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 Gulf of Alaska Groundfish 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 13-17, 2023 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), Craig Faunce, Sandra Lowe, Pete Hulson, Janet Rumble, Nat Nichols, Paul Spencer, Sara Cleaver, Abby Jahn, Kristan Blackhart, Cecilia O'Leary, and Ben Williams.

Management Areas and Species

The Gulf of Alaska (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 for the 2011 fisheries, these categories have been revised in Amendments 96 and 87 to the FMPs for Groundfish of the Bering Sea/Aleutian Islands (BSAI) and Gulf of Alaska (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

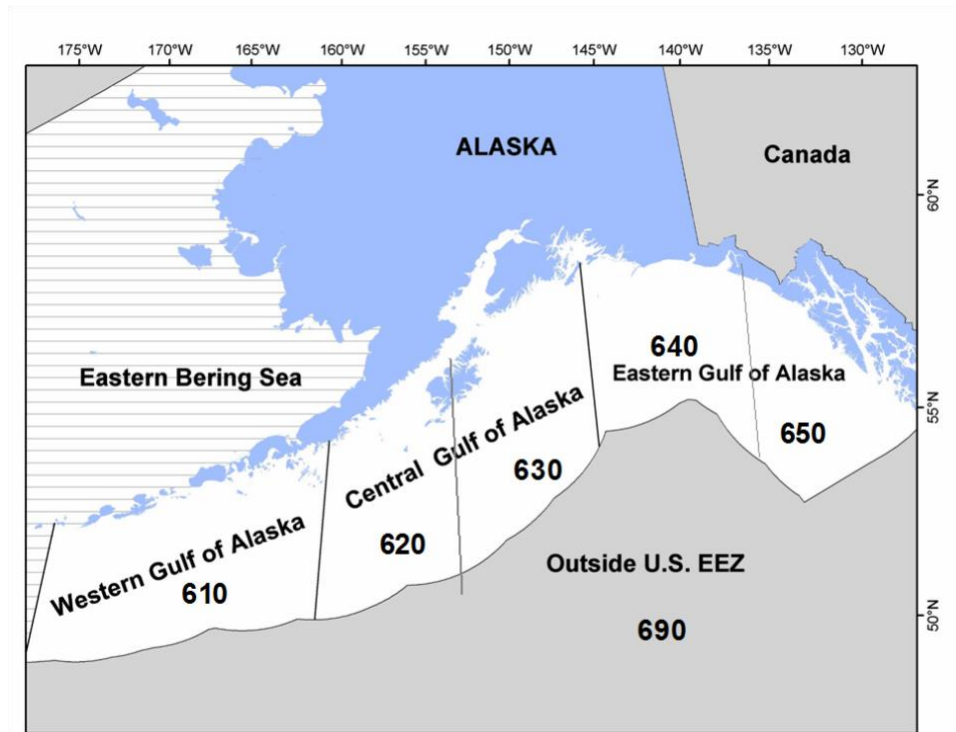FMPs in 2018. Amendments 110/121 moved sculpins to the Ecosystem Component category of the FMPs in 2020.

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 delegated to the State of Alaska
[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 Eastern Regulatory Area is specified by the Council each year. However, management of this fishery is deferred 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 Gulf of Alaska 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 but noted concern regarding the lack of a biomass-based allocation in PWS. The Plan Team deducted a value for the 2024 and 2025 PWS GHL (equal to 2.5% of the recommended 2024 and 2025 W/C/WY pollock ABCs) from the recommended 2024 and 2025 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 2024 and 2025 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}.*
- 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 2023 or 2) above ½ of its MSY level in 2023 and above its MSY level in 2033 under this scenario, then the stock is not overfished.)

