
Figure 1.   Gulf of Alaska statistical and reporting areas.

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 are listed below.

In the Fishery:

Target species – are those species that support a single species or mixed species target fishery, are commercially important, and for which a sufficient database exists that allows each to be managed on its own biological merits. Accordingly, a specific total allowable catch (TAC) is established annually for each target species or species assemblage. Catch of each species must be recorded and reported. This category includes walleye pollock, Pacific cod, sablefish, deep water flatfish, shallow water flatfish, rex sole, flathead sole, arrowtooth flounder, Pacific ocean perch, shortraker rockfish, rougheye/blackspotted rockfish, northern rockfish, "other" rockfish, dusky rockfish, demersal shelf rockfish, thornyhead rockfish, Atka mackerel, sharks, octopus, big skates, longnose skates, and other skates.

Ecosystem Component:

1) 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 quotas have been achieved shall be treated in the same manner as prohibited species.

2) Forage fish species– are those species listed in the table 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. These may include measures prohibiting

directed fishing, limiting allowable bycatch retention, or limiting commercial exchange and the processing of forage fish in a commercial facility.

3) Grenadiers – The grenadier complex (family Macrouridae), also known as "rattails", are comprised of at least seven species of grenadier known to occur in Alaskan waters, but only three are commonly found at depths shallow enough to be encountered in commercial fishing operations or in fish surveys: giant grenadier (*Albatrossia pectoralis*), Pacific grenadier (*Coryphaenoides acrolepis*), and popeye grenadier (*Coryphaenoides cinereus*).

4) Squids –There are approximately 15 species of squids in the GOA, which are mainly distributed along the shelf break. The most abundant species is *Berryteuthis magister* (magistrate armhook squid). Squid in Alaska are generally taken incidentally in the target fishery for pollock. Catches of squids are generally low relative to population size and most of the squid bycatch occurs in the central GOA.

5) Sculpins- Sculpins are a group of benthic-dwelling predatory teleost fishes that include 48 species in waters off the coast of Alaska (Families Cottidae, Hemitripteridae, Psychrolutidae, and Rhamphocottidae). A total of forty-six species of sculpins have been listed as occurring in the GOA, and 39 of these have been identified on NMFS GOA research surveys.

The following lists the GOA stocks within these FMP species categories:

In the Fishery	
Target Species[1]	Walleye pollock, Pacific cod, Sablefish, Flatfish (shallow-water flatfish, deep-water flatfish, rex sole, flathead sole, arrowtooth flounder), Rockfish (Pacific ocean perch, northern rockfish, shortraker rockfish, rougheye/blackspotted rockfish, other rockfish, dusky rockfish, demersal shelf rockfish[3], thornyhead rockfish), Atka mackerel, skates (big skates, longnose skates, and other skates), sharks, octopus
Ecosystem Component	
Prohibited Species[2]	Pacific halibut, Pacific herring, Pacific salmon, Steelhead trout, King crab, Tanner crab
Forage Fish Species[4]	Osmeridae family (eulachon, capelin, and other smelts), Myctophidae family (lanternfishes), Bathylagidae family (deep-sea smelts), Ammodytidae family (Pacific sand lance), Trichodontidae family (Pacific sand fish), Pholidae family (gunnels), Stichaeidae family (pricklebacks, warbonnets, eelblennys, cockscombs, and shannys), Gonostomatidae family (bristlemouths, lightfishes, and anglemouths), Order Euphausiacea (krill)
Grenadiers[5]	Macrouridae family (grenadiers)
Squids[6]	Chiroteuthidae family, Cranchiidae family, Gonatidae family, Onychoteuthidae family, Sepiolidae family,
Sculpins[7]	Families: Cottidae, Hemitripteridae, Psychrolutidae, and Rhamphocottidae

[1] Means there is a 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
[3] Management of the DSR stock complex is delegated to the State of Alaska in the Southeast Outside Area. NMFS manages DSR in the combined Western GOA, Central GOA, and West Yakutat (W/C/WYAK) area. Recommendations to remove the seven demersal shelf rockfish (DSR) species previously assessed in the Other rockfish complex in the W/C/WYAK areas to a separate GOA-wide DSR stock complex was approved for the 2024 assessment cycle for implementation in the 2025 fisheries.
[4] Management measures for forage fish which are an Ecosystem Component are established in regulations implementing the FMP
[5] The grenadier complex was added to both FMPs as an Ecosystem Component in 2014
[6] The squid complex was added to both FMPs as an Ecosystem Component in 2018 and implemented in 2019
[7] Sculpins were added to both FMPS as an Ecosystem Component in 2019 and implemented in 2020.

This SAFE report describes stock status of target and non-target species in the fishery.

A species or species group from within the fishery category may be split out and assigned an appropriate harvest level. Similarly, species in the fishery category may be combined and a single harvest level assigned to the new aggregate species group. The harvest level for demersal shelf rockfish in the combined W/C/WYAK and Southeast Outside Areas are specified by the Council each year. However, management of the fishery in the SEO area is delegated to the State of Alaska with Council oversight.

The GOA FMP recognizes single species and species complex management strategies. Single species specifications are set for stocks individually, recognizing that different harvesting sectors catch an array of species. In the GOA these species include pollock, Pacific cod, sablefish, Pacific ocean perch, flathead sole, rex sole, arrowtooth flounder, northern rockfish, shortraker rockfish, dusky rockfish, Atka mackerel, big skates, and longnose skates. Other groundfish species that are usually caught in groups have been managed as complexes (also called assemblages). For example, other rockfish, rougheye and blackspotted rockfish, demersal shelf rockfish, thornyhead rockfish, deep water flatfish, shallow water flatfish, skates, sharks, and octopus have been managed as complexes.

The FMP authorizes splitting species, or groups of species, from the complexes for purposes of promoting the goals and objectives of the FMP. Atka mackerel was split out from "other species" beginning in 1994. In 1998, black and blue rockfish were removed from the GOA FMP and management was conferred to the ADF&G. In 2008, dark rockfish were similarly removed from the GOA FMP with sole management taken over by the ADF&G. Beginning in 1999, osmerids (eulachon, capelin and other smelts) were removed from the "other species" category and placed in a separate forage fish category. In 2004, Amendment 63 to the FMP was approved which moved skates from the other species category into a target species category whereby individual OFLs and ABCs for skate species and complexes could be established.

Groundfish catches are managed against TAC specifications for the EEZ and near coastal waters of the GOA. State of Alaska internal water groundfish populations are typically not covered by NMFS surveys and catches from internal water fisheries are generally not counted against the TAC. The Team has recommended that these catches represent fish outside of the assessed region and should not be counted against an ABC or TAC. Beginning in 2000, the pollock assessment incorporated the ADF&G survey pollock biomass, therefore, the Plan Team acknowledged that it is appropriate to reduce the Western (W), Central (C) and West Yakutat (WY) combined GOA pollock ABC by the anticipated Prince William Sound (PWS) harvest level for the State fishery. Since 2001, the W/C/WY pollock ABCs have been reduced by the PWS GHL as provided by ADF&G, before area apportionments were made. At the 2012 September Plan Team meeting, ADFG presented a proposal to set the PWS GHL in future years as a fixed percentage of the W/C/WY pollock ABC of 2.5%. That value is the midpoint between the 2001-2010 average GHL percentage of the GOA ABC (2.44%) and the 1996 and 2012 levels (2.55%). The Plan Team accepted this proposal. The Plan Team deducted a value for the 2025 and 2026 PWS GHL (equal to 2.5% of the recommended 2025 and 2026 W/C/WY pollock ABCs) from the recommended 2025 and 2026 W/C/WY pollock ABCs (listed in the summary table), before area apportionments are made. It is important to note that the value of the PWS GHL is dependent on the final specified W/C/WY pollock ABC. The values used by the Plan Team to derive the 2025 and 2026 W/C/WY pollock apportioned ABCs are listed in the pollock summary under *Area apportionment*.

The Plan Team has provided subarea ABC recommendations on a case-by-case basis since 1998. The Plan Team recommended splitting the EGOA ABC for species/complexes that would be disproportionately harvested from the West Yakutat area by trawl gear. The Team did not split EGOA ABCs for species that were prosecuted by multi-gear fisheries or harvested as bycatch. The approaches for splitting the EGOA ABCs are given in the specific stock assessments.

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

Definition of Acceptable Biological Catch and the Overfishing Level
Amendment 56 to the GOA Groundfish FMP, approved by the Council in June 1998, defines ABC and OFL for the GOA groundfish fisheries. The new definitions are shown below, where the fishing mortality rate is denoted F, stock biomass (or spawning stock biomass, as appropriate) is denoted B, and the F and B levels corresponding to MSY are denoted F_{MSY} and B_{MSY} respectively.

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

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

Tier	1)	Information available: *Reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY}.*

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*
       $F_{ABC} \leq \mu_H$, *the harmonic mean of the pdf*
    1b) Stock status: $\alpha < B/B_{MSY} \leq 1$
       $F_{OFL} = \mu_A \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
       $F_{ABC} \leq \mu_H \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
    1c) Stock status: $B/B_{MSY} \leq \alpha$
       $F_{OFL} = 0$
       $F_{ABC} = 0$

2) Information available: *Reliable point estimates of B, B_{MSY}, F_{MSY}, $F_{35\%}$, and $F_{40\%}$.*
    2a) Stock status: $B/B_{MSY} > 1$
       $F_{OFL} = F_{MSY}$
       $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%})$
    2b) Stock status: $\alpha < B/B_{MSY} \leq 1$
       $F_{OFL} = F_{MSY} \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
       $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%}) \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
    2c) Stock status: $B/B_{MSY} \leq \alpha$
       $F_{OFL} = 0$
       $F_{ABC} = 0$

3) Information available: *Reliable point estimates of B, $B_{40\%}$, $F_{35\%}$, and $F_{40\%}$.*
    3a) Stock status: $B/B_{40\%} > 1$
       $F_{OFL} = F_{35\%}$
       $F_{ABC} \leq F_{40\%}$
    3b) Stock status: $\alpha < B/B_{40\%} \leq 1$
       $F_{OFL} = F_{35\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$
       $F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$
    3c) Stock status: $B/B_{40\%} \leq \alpha$
       $F_{OFL} = 0$
       $F_{ABC} = 0$

4) Information available: *Reliable point estimates of B, $F_{35\%}$, and $F_{40\%}$.*
       $F_{OFL} = F_{35\%}$
       $F_{ABC} \leq F_{40\%}$

5) Information available: *Reliable point estimates of B and natural mortality rate M.*
       $F_{OFL} = M$
       $F_{ABC} \leq 0.75 \times M$

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*
    $ABC \leq 0.75 \times OFL$

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

Overfished (listed in each assessment as projection scenario 6):
    In all future years, F is set equal to F_{OFL}. (Rationale: This scenario determines whether a stock is overfished. If the stock is expected to be 1) above its MSY level in 2024 or 2) above ½ of its MSY level in 2024 and above its MSY level in 2034 under this scenario, then the stock is not overfished.)

Approaching an overfished condition (listed in each assessment as scenario 7):
    In 2025 and 2026, 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 2026 or 2) above 1/2 of its MSY level in 2026 and expected to be above its MSY level in 2036 under this scenario, then the stock is not approaching an overfished condition.)