Approaching an overfished condition (listed in each assessment as scenario 7):
In 2024 and 2025, 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 2025 or 2) above 1/2 of its MSY level in 2025 and expected to be above its MSY level in 2035 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.
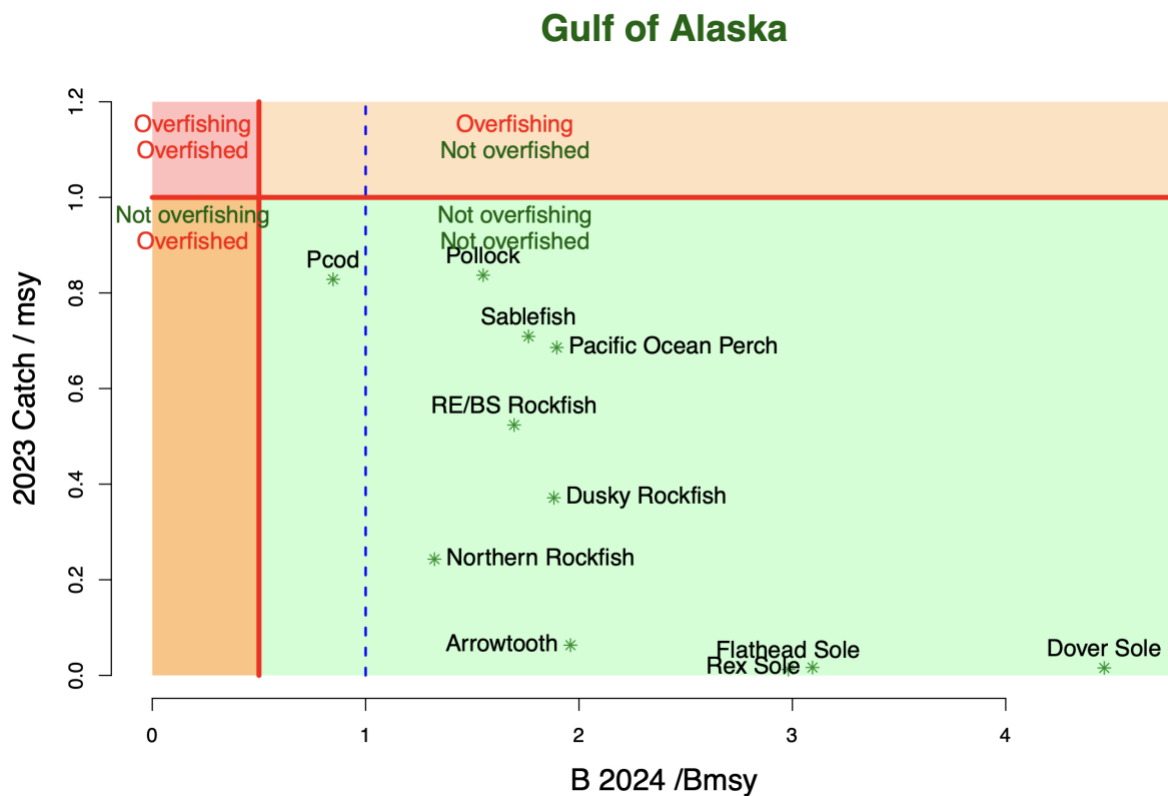
Figure 2.   Summary of Gulf of Alaska stock status next year (spawning biomass relative to B_{MSY}; horizontal axis) and current year catch relative to fishing at F_{MSY} (vertical axis). Note that sablefish is for Alaska-wide values including the BSAI catches.

Summary and Use of Terms

Table 1 provides a summary of the status of the groundfish stocks, including catch statistics, ABCs, and TACs for 2023, and recommendations for ABCs and overfishing levels (OFLs) for 2024 and 2025. ABCs and TACs are specified for each of the Gulf of Alaska regulatory areas illustrated in Figure 1. For 2024 and 2025, 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 2024 ABC for target species in the GOA (excluding sablefish, for which ABC is set Alaska-wide) is 594,441 t (514,874 t for 2025). The sums of the Plan Team's recommended 2024 and 2025 OFLs for target species in the GOA (again, excluding sablefish) are

710,524 and 617,972 t, respectively. For perspective, the sum of the 2023 TACs, not including the 2023 sablefish TAC, was 445,595 t and the sum of the ABCs was 498,570 t (and catch through November 9th, 2023, without sablefish was 200,116 t). The sum of GOA total TAC from 2023, including the GOA sablefish TAC of 23,201 t, is 468,796 t, which is within FMP-approved optimum yield (OY) of 116,000 - 800,000 t for the Gulf of Alaska.