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

Overview of Stock Assessments

The status of individual groundfish stocks managed under the FMP is summarized in this section. The spawning biomass estimates of pollock (W/C GOA), sablefish, northern rock sole, southern rock sole, Dover sole, flathead sole, rex sole, arrowtooth flounder, Pacific ocean perch, rougheye and blackspotted rockfish, northern rockfish, and dusky rockfish are above target stock size (Fig. 2). The spawning biomass of Pacific cod is below the proxy for B_{MSY}. The target biomass levels for EGOA pollock, deep-water flatfish (excluding Dover sole), shallow-water flatfish (excluding northern and southern rock sole), shortraker rockfish, other rockfish, demersal shelf rockfish, thornyhead rockfish, Atka mackerel, skates, octopus, and sharks are unknown.
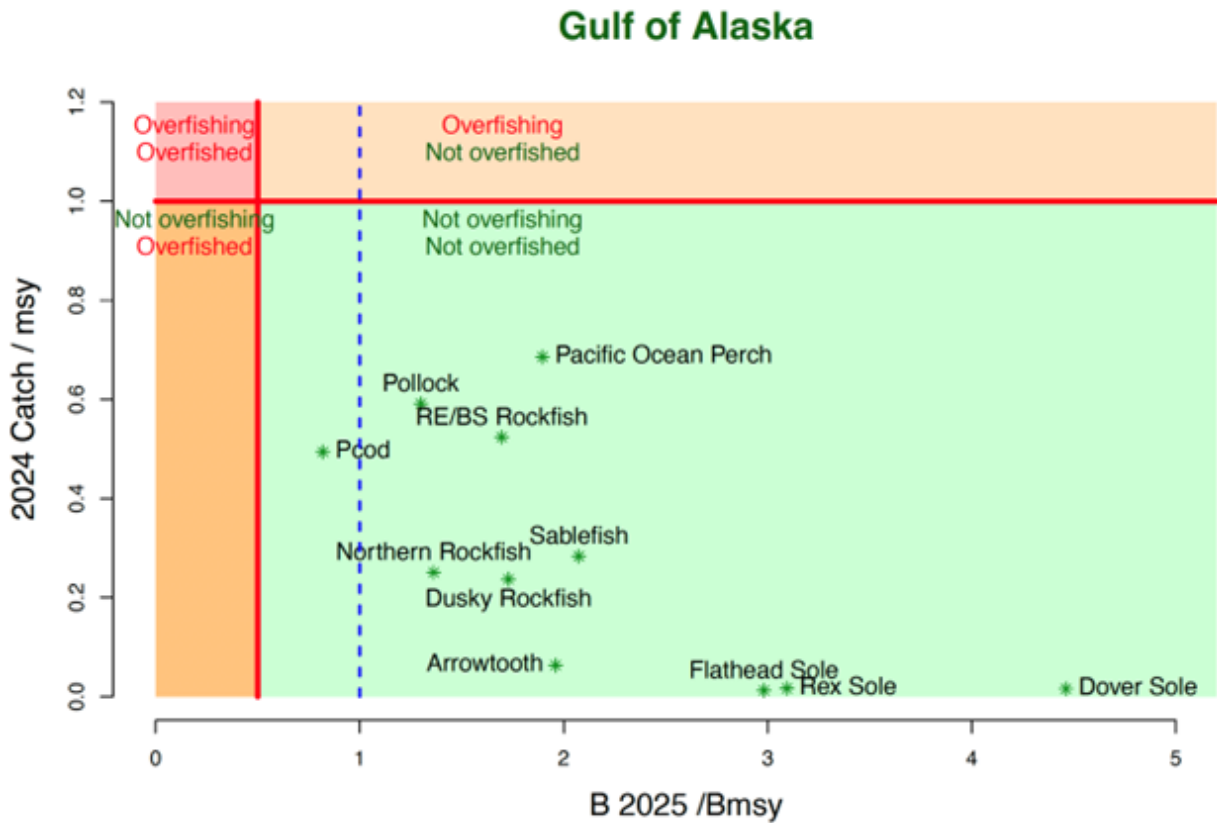
Figure 2.   Summary of Gulf of Alaska stock status next year (spawning biomass relative to B_{MSY}; horizontal axis) and current year catch relative to fishing at F_{MSY} (vertical axis). Note that sablefish is for Alaska-wide values including the BSAI catches. Also, stock status was carried over the previous year for Arrowtooth, RE/BS, Pacific ocean perch, Flathead, Rex, and Dover soles.

Summary

Table 1 provides a summary of the status of the groundfish stocks, including catch statistics, ABCs, and TACs for 2024, and recommendations for ABCs and overfishing levels (OFLs) for 2025 and 2026. ABCs and TACs are specified for each of the GOA regulatory areas illustrated in Figure 1. For 2025 and 2026, the Plan Team recommended an ABC for rougheye and blackspotted rockfish that was below the maximum permissible.

The sum of the Plan Team's recommended 2025 ABC for target species in the GOA (excluding sablefish, for which ABC is set Alaska-wide) is 543,147 t (492,287 t for 2026). The sums of the Plan Team's recommended 2025 and 2026 OFLs for target species in the GOA (again, excluding sablefish) are 650,890 t and 591,267 t, respectively. For perspective, the sum of the 2024 GOA TACs, not including the 2024 sablefish TAC, was 497,424 t and the sum of the ABCs was 552,638 t (and catch through November 1, 2024, without sablefish was 199,193 t). The sum of GOA total TAC from 2024, including the W/C/WYAK/SEO sablefish TACs (which total 22,596 t), is 520,020 t, which is within FMP-approved optimum yield (OY) of 116,000 - 800,000 t for the Gulf of Alaska.

Risk Tables
A general description of guidance and the risk table template that applies to all risk tables in the assessment chapters, is provided here. The risk tables are intended to account for uncertainty not directly captured in the stock assessments. The risk tables can be used to justify recommendations of ABC below maximum permissible ABC.

Risk table considerations/levels of concern				
	Assessment-related	*Population dynamics*	*Ecosystem*	*Fishery-informed stock*
Level 1: Normal	Typical to moderately increased uncertainty/minor unresolved issues in assessment.	Stock population dynamics (e.g., recruitment, growth, natural mortality) are typical for the stock and recent trends are within normal range.	No apparent ecosystem concerns related to biological status (e.g., environment, prey, competition, predation), or minor concerns with uncertain impacts on the stock.	No apparent concerns related to biological status (e.g., stock abundance, distribution, fish condition), or few minor concerns with uncertain impacts on the stock.
Level 2: Increased concern	Substantially increased assessment uncertainty/ unresolved issues, such as residual patterns and substantial retrospective patterns, especially positive ones.	Stock population dynamics (e.g., recruitment, growth, natural mortality) are unusual; trends increasing or decreasing faster than has been seen recently, or patterns are atypical.	Indicator(s) with adverse signals related to biological status (e.g., environment, prey, competition, predation).	Several indicators with adverse signals related to biological status (e.g., stock abundance, distribution, fish condition).
Level 3: Extreme Concern	Severe assessment problems; very poor fits to important data; high level of uncertainty; very strong retrospective patterns, especially positive ones.	Stock population dynamics (e.g., recruitment, growth, natural mortality) are extremely unusual; very rapid changes in trends, or highly atypical patterns compared to previous patterns.	Indicator(s) showing a combined frequency (low/high) and magnitude(low/high) to cause severe adverse signals a) across the same trophic level as the stock, and/or b) up or down trophic levels (i.e., predators and prey of the stock) that are likely to impact the stock.	Multiple indicators with strong adverse signals related to biological status (e.g., stock abundance, distribution, fish condition), a) across different sectors, and/or b) different gear types.

The table is applied by evaluating the severity of four types of considerations that could be used to support a scientific recommendation to reduce the ABC from the maximum permissible. These considerations are stock assessment considerations, population dynamics considerations, ecosystem considerations, and fishery performance. Examples of the types of concerns that might be relevant include the following:

1. Assessment-related considerations—data-inputs: biased ages, skipped surveys, lack of fishery-independent trend data; model fits: poor fits to fits to fishery or survey data, inability to simultaneously fit multiple data inputs; model performance: poor model convergence, multiple minima in the likelihood surface, parameters hitting bounds; estimation uncertainty: poorly-estimated but influential year classes; retrospective bias in biomass estimates.

2. Population dynamics considerations—decreasing biomass trend, poor recent recruitment, inability of the stock to rebuild, abrupt increase or decrease in stock abundance.

3. Ecosystem considerations—adverse trends in environmental/ecosystem indicators, ecosystem model results, decreases in ecosystem productivity, decreases in prey abundance or availability, increases or increases in predator abundance or productivity.

4. Fishery-informed stock considerations—fishery CPUE is showing a contrasting pattern from the stock biomass trend, unusual spatial pattern of fishing, changes in the percent of TAC taken, changes in the duration of fishery openings.

Use of Terms
The following conventions in this SAFE are used:

1) "Fishing mortality rate" refers to the full-selection F (i.e., the rate that applies to fish of fully selected sizes or ages). A full-selection F should be interpreted in the context of the selectivity schedule to which it applies.

2) For consistency and comparability, "exploitable biomass" refers to projected age+ biomass, which is the total biomass of all cohorts greater than or equal to some minimum age. The minimum age varies from species to species and generally corresponds to the age of recruitment listed in the stock assessment. Trawl survey data may be used as a proxy for age+ biomass. The minimum age (or size), and the source of the exploitable biomass values are defined in the summaries. These values of exploitable biomass may differ from values listed in the corresponding stock assessments if the technical definition is used (which requires multiplying biomass at age by selectivity at age and summing over all ages). In those models assuming knife-edge recruitment, age+ biomass and the technical definitions of exploitable biomass are equivalent.

(3) The values listed as 2023 and 2024 ABCs correspond to the values (in metric tons, abbreviated "t") approved by NMFS. The Council TAC recommendations for pollock were modified to accommodate revised area apportionments in the measures implemented by NMFS to mitigate pollock fishery interactions with Steller sea lions and for Pacific cod removals by the State water fishery of not more than 25% of the Federal TAC. **The values listed for 2025 and 2026 in the SAFE introduction correspond to the Plan Team recommendations, while values within each SAFE chapter correspond to author recommendations.**

(4) The exploitable biomass for 2023 and 2024 that are reported in the following summaries were estimated by the assessments in *those* years. Comparisons of the projected 2025 biomass with previous years' levels should be made with biomass levels from the revised hindcast reported in each assessment.

(5) The catches listed in the following summary tables are those reported by the Alaska Regional Office Catch Accounting System (https://www.fisheries.noaa.gov/alaska/commercial-fishing/fisheries-catch-and-landings-reports-alaska#goa-groundfish) unless otherwise noted.

(6) The values used for 2025 and 2026 were from modified assessments for selected species, rolled over (typically for Tiers 4-6) or based on updated projections. Note that projection values often assume catches and hence their values are likely to change (as are the Tiers 4-6 numbers when new data become available and/or is incorporated in the assessment).

Two-year OFL and ABC Determinations

Amendment 48/48 to the GOA and BSAI Groundfish FMPs, implemented in 2005, made a significant change with respect to the stock assessment process requiring proposed and final specifications for a period of at least two years. This requires providing ABC and OFL levels for the next two years in this cycle (Table 1). The 2025 harvest specifications (from Council recommendations in December 2023) are in place to start the fishery on January 1, 2025, but these will be replaced by final harvest specifications that will be recommended by the Council in December 2024. The final 2025 and 2026 harvest specifications will become effective when final rulemaking occurs in February or March 2025. 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 2026 ABC and OFL values recommended in next year's SAFE report are likely to differ from this year's projections for 2026 because of new information (e.g., survey, projections) 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 total year 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.

Stock assessment definitions and revised stock assessment schedule

The AFSC has developed Terms of Reference (TOR) for defining the types of stock assessments AFSC will produce and how these assessment types translate to national stock assessment definitions used in the NMFS next generation stock assessment improvement plan. Stock assessment document definitions are detailed in this draft document. The final TORs will be available in 2025, and the revised definitions will be posted publicly and included in future SAFE introductions. Below is a brief overview of the stock assessment types/definitions for reference:

Operational full assessment
- Formerly known as "full" or "benchmark"
- Considers all data, new model configurations, new modeling platform
- Full in-depth review required (Sept/Oct)

Operational update assessment
- Formerly known as a "full"
- Introduced to help improve efficiency and reduce workload
- Maintains model structure of previous full assessment, incorporates new data, minimal changes
- Reduced review requirements

Harvest projection
- Formerly known as "partial"
- Executive summary
- Runs projection model, reports new catches, catch/biomass or REMA model

Catch report
- Introduced to show off year assessments are considered and accounted for
- Reports recent catch, ABC, OFL

Based on consideration of stock prioritization including assessment methods and data availability, some stocks are assessed on an annual basis while others are assessed less frequently. The following table provides an overview of the level of assessment presented in this year's SAFE report, the Tier level and schedule, as well as the year of the next operational assessment (full or update) by stock.

Alaska Fisheries Science Center's GOA Groundfish stock assessment frequency schedule 2024-2027. OP is operational full or update, HP is harvest projection, CR is catch report, and NA is nothing.

Stock	Tier	Freq.	Last Full	2024	2025	2026	2027
Pollock	3	1	2023	OP	OP	OP	OP
Pacific cod	3	1	2023	OP	OP	OP	OP
Sablefish	3	1	2023	OP	OP	OP	OP
Dusky rockfish	3	2	2022	OP	HP	OP	HP
Northern rockfish	3	2	2022	OP	HP	OP	HP
Pacific ocean perch	3	2	2023	HP	OP	HP	OP
Rougheye & blackspotted rockfish	3	2	2023	HP	OP	HP	OP
Shortraker rockfish	5	2	2023	CR	OP	CR	OP
Skates	5	2	2023	CR	OP	CR	OP
Thornyheads	5	2	2022	OP	CR	OP	CR
Demersal shelf rockfish	4, 5, 6	2	2022	OP	CR	OP	CR
Other rockfish	4, 5, 6	2	2023	CR	OP	CR	OP
Forage species (w/ squid)	Ecosys rep.	2	2022	OP	NA	OP	NA
Arrowtooth flounder	3	4	2021	HP	OP	HP	HP
Flathead sole	3	4	2022	HP	HP	OP	HP
Rex sole	3	4	2021	HP	OP	HP	HP
Atka mackerel	6	4	2021	CR	OP	CR	CR
Octopus	6	4	2021	CR	OP	CR	CR
Shallow water flatfish (incl. N/S rock sole)	3, 5	4	2021	HP	OP	HP	HP
Deep water flatfish (incl. Dover sole)	3, 6	4	2023	HP	HP	HP	OP
Sharks	5, 6	4	2022	CR	CR	OP	CR
Grenadiers	Ecosys rep.	4	2020	OP	NA	NA	NA
Sculpins	Ecosys rep.	4	2023	NA	NA	NA	OP

Economic Summary of the GOA commercial groundfish fisheries in 2022-2023
The Economic SAFE report contains detailed information about economic aspects of the groundfish fisheries, including figures and tables that report historical catch, finished production, and ex-vessel and wholesale value, for harvesting and processing sectors for a range of factors (gear, species, management area, product type), and a set of economic performance indices. The report includes a section summarizing in-season catch and ex-vessel revenue estimates for groundfish and halibut, and wholesale market profiles for the most commercially valuable species. Data tables in the Economic SAFE report are organized into four sections: (1) All Alaska, (2) BSAI, (3) GOA, and (4) Pacific halibut. 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; fishing effort; and crew employment. The data behind the tables from this and past Economic SAFE reports are publicly available online at https://reports.psmfc.org/akfin.

Summary of ex-vessel, and first wholesale, changes in Alaska, and the GOA
The ex-vessel value of all Alaska domestic fish and shellfish catch, which represents the amount paid to harvesters for fish caught, and the estimated value of pre-processed fish species that are caught by catcher/processors, decreased from $2,120 million in 2022 to $1,565 million in 2023 (real 2023$). The first wholesale value of 2023 groundfish catch after primary processing was $2,559 million, an increase from the 2022 value of $2,698 million. The 2023 total quantity of groundfish catch increased by 9%, because of increased pollock (*Gadus chalcogrammus*) harvest in the BSAI and GOA, and the total first wholesale value of groundfish catch decreased by 5%, relative to 2022. The fall in wholesale prices for pollock, cod, and sablefish, more than offset the increase in catch, explaining the decreased 2023 first wholesale value over 2022.

The groundfish fisheries collectively accounted for the largest share (55%) of the ex-vessel value of all commercial fisheries off Alaska in 2023, with $859 million in revenue, while the Pacific salmon (*Oncorhynchus spp.*) fishery was second with $434 million, or 28% of the total Alaska ex-vessel value. The ex-vessel value of the shellfish fishery amounted to $157 million, or 10% of the total for Alaska. The ex-vessel value of Pacific halibut (*Hippoglossus stenolepis*) was $94 million, or 6% of the total for Alaska in 2023.

According to data reported in the current Economic SAFE report, the total real (i.e., inflation-adjusted) ex-vessel value of Gulf of Alaska (GOA) groundfish decreased by 34% from $202 million in 2022 to $133 million in 2023 (Figure 3), and real first-wholesale revenues from the processing and production of groundfish in the GOA decreased by 24% between 2022 ($397million) and 2023 ($301 million) (Figure 4). The total quantity of groundfish products from the GOA increased by 4% from 2022 (90 thousand metric tons) to 2023 (93 thousand metric tons).

Decomposition of the change in first-wholesale revenues from 2022-2023 in the GOA
The following brief analysis summarizes the overall nominal revenue changes that occurred from 2022 to 2023 and the quantity produced, and revenue generated from GOA groundfish and how revenues have been affected by changes in quantity or prices of each species and product group (Figure 5). Unlike the numbers cited above, these values are not adjusted for inflation, so enable a simple comparison of how changes in the price and quantity for each group contribute to the overall change in first-wholesale revenues for groundfish from 2022 to 2023 in the GOA. In results presented by species group, large negative price and quantity effects for sablefish resulted in a negative net effect of $55 million. A negative price effect for pollock outweighed a positive quantity effect for a negative net effect of $4 million (Figure 5, top panel). For Pacific cod, negative price and quantity effects combined to produce a negative net effect of $17 million. Rockfish also experienced a negative price effect, which outweighed a positive quantity effect, for a negative net effect of $4 million. Atka mackerel, flatfish, and other species did not exhibit much change, with negative effects of less than $1 million.

In results by product group, negative price and quantity effects for whole fish and head & gut contributed to a negative net effect of $71 million in the GOA first-wholesale revenue decomposition for 2022 to 2023 (Figure 5, bottom panel). A negative price effect for fillets resulted in a negative net effect of $14 million. For surimi, a negative price effect offset a positive quantity effect. For roe, a positive quantity effect barely outweighed a negative price effect which resulted in a positive net effect of $1 million. For other products, a positive price effect produced a positive net effect of $2 million.

In summary, the changes in first-wholesale revenues from the GOA groundfish fisheries decreased by $82 million from 2022 to 2023 due to negative price effects worth $76 million combined with negative quantity effects worth $6 million. These negative effects were concentrated in the whole head & gut, and fillet, products, price effects for sablefish and pollock, and quantity effects for sablefish and cod.
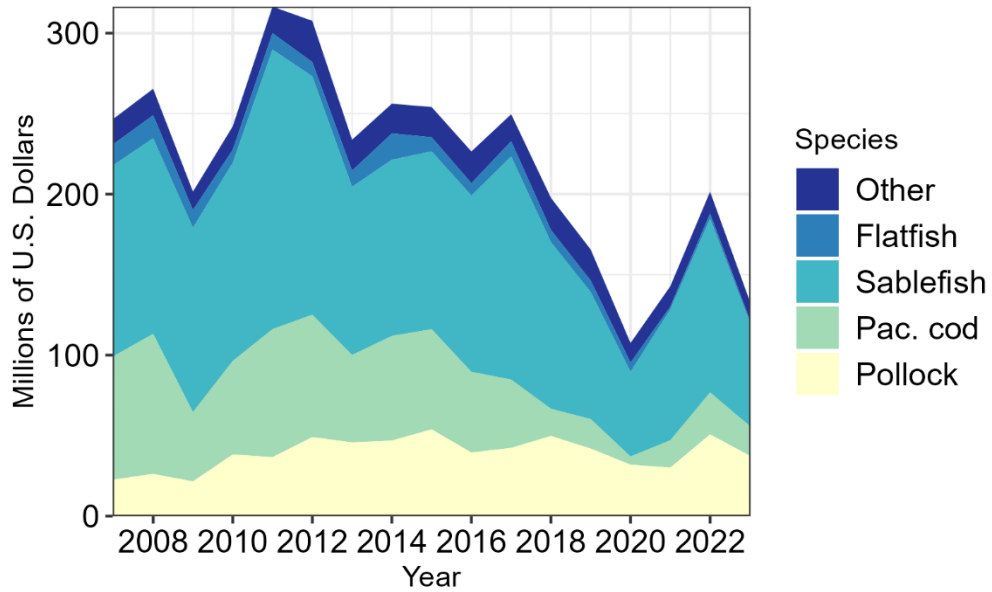
Figure 3.   Real (2023 dollars) ex-vessel value of the groundfish catch in the domestic commercial fisheries in the GOA area by species, 2007-2023.
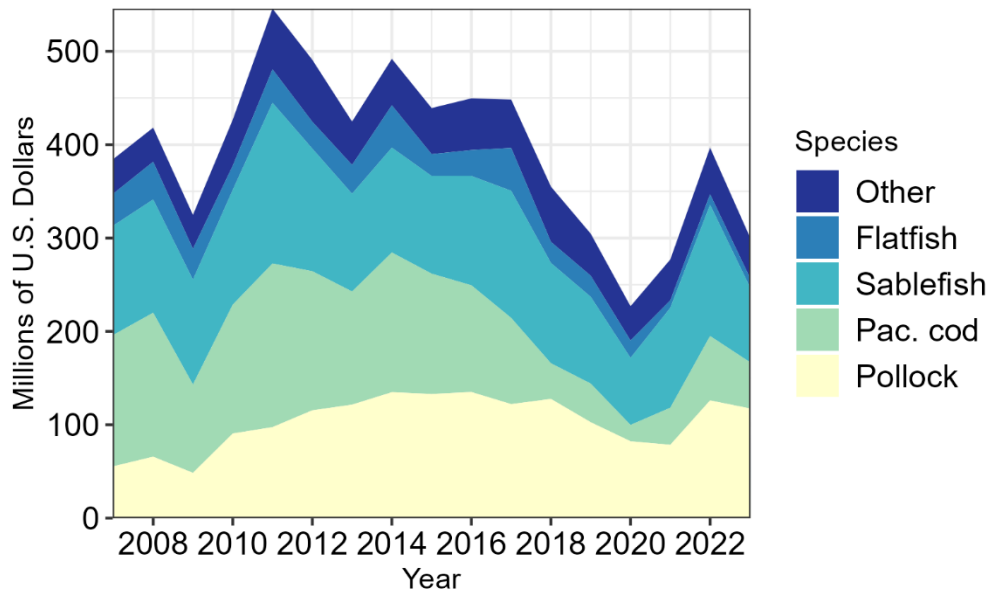
Figure 4.   Real (2023 dollars) gross product value of the groundfish catch in the GOA area by species, 2007-2023.