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 2022 and 2023 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 2024 and 2025 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 2022 and 2023 that are reported in the following summaries were estimated by the assessments in *those* years. Comparisons of the projected 2024 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 2024 and 2025 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 2024 harvest specifications (from Council recommendations in December 2023) are in place to start the fishery on January 1, 2024, but these will be replaced by final harvest specifications that will be recommended by the Council in December 2023. The final 2024 and 2025 harvest specifications will become effective when final rulemaking occurs in February or March 2024. 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 2025 ABC and OFL values recommended in next year's SAFE report are likely to differ from this year's projections for 2025 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.

Revised Stock Assessment Schedule
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 Gulf of Alaska Groundfish stock assessment frequency schedule 2023-2026. OP is operational full or update, HP is harvest projection, CR is catch report, and NA is nothing.

Stock	Tier	Freq.	Last Full	2023	2024	2025	2026
Pollock	3	1	2022	OP	OP	OP	OP
Pacific cod	3	1	2022	OP	OP	OP	OP
Sablefish	3	1	2022	OP	OP	OP	OP
Dusky rockfish	3	2	2022	HP	OP	HP	OP
Northern rockfish	3	2	2022	HP	OP	HP	OP
Pacific ocean perch	3	2	2021	OP	HP	OP	HP
Rougheye & blackspotted rockfish	3	2	2021	OP	HP	OP	HP
Shortraker rockfish	5	2	2021	OP	CR	OP	CR
Skates	5	2	2021	OP	CR	OP	CR
Thornyheads	5	2	2022	CR	OP	CR	OP
Demersal shelf rockfish	4, 5, 6	2	2022	CR	OP	CR	OP
Other rockfish	4, 5, 6	2	2021	OP	CR	OP	CR
Forage species (w/ squid)	Ecosys rep.	2	2022	NA	OP	NA	NA
Arrowtooth flounder	3	4	2021	HP	HP	OP	HP
Flathead sole	3	4	2022	HP	HP	HP	OP
Rex sole	3	4	2021	HP	HP	OP	HP
Atka mackerel	6	4	2021	CR	CR	OP	CR
Octopus	6	4	2021	CR	CR	OP	CR
Shallow water flatfish (incl. N/S rock sole)	3, 5	4	2021	HP	HP	OP	HP
Deep water flatfish (incl. Dover sole)	3, 6	4	2019	OP	HP	HP	HP
Sharks	5, 6	4	2022	CR	CR	CR	OP
Grenadiers	Ecosys rep.	4	2020	NA	OP	NA	NA
Sculpins	Ecosys rep.	4	2023	OP	NA	NA	NA

Economic Summary of the GOA commercial groundfish fisheries in 2021-2022
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 $2,143 million in 2021 to $2,035 million in 2022 (real 2022$). The first wholesale value of 2022 groundfish catch after primary processing was $2,603 million, an increase from the 2021 value of $2,302 million. The 2022 total quantity of groundfish catch decreased by 7.5%, because of decreased pollock (*Gadus chalcogrammus*) harvest in the BSAI, and the total first wholesale value of groundfish catch increased by 13%, relative to 2021. The rise in wholesale prices for groundfish products in general, and above all, for pollock fillets, more than offset the decrease in catch, explaining the increased 2022 first wholesale value over 2021.

The groundfish fisheries collectively accounted for the largest share (46%) of the ex-vessel value of all commercial fisheries off Alaska in 2022, with $945 million in revenue, while the Pacific salmon (*Oncorhynchus spp.*) fishery was second with $775 million, or 38% of the total Alaska ex-vessel value. The ex-vessel value of the shellfish fishery amounted to $148 million, or 7% of the total for Alaska. Likewise, the ex-vessel value of Pacific halibut (*Hippoglossus stenolepis*) was $148 million, or 7% of the total for Alaska in 2022.