GOA First-Wholesale Revenue Change in 2022-2023 Decomposed by Species Group

GOA First-Wholesale Revenue Change in 2022-2023 Decomposed by Product Group
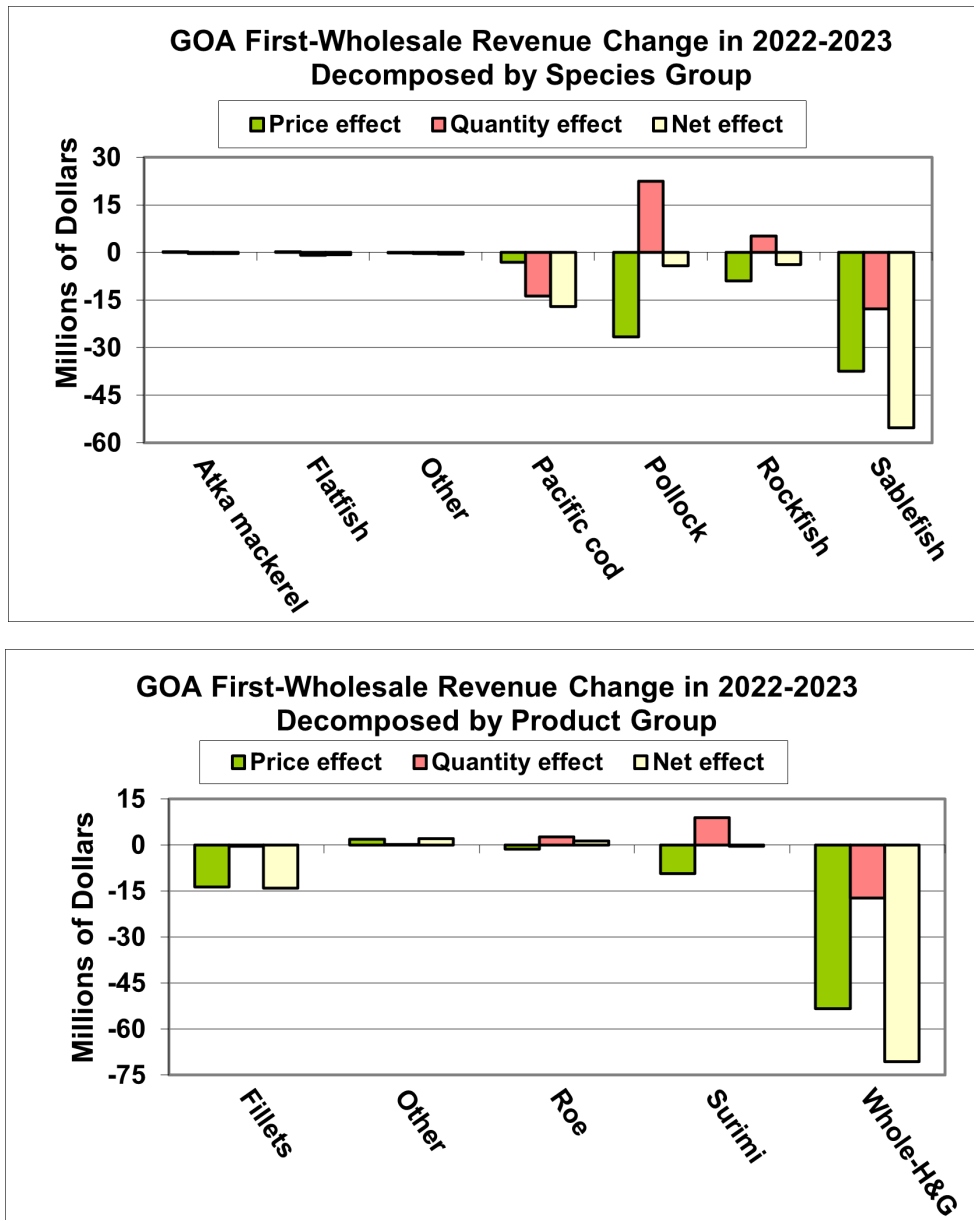
Figure 5.   Decomposition of the change in first-wholesale revenues from 2022 to 2023 in the GOA management area. The first decomposition is by the species groups used in the Economic SAFE report, and the second decomposition is by product group. The price effect refers to the change in revenues due 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).

Ecosystem Considerations summary

The following summaries are extracted from the GOA ecosystem status report. The GOA marine ecosystem experienced a relatively productive year in 2024, generally higher and more spatially consistent than 2023. The winter El Niño conditions were more moderate than expected, although surface and deeper waters did experience some associated warming. Some highlights of the year include indicators of above average primary and secondary (zooplankton) production, suggesting a good prey base for forage fish, juvenile and plankton-eating adult groundfish, and seabirds. Capelin populations continue to rebound across the GOA, and herring populations continue to persist at relatively high levels in Southeast AK. Humpback whale crude birth rates in the Eastern GOA recovered to pre-2014 values for the first time since their post marine heatwave decline. Conversely, GOA commercial salmon landings were some of the lowest since 1985, driven by unexpected low returns of pink salmon in Prince William Sound. While the GOA continues to warm over the long term, 2025 is predicted to be cooler than the 1991–2020 average due to developing La Niña conditions.

Western Gulf of Alaska 2024 Report Card

- Winter average PDO index (Dec–Feb; 1980–2024) continued its negative trend in 2024, despite a positive ENSO index (El Niño event).

- Sea-surface temperatures in the summer (°C) (Jun–Aug) in the Western GOA were approximately average (baseline 1985–2024), slightly warmer than 2023.

- Copepod biomass (g m^{-3}) was one standard deviation below average (1998–2023) in 2023, indicating below average foraging conditions for planktivorous predators. Total (large and small) calanoid copepods are surveyed south of Seward in May of each year. Euphausiid biomass was above average during the same time period. These data have not been updated since 2023.

- Copepod community size (ratio of large calanoid copepods to total calanoid copepods) remained elevated in 2023, close to one standard deviation above average (1998–2023), indicating increased large copepods in the community, relative to small copepods. Total (large and small) calanoid copepods are surveyed south of Seward in May of each year. These data have not been updated since 2023.

- Motile epifauna biomass (1,000 t) increased from 2021 to 2023 and is near the long-term mean (1984–2023). The biomass of this guild is dominated by hermit crabs, brittle stars, other echinoderms, and octopus. In 2023, brittle star biomass declined from 2021 while the biomass of hermit crabs, octopus, and other echinoderms all increased. These data have not been updated since 2023 due to biennial NOAA bottom trawl surveys.

- Capelin abundance (proportion of diet by weight), as sampled by rhinoceros auklets at Middleton Island (Apr–Aug; 1986–2024), continued a multi-year increase in seabird chick diets to slightly above the long-term mean, reflecting a continued rebounding capelin population in the GOA.

- Fish apex predator biomass (1,000 t) decreased from 2021 to 2023 and is more than one standard deviation below the long-term mean (1984–2023). The biomass trends for apex predators, as sampled by NOAA's bottom trawl survey, are primarily driven by arrowtooth flounder, Pacific cod, Pacific halibut, and sablefish. In 2023, arrowtooth flounder, Pacific halibut, and sablefish all declined from 2021 and are below their long-term means. Sablefish surveyed biomass declined due to the shift of large young year classes maturing and moving to deeper slope habitat, out of the survey area. Pacific cod biomass increased from 2021 to 2023 but remains below their long-term mean. These data have not been updated since 2023 due to biennial NOAA bottom trawl surveys.

- Black-legged kittiwake reproductive success during June and July 2024 at the Semidi Islands, slightly increased from the reproductive failure of 2023 but remain well below the long-term average (1980–2023).

- Western Gulf of Alaska Steller sea lion non-pup model predicted counts continued a slightly decreasing trend from previous years, remaining within one standard deviation of the long-term mean (1980–2021). These data have not been updated since 2021 due to lack of GOA surveys.

Eastern Gulf of Alaska 2024 Report Card
- Multivariate El Nino Southern Oscillation (ENSO) Index was positive, El Niño conditions in 2024, after three consecutive La Niña (negative ENSO index) winters. The ENSO transitioned to neutral values in the spring of 2024 and is predicted to develop a negative index value (La Niña) in the fall of 2024.

- Sea-surface temperatures (°C) in the summer of 2024 (Jun–Aug), were approximately average (1985–2023) in the Eastern GOA.

- Total zooplankton density (# m^{-3}) in Southeastern Alaska inside waters (May–Aug) decreased from one standard deviation above long-term mean (baseline 1988–2023), to average, including a decrease in calanoid copepods. Euphausiid densities remained above average. This suggests below-average foraging conditions for planktivorous fish, seabirds, and mammals. These data have not been updated since 2023.

- Copepod community size (ratio of large calanoid copepods to total calanoid copepods) increased to one standard deviation above average in 2023 (May–Aug; 1997–2023). The copepod community is sampled in Icy Strait (Southeast Alaska Inside waters). This suggests above average quality zooplankton prey in SEAK inside waters (but at lower biomass). These data have not been updated since 2023.

- Motile epifauna biomass (1,000 t) has decreased from 2021 to 2023 and is below the long-term mean. Eelpouts, hermit crabs, brittle stars, and other echinoderms are dominant components of this guild. Brittle stars have decreased from 2021 to 2023 and are one standard deviation below their long-term mean, while eelpouts, hermit crabs, and other echinoderms have increased from 2021 to 2023. These data have not been updated since 2023 due to biennial NOAA bottom trawl surveys.

- Estimated total mature herring biomass (age 3+) of Sitka herring in spring 2023 remains one standard deviation above average (1980–2023) continuing a 5-year trend of the largest values in the time series (since 1980) due to strong 2016- and 2020-year classes. The two populations with ocean influence (Sitka Sound and Craig) were elevated while populations in Southeastern AK inner waters and Prince William Sound increased but remained low. These data have not been updated since 2023.

- Fish apex predator biomass (1,000 t) has increased 79% from 2021 to 2023 and is more than one standard deviation above their long-term mean. Apex predator biomass in the eastern GOA is primarily driven by arrowtooth flounder and Pacific halibut, both of which increased in survey- estimated biomass by more than 100% from 2021 to 2023. Pacific cod biomass continued to increase in 2023 from their low in 2017 and are above their long-term mean. These data have not been updated since 2023 due to biennial NOAA bottom trawl surveys.

- Growth rates of piscivorous rhinoceros auklet chicks in June and July (g d^{-1}) decreased from 2023 and remain one standard deviation below the long-term mean in 2024 (1995–2023), reversing a multi-year increasing trend.

- Eastern Gulf of Alaska Steller sea lion non-pups model predicted counts continue a decreasing trend but remain above one standard deviation of the long-term mean (1980–2021) through 2021. However, counts suggest that non-pup have been lower than predicted in 2019 and 2017. These data have not been updated since 2021 due to lack of GOA surveys.

1. Walleye pollock

Status and catch specifications (t) of pollock and projections for 2025 and 2026. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year (age 3+ for W/C/WYAK and survey biomass for SEO). The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data were through November 1st, 2024.

The GOA-wide and W/C/WYAK ABCs listed in this table are before reductions for the Prince William Sound GHL. However, the federal TACs from earlier years reflect reductions from the ABC due to State waters GHL. State waters GHL was computed as 2.5% of the total W/C/WYAK ABC.

Area	Year	age-3+ Biomass	OFL	ABC	TAC	Catch
W/C/WYAK	2023	1,137,330	173,470	148,938	145,215	131,841
	2024	1,154,403	269,916	190,740	185,971	124,219
	2025	1,269,931	210,111	181,022		
	2026		153,971	133,075		
SEO	2023	50,500	15,150	11,363	11,363	0
	2024	43,328	12,998	9,749	9,749	0
	2025	43,328	12,998	9,749		
	2026		12,998	9,749		
GOA-wide	2023	1,187,830	188,620	160,301	156,578	131,841
	2024	1,197,731	282,914	200,489	195,720	124,219
	2025	1,313,259	223,109	190,771		
	2026		166,969	142,824		

Changes from the previous assessment
There were several changes to this year's pollock assessment model compared to the previous assessment. These changes included (1) updated Coefficients of Variation (CV) for biomass indices and input sample sizes for age compositions for the survey data used in the assessment, (2) an environmental covariate on catchability for the Shelikof Strait survey was incorporated, (3) age-1 and -2 indices from the Shelikof Strait survey were removed, and (4) the Dirichlet-multinomial likelihood replaced the multinomial for all age compositions. Data were updated through the current year.

Spawning biomass and stock trends
Total estimated biomass for 2025 increases from the 2024 estimate, though the spawning stock is projected to decline in 2025 and 2026 as the 2012 year-class is further reduced in abundance. New survey data in 2024 include the winter Shelikof Strait acoustic survey and the ADF&G bottom trawl survey. These survey indices showed similar trends, with increases in the winter acoustic (12.0%) and ADF&G bottom trawl survey (17.3%) from 2023.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Spawning biomass is above $B_{40\%}$ thereby placing W/C/WYAK Gulf of Alaska pollock stock in Tier 3a. The Team supported the model estimates for pollock in the Gulf of Alaska west of 140W longitude. Pollock ABCs and OFLs in SEO Alaska were based on Tier 5 using 1990-2023 survey biomass estimates. This resulted in a 22.2% decrease in the 2025 recommended ABC compared to the 2024 ABC.

Status determination
The Gulf of Alaska pollock stock is not being subjected to overfishing and is neither overfished nor approaching an overfished condition.

Year	W (610)	C (620)	C (630)	WYAK	SEO	PWS GHL	Total
2025	37,344	82,265	51,605	5,282	9,749	4,526	190,771
2026	27,453	60,477	37,936	3,883	9,749	3,326	142,824

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 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	age-0+ Biomass	OFL	ABC	TAC	Catch
2023	163,477	29,737	24,634	18,103	16,095
2024	184,242	38,712	32,272	23,766	19,106
2025	177,497	38,688	32,141		
2026		36,459	30,193		

Changes from the previous assessment
The author and Plan Team recommended model (Model 24.0). This model includes a series of changes in data processing affecting the standard deviation of population indices, length composition data, and seasons for AFSC trawl survey conditional length-at-age. Additionally, the estimation of forecast recruitment parameters is removed, the ageing error matrix is updated, the Alaska Fish and Game length composition data is more fully utilized, and the bin size for the length composition data increased from 1 cm to 5 cm. Estimates of biomass and recruitment for model 24.0 is consistent with the scale and trends obtained from the 2023 assessment.