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 wholesale ex-vessel and first wholesale changes in Gulf of Alaska revenues

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 increased by 42% from $138 million in 2021 to $195 million in 2022 (Figure 3), and real first-wholesale revenues from the processing and production of groundfish in the GOA increased by 43% between 2021 ($268 million) and 2022 ($382.5 million) (Figure 4). The total quantity of groundfish products from the GOA increased by 22% from 2021 (73 thousand metric tons) to 2022 (90 thousand metric tons).

Decomposition of the change in first-wholesale revenues from 2021-2022 in the GOA

The following brief analysis summarizes the overall nominal revenue changes that occurred from 2021 to 2022 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 2021 to 2022 in the GOA.

In results presented by species group, large positive price and quantity effects for pollock resulted in a positive net effect of $50.9 million (Figure 5, top panel). For Pacific cod, a positive price and quantity effects combined to produce a positive net effect close to $30 million. Rockfish also experienced a positive price effect, which outweighed the negative quantity effect, for a positive net effect of $7.2 million. Atka mackerel did not exhibit much change, with negative effects of less than $1 million. Flatfish had a small positive price effect and a positive quantity effect that resulted in a net revenue increase, equal to $3.7 million. Sablefish exhibited a positive price effect and a very strong quantity effect that combined for a positive net effect of $40.1 million. The "Other" species group experienced a net revenue increase of $1.3 million.

In results by product group, positive price and quantity effects for fillets contributed equally to a positive net effect of $44.5 million in the GOA first-wholesale revenue decomposition for 2021 to 2022 (Figure 5, bottom panel). For surimi, positive price and quantity effects resulted in a positive net effect of $5.5

million. For roe, positive price and quantity effects resulted in a positive net effect of $6.1 million. For whole fish and head & gut, a strong positive price and quantity effects combined to produce a net positive effect of $73.9 million. For 'other' products, positive price and quantity effects produced a positive net effect of $2.7 million.

In summary, the changes in first-wholesale revenues from the GOA groundfish fisheries increased by $132.8 million from 2021 to 2022 due to positive price effects worth $62.3 million combined with positive quantity effects worth $70.5 million. These positive effects were concentrated in the whole head & gut, and fillet, products, a very strong price effect for pollock, and strong quantity effects for cod, pollock, and especially, sablefish.
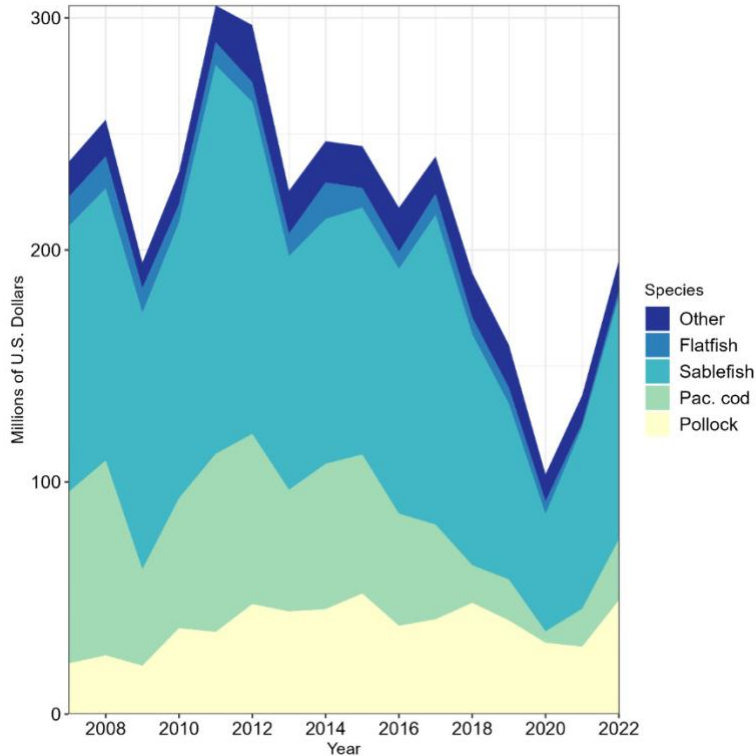
Figure 3.   Real (2022 dollars) ex-vessel value of the groundfish catch in the domestic commercial fisheries in the GOA area by species, 2007-2022.
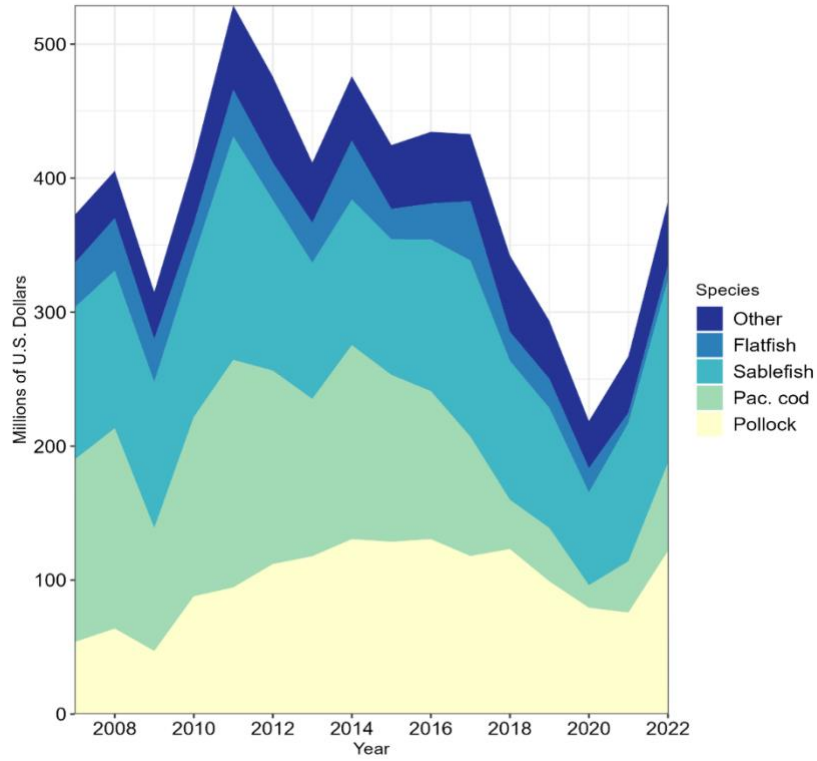
Figure 4. Real (2022 dollars) gross product value of the groundfish catch in the GOA area by species, 2007-2022.
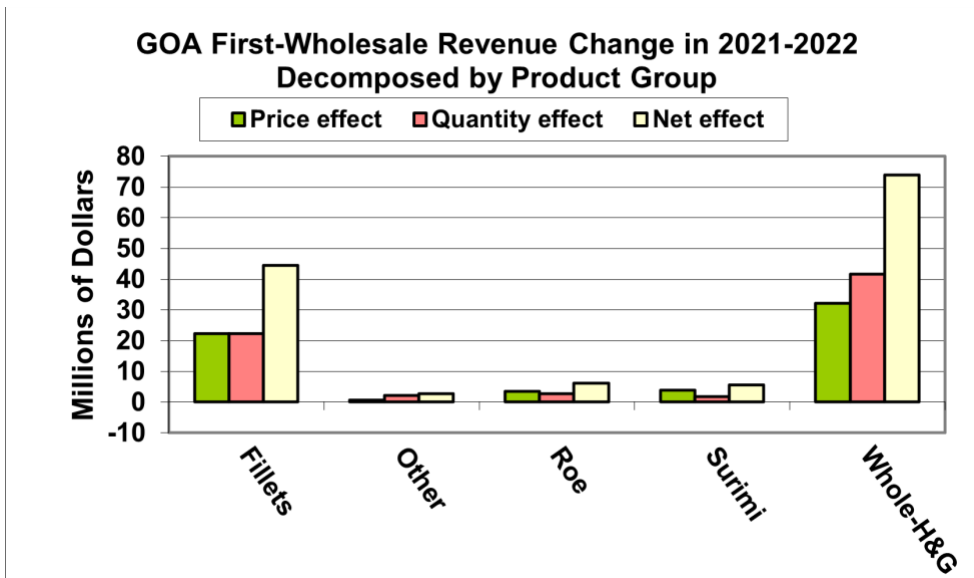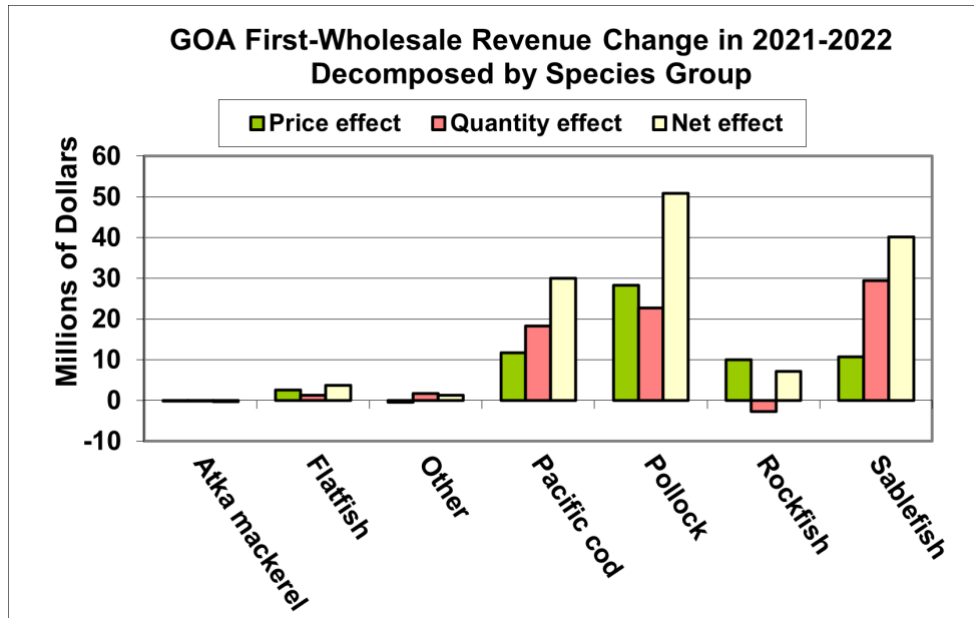
Figure 5. Decomposition of the change in first-wholesale revenues from 2021 to 2022 in the GOA management area. The first decomposition is by the species groups used in the Economic SAFE report, and the second decomposition is by product group. The price effect refers to the change in revenues due to 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 ecosystem status report.