Spawning biomass and stock trends
Total biomass and spawning biomass over time have shown sharp declines from 2014-2018 and have increased since 2018. The 2025 projected spawning biomass is $B_{28.7\%}$ (i.e., approximately 30% of the unfished value and below $B_{40\%}$), which is nearly identical (relative to biological reference points) to the estimated value of $B_{29.7}\%$ for the 2024 spawning biomass from the 2023 assessment.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The GOA Pacific cod stock is determined to be in Tier 3b. The Team agreed with the author recommended ABC and OFLs. The Team concurred with the authors' conclusion that although there is an increased concern of a population dynamics risk related to low levels of abundance, this concern was not sufficient to recommend a reduction from the maximum permissible ABC.

Status determination
The stock is not being subject to overfishing, is not currently overfished, nor is it approaching a condition of being overfished.

Area apportionment
The area apportionments of ABC were obtained by application of the REMA model to the GOA trawl survey biomass estimates and are as follows:

Year	Western	Central	Eastern	Total
2025	8,710	20,506	2,925	32,141
2026	8,182	19,263	2,748	30,193

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. Beginning in 2020, the OFL was specified Alaska-wide (for both BSAI and GOA). The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Area	Year	Age-4+ Biomass	OFL	ABC	TAC	Catch
GOA Total	2023	317,000			23,201	16,393
	2024	317,000		22,596	22,596	15,686
	2025	305,000		24,038		
	2026			23,737		
AK Total	2023	621,000	47,390			
	2024	701,300	55,084	47,146		
	2025	633,000	58,532	50,111		
	2026		57,797	49,482		

Changes from the previous assessment
1. New data included in the author recommended assessment model 23.5 were:
2. Length data from the fixed gear fishery for 2023.
3. Length data from the trawl fisheries for 2023.
4. Age data from the longline survey and fixed gear fishery for 2023.
5. Finalized catch for 2023.
6. Preliminary catch for 2024, including non-commercial catch of sablefish in federal waters, and projected catch for the portion of the fishing year not yet completed.
7. Estimates of killer and sperm whale depredation in the fishery for 2024 were held constant at 2022 values.

There were no changes to the stock assessment model methodology in 2024.

Spawning biomass and stock trends
The model estimates that all year classes since 2014 have been at or well above the time series average, though the two most recent estimated year classes (2020 and 2021) are well below the recent (since 2014) mean. However, early indications from eastern Bering Sea (EBS) trawl fishery length data suggest that the 2022 year class (not estimated in the 2024 assessment) could be large. Growth in total biomass has leveled off over the last year (1% increase), which follows a tripling of the population from a time series low of 234,000 t in 2015 to 705,000 t in 2024. Conversely, spawning stock biomass (SSB) grew by 20% in 2024, representing a more than doubling of the spawning population from the time series low of 83,000 t in 2018 to 191,000t in 2024. Thus, the sablefish population continues to grow rapidly, where total biomass is at the fifth highest level on record and SSB is nearing levels observed in the mid-1980s. Currently, the SSB in 2024 is at 63% of the unfished SSB (i.e., B100%). Additionally, the sablefish age structure continues to gradually expand as the recent large year classes (e.g.,2014) begin to enter ages that are nearing full maturity. For instance, the 2014 year class is now 10 years old and around 90% mature, while the larger 2016 year class is 8 years of age and 67% mature. The abundance of the 2014—2019

cohorts remain high as they age, which is a positive sign for the sablefish population. However, there remains a lack of fully mature sablefish age classes (i.e., greater than 10 years of age), and these recent year classes may need to support the population and fishery for a decade or more. The imbalance in the age structure is apparent given that the 2014 through 2021 cohorts comprise more than 81% of the projected 2025 SSB.

Fishery dynamics for sablefish are rapidly fluctuating due to changes in gear utilization (i.e., a transition from predominantly hook-and-line gear to pot gear), the influx of low value small fish, and market saturation leading to reduced value. Due to biological and socioeconomic drivers, catch has been well below acceptable biological catch (ABC) with the proportion of the quota utilized averaging ~71% over the last three years and projected to be <50% in 2024. Stakeholders have been pursuing changes to the full retention requirement for sablefish through the North Pacific Fisheries Management Council (NPFMC) to allow for discarding of small, low-value fish.

Although the sablefish assessment model does not demonstrate any strong diagnostic issues, a number of moderate concerns with data inputs and model performance are worth monitoring. Poor market conditions led to the 2024 NOAA domestic longline survey for sablefish being canceled, which has caused increased uncertainty in assessment estimates of recent population growth and year class strength. Moreover, projections have been recently hindered by increasing overestimation of ABC utilization in future years, but this leads to overly pessimistic projections and is not a major concern for management advice. Resolving trends in residual patterns is a priority for future assessments, primarily through improved modeling of sex specific sablefish dynamics. Generally, the population remains in a very healthy state, though continued expansion of the age structure is needed and should be monitored. Environmental and ecosystem conditions for sablefish remain generally favorable and near average conditions, while no fishery performance metrics indicate any biological concerns for the resource. Thus, there are no elevated risk table concerns for sablefish.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Sablefish are managed under Tier 3 of the NPFMC harvest control rule, which aims to maintain the population at B40%. Since projected female spawning biomass (combined areas) for 2025 is equivalent to B73%, sablefish is in sub-tier "a" of Tier 3. Spawning biomass is projected to increase rapidly in the near term, and the maximum permissible value of FABC under Tier 3a is 0.087, which translates into a Tier 3a maximum permissible 2025 ABC (combined areas) of 50,283 t. After adjusting for whale depredation, the final author recommended ABCw is 50,111 t (representing a 6% increase in the author recommended ABC from 2024). The OFL fishing mortality rate is 0.102, which translates into a 2025 OFL (combined areas) of 58,731 t, and results in a whale depredation adjusted OFLw of 58,532 t. The Teams agree with these recommendations.

Status determination
This stock is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition.

Area apportionment
Based on biological rationale, the SSC adopted a five-year average survey apportionment method in 2020. A five-year moving average of the longline survey proportions of biomass in each region are used to apportion catch to management area. The apportionment values are updated yearly as new survey data is collected. There was no longline survey in 2024, so apportionment remains unchanged from 2023. This gives the following area-specific ABCs (including deductions for estimated whale depredation):

Year	Western	Central	WYAK[*]	SEO[*]	GOA-wide	AK Total
2025	4,996	10,257	3,125	5,660	24,038	50,111
2026	4,934	10,128	3,086	5,589	23,737	49,482

[*]95:5 split in the EGOA following the trawl ban in SEO.

4. Shallow-water flatfish
Status and catch specifications (t) of shallow water flatfish and projections for 2025 and 2026. The shallow water flatfish (SWF) complex comprises of northern rock sole, southern rock sole, yellowfin sole, butter sole, starry flounder, English sole, sand sole and Alaska plaice. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	Biomass	OFL	ABC	TAC	Catch
2023	449,607	65,736	53,537	44,302	1,011
2024	453,606	68,121	55,565	45,478	2,808
2025	453,606	69,277	56,559		
2026		69,610	56,910		

Changes from the previous assessment
The shallow-water flatfish stock complex is assessed on a four-year schedule. The last full assessment was conducted in 2021. This year, the authors presented a harvest projection. Northern and southern rock sole are Tier 3a species and assessed separately from the other shallow water flatfish, which are Tier 5. This year's harvest projection includes results from the projection model for northern and southern rock sole, and results from the random effects model from the last operational assessment for the Tier 5 species. A full stock assessment document with assessment and projection model results is expected to be presented in November 2025.

Spawning biomass and stock trends
The shallow-water flatfish complex 2025 biomass estimate is a slight increase from the 2024 biomass estimate. Overall, biomass for shallow water flatfish is stable.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Northern and southern rock sole are in Tier 3a while the other species in the complex are in Tier 5. The OFL and ABC estimated for SWF species other than the rock soles were added to the management advice from the 2024 projection model for northern rock sole and southern rock sole to provide a SWF complex OFL and ABC. The Team agreed with author recommendations.

Status determination
Information was insufficient to determine stock status relative to overfished criteria for the complex. For the rock sole species, the projection model indicates they are not overfished nor are they approaching an overfished condition. Catch levels for this complex remain below the TAC and below levels where overfishing would be a concern.

Area apportionment
The recommended apportionment percentages based on the random effects model applied to survey
biomass estimates (including the 2023 GOA survey) for ABC are:

Year	Western	Central	WYAK	SEO	Total
2025	23,755	28,279	2,828	1,697	56,559
2026	23,902	28,455	2,846	1,707	56,910

5. Deep-water flatfish
Status and catch specifications (t) of deepwater flatfish (Dover sole and others) and projections for 2025
and 2026. Biomass for each year is for Dover sole only and corresponds to the model estimate associated
with the ABC for that year. The OFL and ABC for 2025 and 2026 are those recommended by the Plan
Team. Catch data are current through November 1st, 2024.

Year	age-3+ Biomass	OFL	ABC	TAC	Catch
2023	81,328	6,918	5,816	5,816	104
2024	86,182	8,387	7,062	7,062	91
2025	84,026	8,263	6,958		
2026		8,114	6,832		

Changes from the previous assessment
The deepwater flatfish complex is comprised of Dover sole, Greenland turbot, Kamchatka flounder, and
deepsea sole. Deep-water flatfish are on a 4-year assessment schedule. The last full assessment for the
Gulf of Alaska deepwater flatfish complex was conducted in 2023. This year, the authors presented a
harvest projection for Deep-water flatfish which includes results from the projection model for Dover
sole, and Tier 6 estimates based on the average catch for Greenland turbot, Kamchatka flounder, and
deepsea sole.

Spawning biomass and stock trends
The model estimate of 2025 spawning stock biomass for Dover sole is well above $B_{40\%}$ and is expected to
remain stable through 2026. Stock trends for Greenland turbot, Kamchatka flounder, and deepsea sole are
unknown.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
For ABC/OFL calculations, a Tier 3a approach was used for Dover sole and Tier 6 approaches were used
for Greenland turbot, Kamchatka flounder, and deepsea sole. OFLs and ABCs for the individual species
in the deepwater flatfish complex are determined and then summed for calculating complex-level OFLs
and ABCs. The Team agreed with the author's recommended ABC and OFL.

Status determination
The Gulf of Alaska Dover sole stock is not being subjected to overfishing and is neither overfished nor
approaching an overfished condition. Information is insufficient to determine stock status relative to
overfished criteria for Greenland turbot, Kamchatka flounder, and deepsea sole. Since Dover sole
comprises approximately 96% of the deepwater flatfish complex they are considered the main component
for determining the status of this stock complex. Catch levels for this complex remain well below the
TAC and below levels where overfishing would be a concern.

Area apportionment

The REMA random effects model was used to determine area apportionment for Dover sole. The Greenland turbot, Kamchatka flounder, and deepsea sole portion of the apportionment is based on the relative proportion of survey biomass of these species found in each area, averaged over the years 2001–2023. The ABC by area for the deepwater flatfish complex is the sum of the species-specific portions of the ABC. The area apportionment for 2025 and 2026 are as follows:

Year	Western	Central	WYAK	SEO	Total
2025	234	2,616	1,828	2,280	6,958
2026	231	2,568	1,795	2,238	6,832

6. Rex sole

Status and catch specifications (t) of rex sole and projections for 2025 and 2026. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	age-3+ Biomass	OFL	ABC	TAC	Catch
2023	127,297	25,135	20,664	20,664	411
2024	129,611	25,978	21,364	21,364	497
2025	129,835	26,002	21,387		
2026		25,743	21,173		

Changes from the previous assessment

The rex sole stock is assessed on a four-year schedule. A full stock assessment was conducted in 2021. This year a harvest projection was presented. The projection model was run using updated catches.

Spawning biomass and stock trends

Projected female spawning biomass is projected to be stable through 2026. Projected total biomass (3+) is stable with a slight decrease projected through 2026.

Tier determination/Plan Team discussion and resulting ABCs and OFLs

Rex sole are determined to be in Tier 3a. The Team concurred with the author's recommendation to use the maximum permissible ABC and corresponding OFL from the updated harvest projection.

Status determination

This stock is not being subjected to overfishing and is neither overfished nor approaching an overfished condition.

Area apportionment

Area apportionment for ABC of rex sole is currently based on the proportion of trawl survey biomass projected for each area using the REMA model.

Year	Western	Central	WYAK	SEO	Total
2025	3,382	13,698	1,436	2,871	21,387
2026	3,353	13,582	1,413	2,825	21,173

7. Arrowtooth flounder

Status and catch specifications (t) of arrowtooth flounder and projections for 2025 and 2026. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	age-1+ Biomass	OFL	ABC	TAC	Catch
2023	1,265,950	142,749	119,485	94,286	9,174
2024	1,295,410	142,485	119,249	94,141	16,866
2025	1,316,560	142,832	119,547		
2026		143,347	119,985		

Changes from the previous assessment
The arrowtooth flounder stock is assessed on a four-year schedule. A full stock assessment was conducted in 2021. This year a harvest projection was presented. The projection model was run using updated catches.

Spawning biomass and stock trends
Projected female spawning biomass is projected to slightly decrease through 2026. Projected total biomass (1+) is stable with a slight increase projected through 2026.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Arrowtooth flounder sole determined to be in Tier 3a. The Team concurred with the author's recommendation to use the maximum permissible ABC and corresponding OFL from the updated harvest projection

Status determination
This stock is not being subjected to overfishing and is neither overfished nor approaching an overfished condition.

Area apportionment
Area apportionment for ABC of arrowtooth flounder is currently based on the proportion of trawl survey biomass projected for each area using the REMA model.

Year	Western	Central	WYAK	SEO	Total
2025	33,593	68,261	6,695	10,998	119,547
2026	33,716	68,511	6,719	11,039	119,985

8. Flathead sole

Status and catch specifications (t) of flathead sole and projections for 2025 and 2026. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	age-2+ Biomass	OFL	ABC	TAC	Catch
2023	294,188	48,161	39,480	35,337	469
2024	294,616	49,414	40,503	35,880	908
2025	293,674	50,587	41,476		
2026		51,176	41,980		

Changes from the previous assessment
The flathead sole stock is assessed on a four-year schedule. The last full assessment was conducted in 2022. This year a harvest projection was presented. The projection model was run using updated catches.

Spawning biomass and stock trends
Projected female spawning biomass is projected to increase through 2026. Projected total biomass (3+) is stable with a slight decrease projected through 2026.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Flathead sole are determined to be in Tier 3a. The Team concurred with the author's recommendation to use the maximum permissible ABC and corresponding OFL from the updated harvest projection.

Status determination
This stock is not being subjected to overfishing and is neither overfished nor approaching an overfished condition.

Area apportionment
Area apportionment for ABC of flathead sole is currently based on the proportion of trawl survey biomass projected for each area using the REMA model.

Year	Western	Central	WYAK	SEO	Total
2025	13,592	21,817	3,970	2,097	41,476
2026	13,757	22,083	4,018	2,122	41,980

9. Pacific ocean perch

Status and catch specifications (t) of Pacific ocean perch and projections for 2025 and 2026. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	age-2+ Biomass	OFL	ABC	TAC	Catch
2023	636,129	44,302	37,193	37,193	29,761
2024	650,027	47,466	39,719	39,719	24,907
2025		46,562	38,962		
2026		44,826	37,509		

Changes from the previous assessment
The Pacific ocean perch stock is assessed on a two-year schedule. A full stock assessment was conducted in 2023. This year a harvest projection was presented. The projection model was run using updated catches. In 2023, the Plan Team and SSC recommended a GOA-wide OFL for POP for consistency with stock definition and stock status determination criteria.

Spawning biomass and stock trends
The estimate of spawning biomass for 2025 is above B40% and is projected to decrease slightly in 2026.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Pacific ocean perch are estimated to be in Tier 3a. The Team concurred with the author's recommendation to use the maximum permissible ABC and corresponding OFL from the updated harvest projection.

Status determination
The stock is not being subjected to overfishing and is neither overfished nor approaching an overfished condition.

Area apportionment
The following tables show the recommended apportionment for 2025 and 2026 ABCs from the random effects model.

Year	Western	Central	Eastern	Total
2025	1,753	28,209	9,000	38,962
2026	1,688	27,156	8,665	37,509

Amendment 41 prohibited trawling in the Eastern area east of 140° W longitude. The Team and authors consider the biomass in the W. Yakutat area (between 147° W and 140° W) to be fishable, and therefore estimate the proportion of biomass in this sub-region for ABC considerations. The proportion of biomass between the W. Yakutat and E. Yakutat/Southeast areas is unchanged from the 2023 assessment, and resulted in the following ABC apportionment of the Eastern Gulf area:

Year	WYAK	SEO	Total
2025	2,070	6,930	9,000
2026	1,993	6,672	8,665

10. Northern rockfish

Status and catch specifications (t) of northern rockfish and projections for 2025 and 2026. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	age-2+ Biomass	OFL	ABC[*]	TAC	Catch
2023	95,452	5,927	4,964	4,964	1,325
2024	94,319	5,750	4,815	4,815	1,132
2025	96,967	6,064	5,076		
2026		5,848	4,895		

*Note that 1 mt northern rockfish ABC apportionment from the Eastern Gulf is combined with the Other rockfish stock complex ABC in the West Yakutat management area for management purposes and is removed from the Team recommended ABC totals for northern rockfish.

Changes from the previous assessment
This year a full assessment was completed for northern rockfish. The following changes were made to input data:

- Update design-based and model-based (VAST) survey biomass estimates through 2023
- Update survey age compositions with 2023 data
- Update fishery age compositions with 2022 data
- Update final catch values for 2022 and 2023, and use preliminary catch for 2024
- Update weight-at-age with data through 2023
- Update size-at-age transition matrix with data through 2023
- Change survey age composition input sample sizes to reflect current best practices
- Update maturity-at-age ogive with data from Conrath (2019)

The following changes in assessment methodology were made:

- Change survey biomass negative log likelihood from a normal error structure to a lognormal error structure
- Base area apportionment on VAST model outputs instead of REMA-smoothed, design-based survey abundance
- Transition the model from ADMB to RTMB and move maturity estimation outside of model

Spawning biomass and stock trends
The projected 2025 spawning biomass estimate is above the $B_{40\%}$ estimate and is projected to decrease to
in 2026.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Northern rockfish are estimated to be in Tier 3a. The Team agreed with the authors' recommended model
m24 and to use the maximum permissible 2025 ABC and OFL values. This ABC is a 5 % increase from
the 2024 ABC.

Status determination
This stock is not being subjected to overfishing and is neither overfished nor approaching an overfished
condition.

Area apportionment
The authors proposed an alternative apportionment method based on using an area-specific model based
(VAST) approach that applies the same model structure as the VAST model used for the assessment
survey biomass index. The Team recognized this new alternative resulted in large changes to
apportionment but that there are no biological or conservation concerns to using either the new VAST
model-based approach or the status quo design-based approach. The Team also recognized that both
design- and model-based apportionment methods have pros and cons but agreed that the model-based
index of abundance using VAST may be a useful tool to pursue for apportioning this stock. The Team
ultimately recommended using the status quo approach for 2025. The Team noted that, based on
discussions, more research is needed before adopting the VAST modeling approach for apportionment.

The following table shows the recommended status-quo ABC apportionment for 2025 and 2026.

Year	Western	Central	Eastern[*]	Total
2025	1,396	3,680	1	5,076
2026	1,346	3,549	1	4,895

[*] Note that the small northern rockfish ABC apportionment from the Eastern Gulf is combined with the
Other rockfish stock complex ABC in the West Yakutat management area for management purposes
and is removed here from the Team recommended apportionments and ABC totals for northern
rockfish.

11. Shortraker rockfish
The last full/operational stock assessment was conducted in 2023. This year is a catch report, with ABC
and OFL values rolled over from last year's harvest specifications. Catch data are current through
November 1st, 2024.

Year	Biomass	OFL	ABC	TAC	Catch
2023	31,331	940	705	705	494
2024	28,768	863	647	647	343
2025		863	647		
2026		863	647		

Area apportionment
The method for shortraker rockfish is unchanged from previous years:

Year	Western	Central	Eastern	Total
2025	34	189	424	647
2026	34	189	424	647

12. Dusky rockfish

Status and catch specifications (t) of dusky rockfish and projections for 2025 and 2026. Biomass for each year corresponds to the projections given in the SAFE report issued in the preceding year. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	age-4+ Biomass	OFL	ABC	TAC	Catch
2023	107,160	9,638	7,917	7,917	3,489
2024	103,997	9,281	7,624	7,624	2,198
2025	85,912	7,705	6,338		
2026		7,319	6,021		

Changes from the previous assessment
This year a full assessment was completed for dusky rockfish. The following changes were made to input data:

- Include model-based (Vector Autoregressive Spatio-temporal [VAST]) survey biomass estimates for 2023
- Update survey age compositions with 2023 data
- Update fishery age compositions with 2022 data
- Update fishery size compositions with 2023 data
- Final catch values for 2022 and 2023, and use preliminary catch for 2024

The following changes in assessment methodology were made:

- The trawl survey biomass likelihood is changed from a normal error structure to the lognormal error structure

- A correction of the start year for the average recruitment calculation used for determining the abundance at the start of the first projection year and for use in the B_{100} and B_{40} calculations

- An alternative apportionment methodology is applied to determine proportion of biomass within each management area (Western, Central, and Eastern), which uses an area-specific model-based (VAST) index of abundance with similar model setup as the VAST model used in the assessment

Spawning biomass and stock status trends
The 2025 spawning biomass estimate above the $B_{40\%}$ estimate and is projected to decrease in 2026.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The dusky rockfish stock is in Tier 3a. The Team agreed with the authors' recommended model m22.5a and to use the maximum permissible 2025 ABC and OFL values. This ABC is a 17% decrease from the 2024 ABC. The decreases in biomass estimates and ABC/OFL are mainly attributed to the model updates with slight effects from the new input data. Catches in recent years remain well below ABC.

Status determination
The stock is not being subjected to overfishing, is not currently overfished, nor is it approaching an overfished condition.

Area apportionment
The authors proposed an alternative apportionment method based on using an area-specific model based (VAST) approach that applies the same model structure as the VAST model used for the assessment survey biomass index. The Team recognized this new alternative resulted in large changes to apportionment but that there are no biological or conservation concerns to using either the new VAST model-based approach or the status quo design-based approach. The Team also recognized that both design- and model-based apportionment methods have pros and cons but agreed that the model-based index of abundance using VAST may be a useful tool to pursue for apportioning this stock. The Team ultimately recommended using the status quo approach for 2025. The Team noted that, based on discussions, more research is needed before adopting the VAST modeling approach for apportionment.

The following table shows the recommended status-quo ABC apportionment for 2025 and 2026.

Year	Western	Central	Eastern	Total
2025	209	5,818	311	6,338
2026	199	5,527	295	6,021

Amendment 41 prohibited trawling in the Eastern area east of 140° W longitude. The ratio of biomass still obtainable in the W. Yakutat area (between 147° W and 140° W) is 0.69. This results in the following apportionment to the W. Yakutat area:

Year	WYAK	SEO	Total
2025	215	96	311
2026	204	91	295

13. Rougheye and blackspotted rockfish
Status and catch specifications (t) of rougheye and blackspotted rockfish and projections for 2025 and 2026. Biomass for each year corresponds to the projections given in the SAFE report issued in the preceding year. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	age-3+ Biomass	OFL	ABC	TAC	Catch
2023	25,837	930	775	775	436
2024	46,029	1,555	1,037	1,037	289
2025	46,360	1,576	1,180		
2026		1,631	1,203		

Changes from the previous assessment
The rougheye and blackspotted rockfish stock is assessed on a two-year schedule. A full stock assessment was conducted in 2023. This year a harvest projection was presented. The projection model was run using updated catches.

Spawning biomass and stock status trends
The estimate of spawning biomass for 2025 is above B40% and is projected to decrease slightly in 2026.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The rougheye/blackspotted complex qualifies as a Tier 3a stock.