Western Gulf of Alaska 2023 Report Card
- Winter average PDO index (Dec.–Feb., 1980–2023) continued its negative trend in 2023, reflecting cooling sea surface temperatures in the GOA.

- Sea-surface temperatures in the summer (^{o}C) (Jun.–Aug., 1985–2023) 2023 in the western GOA were cooler than average, but remained within 1SD of the long-term mean.

- Copepod biomass (g m^{-3}) was 1SD 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.

- Copepod community size (ratio of large calanoid copepods to total calanoid copepods) remained elevated in 2023, close to 1SD 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.

- 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 has declined from 2021 while the biomass of hermit crabs, octopus, and other echinoderms have all increased.

- Capelin abundance (proportion of diet by weight), as sampled by rhinoceros auklets at Middleton Island (Apr.–Aug., 1986–2023), continue to be minimal. Capelin slightly increased in seabird chick diets in recent years and remain within 1SD of the long-term mean.

- Fish apex predator biomass (1,000 t) decreased from 2021 to 2023 and is more than one standard deviation below the long-term mean. The biomass trends for apex predators 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. Pacific cod biomass increased from 2021 to 2023 but remain below their long-term mean.

- Black-legged kittiwakes reproductive success in 2023 (Jun.–Jul., 1980–2023) experienced reproductive failure (no reproduction) at the Semidi Islands, a sharp decrease from the production in 2022. This drop indicates below-average prey (sandlance and age-0 pollock) availability for these surface-feeding, piscivorous seabirds.

- Black-legged kittiwakes reproductive success in 2022 (Jun.–Jul., 1980–2022) increased to 1SD above the long-term mean at the Semidi Islands, potentially, indicating above-average prey availability for these surface-feeding, piscivorous seabirds.

- Western Gulf of Alaska Steller sea lion non-pup model predicted counts continued a slightly decreasing trend from previous years, remaining within 1SD 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 2023 Report Card
- Multivariate ENSO Index was negative, La Niña conditions for the third consecutive winter of 2022/2023 (Dec./Jan., 1980–2023). The North Pacific transitioned to El Niño conditions (positive ENSO index) in the summer 2023, which are predicted to persist through 2024.

- Sea-surface temperatures (^{o}C) in the summer of 2023 (Jun.–Aug.), were approximately average (1985–2023) in the eastern GOA.

- Total zooplankton density (# m^{-3}) in southeastern Alaska inside waters (May–Aug., 1988–2023) decreased from 1SD above long-term mean, 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.

- Copepod community size (ratio of large calanoid copepods to total calanoid copepods) increased to 1SD 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).

- 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 1SD below their long-term mean, while eelpouts, hermit crabs, and other echinoderms have increased from 2021 to 2023.

- Estimated total mature herring biomass (age 3+) of Sitka herring in spring 2023 remains 1SD above average (1980–2023) continuing a 5-year trend of the largest value in the time series (since 1980). The population is declining due to the reduced abundance of the large 2016 year class. 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.

- Fish apex predator biomass (1,000 t) has increased 79% from 2021 to 2023 and is more than 1SD 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 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.

- Growth rates of piscivorous rhinoceros auklet chicks (g d^{-1}) remain 1SD below the long-term mean in 2023 (Jun.–Jul., 1995–2023), but continue a multi-year increasing trend.

- Eastern Gulf of Alaska Steller sea lion non-pups model predicted counts continue a decreasing trend but remain above 1SD 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.

One item was highlighted as Noteworthy (formerly "hot topics") for the GOA this year:

The North Pacific transitioned to El Niño conditions (positive ENSO index) in the summer 2023 after three consecutive years of La Niña conditions. El Niño conditions are expected to persist through 2024; the Aleutian Low is expected to move deeper resulting in more downwelling, and warmer sea surface temperatures are anticipated. Past observations under these conditions include earlier phenology, potentially lower quality zooplankton prey, and increased cross shelf transport. Adult fish such as Pacific Ocean perch, walleye pollock, dusky rockfish, and northern rock sole may be vulnerable under warmer than average conditions; however, larval & age-0 groundfish are the most sensitive. Larvae that favor cooler springs may be more vulnerable (e.g., Pacific cod, walleye pollock, northern rock sole). Larvae that favor warmer springs may benefit (e.g., sablefish, rockfish, southern rock sole).

Stock status summaries

1. Walleye pollock

Status and catch specifications (t) of pollock and projections for 2024 and 2025. 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 ABCs for 2024 and 2025 are those recommended by the Plan Team. Catch data were through November 9th, 2023.

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 is computed as 2.5% of the total W/C/WYAK ABC.

Area	Year	Age 3+ Biomass	OFL	ABC	TAC	Catch
W/C/WYAK	2022	848,878	154,983	133,081	129,754	129,902
	2023	1,137,330	173,470	148,938	145,215	131,892
	2024	1,154,403	269,916	232,543		
	2025		182,891	157,687		
SEO	2022	50,500	15,150	11,363	11,363	0
	2023	50,500	15,150	11,363	11,363	0
	2024	43,328	12,998	9,749		
	2025		12,998	9,749		
GOA-wide	2022	899,378	170,133	144,444	141,117	129,902
	2023	1,187,830	188,620	160,301	156,578	131,892
	2024	1,197,731	282,914	242,292		
	2025		195,889	167,436		

Changes from the previous assessment
This year's pollock assessment model code was transferred to Template Model Builder (TMB) and was shown to be identical to the previously used software (but given a new number for future reference). No other changes were proposed for advice. Data were updated through to the current year.