In 2023, there were major concerns in the assessment and population dynamics categories of the risk table and a reduction from the maximum permissible ABC was recommended and adopted. Hence, this year the author put forth a recommended 2025 ABC that was calculated as the mean of the 2025 ABC specified last year and the 2025 maximum ABC estimated this year. Similarly, the recommended 2026 ABC was calculated as the mean of the 2025 ABC specified last year and the 2026 maximum ABC estimated this year. The Team agreed with the author recommended reductions from maximum permissible ABC for 2025 and 2026.

Status determination
The stock is not being subject to overfishing, is not currently overfished, nor is it approaching a condition of being overfished.

Area apportionment
The recommended apportionments for 2025 and 2026 are calculated using the two-survey random effects model. This method equally weights the longline and trawl survey indices.

Year	Western	Central	Eastern	Total
2025	224	359	597	1,180
2026	229	366	608	1,203

14. Demersal shelf rockfish
Status and catch specifications (t) of demersal shelf rockfish and projections for 2025 and 2026. Biomass for each year is for yelloweye rockfish only and corresponds to the model estimate associated with the ABC for that year. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Area	Year	Biomass	OFL	ABC	TAC	Catch
W/C/WYAK	2023	n/a	n/a	n/a	n/a	n/a
	2024	n/a	n/a	n/a	n/a	n/a
	2025		361	271	n/a	n/a
	2026		361	271	n/a	n/a
SEO	2023	17511	376	283	283	197
	2024		376	283	283	153
	2025	24912	524	394		
	2026	24912	524	394		

Changes from the previous assessment
The author gave an overview of the changes to assemblages and the associated tiers: DSR in W/C/WY) is Tier 6; DSR in the Southeast Outside is in Tier 6 (except yelloweye rockfish), and yelloweye rockfish in SEO is in Tier 5 and assessed using a two-index multi-area random effects model (REMA). There were some updates to the input data including updated ADFG ROV survey data for NSEO and EYKT and updated IPHC survey data for 2022 and 2023. A major change in the assessment is that it now includes DSR species in W/C/WY, which were previously assessed as part of the GOA Other Rockfish stock complex; all these species are managed as Tier 6.

The biggest methodological change was the yelloweye natural mortality value, which was changed from 0.02 to 0.044 in response to a CIE recommendation. In addition, the authors standardized the IPHC longline survey CPUE index and changed the CPUE units from numbers per hook to kg per hook. The CPUE index is used as a second index of abundance in the REMA model and is spatially stratified. The OFL and ABC for SEO are calculated by adding together the Tier 5-based quantities for SEO yelloweye and the Tier 6-based quantities for the other SEO DSR species in the complex.

Spawning biomass and stock trends
The estimated yelloweye rockfish biomass for SEO increased based the most recent ROV surveys (conducted in 2022 and 2023, respectively). For W/C/WY DSR, this is the first stock assessment with these species split out from the Other Rockfish complex.

The 2024 SEO yelloweye biomass increased 42% from the 2022 estimate, most of this increase is the result of a change in methodology adopted in this year's assessment.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The Team expressed concern for the large increase in natural mortality and discussed alternatives. The historically used value of M = 0.02, is based on a catch-curve analysis of yelloweye rockfish age data grouped into 2-year intervals (to avoid zero counts) between the ages of 36 and 96 (Green et al. 2015) and was previously recommended for this species. The Team also noted a newly published paper on a phylogenetically informed method for estimating M based on longevity and/or growth data that could be applied to this stock and compared to other methods (Thorson 2024). The Team concluded that more exploration of alternative methods for calculating M for SEO yelloweye rockfish is warranted before such a large shift away from M = 0.02 is recommended. Given these concerns, the Team recommended continuing to use M = 0.02 for yelloweye rockfish instead of the M = 0.044 value recommended by the author based on the CIE review. The Team disagreed with the authors' recommended ABC/OFL for SEO yelloweye rockfish that included a 20% reduction in maxABC based on the risk table analysis. Instead, The Team recommended using a natural mortality value of 0.02 applied to the new standardized IPHC CPUE index for determining maxABC/OFL for 2025. The Team agreed with the author's recommended ABC/OFLs for the remaining Tier 6 Southeast Outside and W/C/WY species.

Status determination
The DSR stock complex in the SEO district of the GOA is not being subjected to overfishing. Information is insufficient to determine stock status relative to overfished criteria as estimates of spawning biomass are unavailable.

Area apportionment
There are separate ABCs and OFLs for SEO DSR and for DSR in W/C/WYAK. DSR management in SEO is deferred to the State of Alaska and any further apportionment within the SEO District is at the discretion of the State. The ABC for W/C/WYAK is not apportioned further across subareas.

15. Thornyhead rockfish
Status and catch specifications (t) of thornyhead rockfish and projections for 2025 and 2026. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Catch data are current through November 1st, 2024.

Year	Biomass	OFL	ABC	TAC	Catch
2023	72,349	2,170	1,628	1,628	208
2024	72,349	2,170	1,628	1,628	164
2025	59,459	1,784	1,338		
2026		1,784	1,338		

Changes from the previous assessment
The thornyhead complex remains on a biennial assessment schedule with full assessments in even years and no stock assessments in odd years. The last full assessment for the thornyhead complex occurred in 2022. New information in this full assessment includes: 1) catch estimates though 2024; 2) Relative

Population Weights (RPW) from the 1992 to 2023 GOA longline survey (with no survey occurring in 2024); 3) GOA bottom trawl survey biomass from 1990 to 2023. These data were used in the Random Effects Multi-area model with an Additional survey (REMA) model.

Model 24.2 was used and includes a small update to the model 22.1 used in 2022. Specifically, model 24.2 specified a single value for the variance of process errors across all three regions, rather than estimating a separate value for process-error variance for each region in model 22.1.

Spawning biomass and stock trends
Estimates of spawning biomass are unavailable for thornyheads. Biomass continues to decline in the longline survey across all three regions. A decline is also evident in the bottom-trawl survey in the shallow stratum (0-500m).

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Thornyhead rockfish are in Tier 5. The Team concurred with the authors' recommendations for ABC and OFL for 2025 and 2026.

Status determination
The thornyhead complex is not being subjected to overfishing. Information is insufficient to determine stock status relative to overfished criteria as estimates of spawning biomass are unavailable.

Area apportionment
For apportionment of ABC/OFL, the REMA model was fit to area-specific biomass and RPWs, and subsequent proportions of biomass by area were calculated. The following table shows the recommended apportionment and ABC value by regulatory area for 2025.

Year	Western	Central	Eastern	Total
2025	206	590	542	1,338
2026	206	590	542	1,338

16. Other rockfish
Status and catch specifications (t) of the Other rockfish stock complex. Biomass estimates for 2025 and 2026 are based on the random effects model for Tier 4 and 5 species from the last full assessment. The OFL and ABC for 2025 and 2026 are those recommended by the Plan Team. Note that the 1 t EGOA ABC apportionment of Northern rockfish has been added for management purposes to the Other rockfish complex in WYAK of the EGOA. Catch data are current through November 1st, 2024.

Year	Biomass[1]	OFL	ABC[2]	TAC	Catch
2023	70,687	5,320	4,054	1,610	1,079
2024	70,299	4,977	3,774	1,653	541
2025	70,299	4,618	3,505		
2026		4,618	3,505		

[1]Total biomass estimates from the random effects model for the Tier 4/5 species only.

[2]The ABCs for past years include the transferred northern rockfish ABC to the Other Rockfish ABC. The total northern rockfish ABC is estimated in the northern rockfish assessment. The recommended ABCs (in 2025–2026) do not include DSR species, which were moved to a separate assessment beginning in 2024.

Changes from the previous assessment
Other rockfish are assessed on a biennial stock assessment schedule to coincide with the availability of new survey data. The last operational full assessment was conducted in 2023. However, an operational

update assessment has been provided this year as a result of removing DSR species from the GOA Other rockfish complex. Recommendations to remove the seven demersal shelf rockfish (DSR) species previously assessed in the Other rockfish complex in the W/C/WYAK areas to a separate W/C/WYAK DSR stock complex was approved at the December 2024 Council meeting for the 2024 assessment cycle and for implementation in the 2025 fisheries. The next operational assessment is scheduled for 2025.

New data included in the assessment are updated total catch for 2023 and partial year's catch for 2024 through the date specified.

There were no changes made to the assessment methodology. However, modifications in the species composition of the GOA Other rockfish complex, specifically in Tier 6 (decreasing from twenty-one species to fourteen species), changed the resulting ABCs and OFL. Harvest specifications for Tier 6 are based on the maximum catch from 2013 to 2022 for each species.

Spawning biomass and stock trends
Biomass estimates for 2025 and 2026 are based on the random effects model for Tier 4 and 5 species from the previous operational assessment. The estimated OR biomass is stable, <1% decline from 2023, and there is no evidence to suggest that overfishing is occurring. There is considerable variation in individual species biomass estimates, mostly attributed to sampling variation as many of these species are poorly sampled by the trawl survey.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The Team agreed with the authors that there are currently no apparent conservation concerns for OR, including concerns of overfishing this complex. The Team supported the authors' ABC and OFL recommendations.

Status determination
The OR complex is not being subjected to overfishing. Information is insufficient to determine stock status relative to overfished criteria as estimates of spawning biomass are unavailable.

Area apportionment
Area apportionment is based on the sum of random effects model biomass from last operational assessment (Tier 4 and 5 species) and catch history (Tier 6 species) by region. The Team recommends subarea apportionments for the combined W/C/WYAK area and for the SEO area. The Team recommends the following apportionments:

Year	W/C/WYAK	SEO	Total
2025	1,084	2,421	3,505
2026	1,084	2,421	3,505

17. Atka mackerel

The last full/operational stock assessment was conducted in 2021. This year is a catch report, with ABC and OFL values rolled over from last year's harvest specifications. Catch data are current through November 1st, 2024.

		GOA Atka mackerel, Tier 6			
Year	Biomass	OFL	ABC	TAC	Catch
2023		6200	4700	3000	925
2024		6200	4700	4700	760
2025		6200	4700		
2026		6200	4700		

Area apportionment
Atka mackerel are managed Gulf-wide.

18. Skates

The last full/operational stock assessment was conducted in 2023. This year is a catch report, with ABC and OFL values rolled over from last year's harvest specifications. Catch data are current through November 1st, 2024.

			Tier 5			
Species	Year	Biomass	OFL	ABC	TAC	Catch
Big Skate	2023	38,220	3,822	2,867	2,867	1,273
	2024	37,804	3,780	2,835	2,835	1,117
	2025		3,780	2,835		
	2026		3,780	2,835		
Longnose Skate	2023		3,616	2,712	2,712	1,180
	2024		3,380	2,536	2,536	716
	2025		3,380	2,536		
	2026		3,380	2,536		
Other Skates	2023		1,311	984	984	611
	2024		887	665	665	547
	2025		887	665		
	2026		887	665		

Area apportionment
Big and longnose skates have area-specific ABCs and Gulf-wide OFLs; other skates have a Gulf-wide ABC and OFL.

Year	Species	Western	Central	Eastern	Total
2025	Big skate	745	1,749	341	2,835
2026		745	1,749	341	2,835
2025	Longnose	104	1,894	538	2,536
2026		104	1,894	538	2,536
2025	Other skates				665
2026					665

19. Sharks

The last full/operational stock assessment was conducted in 2022. This year is a catch report, with ABC and OFL values rolled over from last year's harvest specifications. Catch data are current through November 1st, 2024.

Year	Biomass[*]	OFL	ABC	TAC	Catch
2023	31,243	6,521	4,891	4,891	1,963
2024		6,521	4,891	4,891	1,288
2025		6,521	4,891		
2026		6,521	4,891		

[*]Spiny dogfish random effects modelled biomass only.

Area apportionment
GOA sharks are managed Gulf-wide.

20. Octopus

The last full/operational stock assessment was conducted in 2021. This year is a catch report, with ABC and OFL values rolled over from last year's harvest specifications. Catch data are current through November 1st, 2024.

Year	Biomass	OFL	ABC	TAC	Catch
2023		1,307	980	980	191
2024		1,307	980	980	197
2025		1,307	980		
2026		1,307	980		

Area apportionment
GOA octopus are managed Gulf-wide.

Appendix 1. Forage Fish

The forage species ecosystem report for the Gulf of Alaska (GOA) and Bering Sea/Aleutian Islands (BSA) regions is prepared jointly. This joint report is presented to the Plan Teams and Council in even years. The report is not a formal stock assessment; it is a presentation of the available data on trends in abundance and distribution of forage populations and a description of their interactions with federal fisheries through bycatch. Forage species are a fundamental component of the GOA ecosystem, so there is overlap between the information presented here and in the Ecosystem Considerations report (https://www.npfmc.org/wp-content/PDFdocuments/SAFE/2024/GOAecosys.pdf).

The forage report primarily displays data from the GOA bottom trawl surveys. Estimated capelin abundance and biomass from the NMFS bottom trawl surveys had declined from near all-time highs in 2021 to historical averages in 2023, with greatest abundance in the Kodiak International North Pacific Fisheries Commission (INPFC) area. Eulachon increased slightly in 2023 compared to 2021 but remain relatively low compared compared to high abundances in 2001-2015. Eulachon were most abundant in the central Gulf. Magistrate armhook squid, most abundant in the western GOA, continued to increase and were near all-time high estimated abundance, biomass, and prevalence during 2023, up from all-time lows in 2017. Similarly, unidentified squid abundance was near all-time high and prevalence has shown a continual increase to 2023, the highest on record. After a positive trend in abundance and biomass of sidestripe shrimp since the mid-1980's, 2023 saw continued declines from all-time highs in 2019. Similarly, estimated abundance of unidentified shrimp declined since all-time highs in 2021 and estimated biomass fell to near-average values.

With the exception of squid, total incidental catches of the FMP forage group in 2024 remained low since 2022 compared to historical observations. Incidental catch of squid fell to a third of a large peak in 2023. Incidental catch of squid is greatest in the central GOA, and most consistently in the walleye pollock bottom trawl surveys. Incidental catch of pandalid shrimp has remained among the lowest since 2021. Prohibited species catch of herring mostly occurs in midwater trawl fisheries for pollock in the central GOA. Herring catch is generally low with some occasional larger catches and has continued to decline since a large catch in 2022.

Appendix 2. Grenadier

Grenadiers are managed as non-target species in in the GOA and are taken only as bycatch when directed fishing for other species. In 2015, a final rule was issued adding the grenadier stock complex as an Ecosystem Component to the GOA and BSAI Fishery Management Plans (FMPs) under Amendments 100/91. No ABCs or OFLs are adopted in the annual groundfish harvest specifications. However, the abbreviated SAFE report for the GOA was presented for tracking trends in abundance and catch. The New data for the GOA grenadier report include 1) updated catch data through October 7, 2024, 2) 2021 and 2023 GOA bottom trawl survey data, and 3) survey index estimates from the 2021-2023 GOA longline survey. In the GOA, survey data indicate that the biomass of giant grenadier was relatively low since 2020, and the REMA model indicates a decline that began in 2015. The biomass appears similar in the WGOA and the CGOA, but the EGOA is much lower with a less pronounced decline. The biomass predicted for 2025 is the lowest in the time series but the catch levels in recent years were quite small relative to this biomass and do not cause any concern.

Tables

Table 1.   Gulf of Alaska groundfish 2025-2026 OFLs and ABCs, 2024 TACs, and 2024 catch (reported through 11/1/24). Note totals depend on sablefish sums/areas.

Species	Area	2024			Catch	Plan Team recommended 2025		Plan Team recommended 2026	
		OFL	ABC	TAC	11/1/24	OFL	ABC	OFL	ABC
Pollock	State GHL	n/a	4,769	-	3,640	n/a	4,526	n/a	3,326
	W (610)	n/a	38,882	38,882	31,457	n/a	37,344	n/a	27,453
	C (620)	n/a	90,937	90,937	71,571	n/a	82,265	n/a	60,477
	C (630)	n/a	50,587	50,587	20,534	n/a	51,605	n/a	37,936
	WYAK	n/a	5,565	5,565	1,382	n/a	5,282	n/a	3,883
	Subtotal	269,916	190,740	185,971	124,944	210,111	181,022	153,971	133,075
	SEO	12,998	9,749	9,749	-	12,998	9,749	12,998	9,749
	Total	282,914	200,489	195,720	124,944	223,109	190,771	166,969	142,824
Pacific Cod	W	n/a	8,745	6,121	4,216	n/a	8,710	n/a	8,182
	C	n/a	20,590	15,442	14,401	n/a	20,506	n/a	19,263
	E	n/a	2,937	2,203	489	n/a	2,925	n/a	2,748
	Total	38,712	32,272	23,766	19,106	38,688	32,141	36,459	30,193
Sablefish	W	n/a	4,699	4,699	2,620	n/a	4,996	n/a	4,934
	C	n/a	9,651	9,651	6,698	n/a	10,257	n/a	10,128
	WYAK	n/a	2,926	2,926	2,295	n/a	3,125	n/a	3,086
	SEO	n/a	5,320	5,320	4,073	n/a	5,660	n/a	5,589
	GOA Total[1]	n/a	n/a	22,596	15,686	n/a	24,038	n/a	23,737
	AK Total	55,084	47,146	n/a	21,758	58,532	50,111	57,797	49,482
Shallow-Water Flatfish	W	n/a	23,337	13,250	63	n/a	23,755	n/a	23,902
	C	n/a	27,783	27,783	2,742	n/a	28,279	n/a	28,455
	WYAK	n/a	2,778	2,778	1	n/a	2,828	n/a	2,846
	SEO	n/a	1,667	1,667	1	n/a	1,697	n/a	1,707
	Total	68,121	55,565	45,478	2,807	69,277	56,559	69,610	56,910
Deepwater Flatfish	W	n/a	237	237	8	n/a	234	n/a	231
	C	n/a	2,655	2,655	78	n/a	2,616	n/a	2,568
	WYAK	n/a	1,856	1,856	3	n/a	1,828	n/a	1,795
	SEO	n/a	2,314	2,314	2	n/a	2,280	n/a	2,238
	Total	8,387	7,062	7,062	91	8,263	6,958	8,114	6,832
Rex Sole	W	n/a	3,367	3,367	23	n/a	3,382	n/a	3,353
	C	n/a	13,639	13,639	474	n/a	13,698	n/a	13,582
	WYAK	n/a	1,453	1,453	1	n/a	1,436	n/a	1,413
	SEO	n/a	2,905	2,905	-	n/a	2,871	n/a	2,825
	Total	25,978	21,364	21,364	498	26,002	21,387	25,743	21,173
Arrowtooth Flounder	W	n/a	30,409	14,500	486	n/a	33,593	n/a	33,716
	C	n/a	64,871	64,871	16,329	n/a	68,261	n/a	68,511
	WYAK	n/a	7,870	7,870	29	n/a	6,695	n/a	6,719
	SEO	n/a	16,099	6,900	22	n/a	10,998	n/a	11,039
	Total	142,485	119,249	94,141	16,866	142,832	119,547	143,347	119,985
Flathead Sole	W	n/a	13,273	8,650	145	n/a	13,592	n/a	13,757
	C	n/a	21,307	21,307	763	n/a	21,817	n/a	22,083
	WYAK	n/a	3,876	3,876	0	n/a	3,970	n/a	4,018
	SEO	n/a	2,047	2,047	0	n/a	2,097	n/a	2,122
	Total	49,414	40,503	35,880	908	50,587	41,476	51,176	41,980
Pacific ocean perch	W	n/a	1,787	1,787	1,667	n/a	1,753	n/a	1,688
	C	n/a	28,757	28,757	21,294	n/a	28,209	n/a	27,156
	WYAK	n/a	2,110	2,110	1,946	n/a	2,070	n/a	1,993
	SEO	47,466	39,719	39,719	24,907	46,562	38,962	44,826	37,509
	Total	n/a	2,535	2,535	315	n/a	1,396	n/a	1,346

Species	Area	2024			Catch	Plan Team recommended 2025		Plan Team recommended 2026	
		OFL	ABC	TAC	11/1/24	OFL	ABC	OFL	ABC
Northern Rockfish	W	n/a	2,280	2,280	817	n/a	3,680	n/a	3,549
	C	n/a	-	-	NA	n/a	-	n/a	-
	E	5,750	4,815	4,815	1,132	6,064	5,076	5,848	4,895
	Total	n/a	34	34	15	n/a	34	n/a	34
Shortraker Rockfish	W	n/a	189	189	137	n/a	189	n/a	189
	C	n/a	424	424	191	n/a	424	n/a	424
	E	863	647	647	343	863	647	863	647
	Total	n/a	145	145	71	n/a	209	n/a	199
Dusky Rockfish	W	n/a	7,365	7,365	2,122	n/a	5,818	n/a	5,527
	C	n/a	84	84	5	n/a	215	n/a	204
	WYAK	n/a	30	30	-	n/a	96	n/a	91
	SEO	9,281	7,624	7,624	2,198	7,705	6,338	7,319	6,021
	Total	n/a	197	197	51	n/a	224	n/a	229
Rougheye and Blackspotted Rockfish	W	n/a	315	315	140	n/a	359	n/a	366
	C	n/a	525	525	98	n/a	597	n/a	608
	E	1,555	1,037	1,037	289	1,576	1,180	1,631	1,203
	Total	1,555	1,037	1,037	289	1,576	1,180	1,631	1,203
Demersal shelf rockfish	W/C/WYAK	n/a	n/a	n/a	n/a	361	271	361	271
	SEO	376	283	283	153	524	394	524	394
Thornyhead Rockfish	W	n/a	314	314	35	n/a	206	n/a	206
	C	n/a	693	693	65	n/a	590	n/a	590
	E	n/a	621	621	64	n/a	542	n/a	542
	Total	2,170	1,628	1,628	164	1,784	1,338	1,784	1,338
Other Rockfish	W/C/WYAK	n/a	1,353	1,353	511	n/a	1,084	n/a	1,084
	SEO	n/a	2,421	300	30	n/a	2,421	n/a	2,421
	Total	4,977	3,774	1,653	541	4,618	3,505	4,618	3,505
Atka mackerel	Total	6,200	4,700	4,700	380	6,200	4,700	6,200	4,700
Big Skate	W	n/a	745	745	163	n/a	745	n/a	745
	C	n/a	1,749	1,749	815	n/a	1,749	n/a	1,749
	E	n/a	341	341	140	n/a	341	n/a	341
	Total	3,780	2,835	2,835	1,118	3,780	2,835	3,780	2,835
Longnose Skate	W	n/a	104	104	35	n/a	104	n/a	104
	C	n/a	1,894	1,894	461	n/a	1,894	n/a	1,894
	E	n/a	538	538	220	n/a	538	n/a	538
	Total	3,380	2,536	2,536	716	3,380	2,536	3,380	2,536
Other Skates	GOA	887	665	665	547	887	665	887	665
Sharks	GOA	6,521	4,891	4,891	1,288	6,521	4,891	6,521	4,891
Octopuses	GOA	1,307	980	980	197	1,307	980	1,307	980
TOTAL	-	765,608	599,784	520,020	214,879	709,422	593,268	649,064	541,769

Table 2.   2025 and 2026 Discard Mortality Rates for Vessels Fishing in the Gulf of Alaska. Values are percent of halibut assumed to be dead]

Gear	Sector	Groundfish fishery	Halibut discard mortality rate (percent)
Pelagic trawl	Catcher vessel	All	100
	Catcher/processor	All	100
Non-pelagic trawl	Catcher vessel	Rockfish Program	56
	Catcher vessel	All others	74
	Mothership and catcher/processor	All	76
Hook-and-line	Catcher/processor	All	10
	Catcher vessel	All	19
Pot	Catcher vessel and catcher/processor	All	32

Table 3.   Maximum permissible fishing mortality rates and ABCs as defined in Amendment 56 to the GOA and BSAI Groundfish FMPs, and the Plan Team's 2025 and 2026 recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum permissible.

		2025			
Species	Tier	$Max\ F_{ABC}$	Max ABC	F_{ABC}	ABC
Rougheye and blackspotted rockfish	3	0.038	1,319	0.034	1,180
		2026			
Species	Tier	$Max\ F_{ABC}$	Max ABC	F_{ABC}	ABC
Rougheye and blackspotted rockfish	3	0.038	1,365	0.034	1,203