Spawning biomass and stock trends
While the updated data from 2023 increased the scale of spawning biomass in comparison to last year's assessment, the spawning stock is projected to decline in 2024 and 2025 as the 2012 year-class is further reduced in abundance. There were mixed signals in the index data updated through 2023, where the Shelikof straight winter survey decreased by 27% (from 2022), the summer acoustic survey increased by 72% (from 2021), the AFSC bottom trawl survey increased by 79% (from 2021), and the ADF&G trawl survey decreased by 1% (from 2022). These mixed signals resulted in conflicting model fits but on balance, resulted in larger biomass estimates compared to last year.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The model projection of female spawning biomass in 2024 is 274,141, which is above $B_{40\%}$ (202,000), which places the 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 southeast Alaska (East Yakutat and Southeastern areas) were based on Tier 5 given updated 2023 survey biomass estimates. This resulted in a 14% decrease in the 2024 recommended ABC compared to the 2023 ABC.

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

The assessment was updated to include the most recent data available for area apportionments within each season (Appendix 1D of the GOA pollock chapter). For winter seasons, model estimates of biomass for winter acoustic surveys were used as a basis for apportionment. Apportionments for the B1 and B2 seasons were based on a 3-year weighted average of the sum of the AFSC bottom trawl survey and the Gulf-wide acoustic summer survey (unchanged from the previous assessment). Area apportionments, including the 2.5% of the ABC for the State of Alaska managed pollock fishery Groundfish Harvest Level (GHL) in Prince William Sound (PWS), are as follows:

Year	W (610)	C (620)	C (630)	WYAK	EYAK/SEO	PWS GHL	Total
2024	47,404	110,866	61,674	6,785	9,749	5,814	242,292
2025	32,144	75,179	41,821	4,601	9,749	3,942	167,436

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 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	Age-0+ Biomass	OFL	ABC	TAC	Catch
2022	178,961	39,555	32,811	24,111	18,813
2023	163,477	29,737	24,634	18,103	14,883
2024	184,242	38,712	32,272		
2025		33,970	28,184		

Changes from the previous assessment
The author and Plan Team recommended model (Model 19.1b) sets the minimum sample sizes for the conditional age-at-length data to 0.001. In previous assessments, this value had been set to 1, which is the default value for the assessment software (Stock Synthesis 3, version 3.24) and had the result of applying larger than intended data weights to the conditional age-at-length data. This modeling change resulted in approximately a 5% increase in the estimated spawning biomass, and achieves the intended data weighting of the conditional age-at-length data.

Spawning biomass and stock trends
Total biomass and spawning biomass show sharp declines from 2013-2018 and have increased since 2018. The 2024 projected spawning biomass is $B_{29.7\%}$ (i.e., approximately 30% of the unfished value and below $B_{40\%}$), an increase (relative to biological reference points) from the estimated value of $B_{25.5\%}$ for the 2023 spawning biomass from the 2022 assessment. The increased biomass is supported by increases in both the 2023 estimates of total biomass in the AFSC trawl survey (53%) and the AFSC longline survey relative population number (32%), from their previous estimates.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The GOA Pacific cod stock are determined to be in Tier 3b. The Team agreed with the author recommended ABC and OFLs. The Team also noted the author's discussion on concerns related to the risks and environmental conditions affect Pacific cod and agreed with the authors' rationale for selecting the recommended OFL and 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
2024	8,745	20,590	2,937	32,272
2025	7,638	17,981	2,565	28,184

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 2024 and 2025 are those recommended by the Plan Team after accounting for whale depredation. Catch data are current through November 9th, 2023.

Area	Year	Age-4+ Biomass	OFL	ABC	TAC	Catch
GOA Total	2022	240,600			22,794	19,207
	2023	317,000			23,201	16,118
	2024	337,300				
	2025					
AK Total	2022	529,800	40,432	34,521		24,929
	2023	621,000	47,390	40,502		22,746
	2024	701,300	55,084	47,146		
	2025		55,317	47,350		

Changes from the previous assessment
There were minor model changes that refined some of the output and responded to SSC and Plan Team requests. These included removing the 1980s trawl survey data, including the non-commercial catch, and using a fishery CPUE index that combined pot of longline gear. Other model changes were incrementally shown in the assessment document.

Spawning biomass and stock trends
Survey abundance and biomass indices were mixed for 2023; the longline survey abundance index stabilized (after recent increases), while the trawl survey biomass index decreased relative to 2021 (after large increases over the past ~decade). The standardized CPUE increased 37% between 2021 and 2022. The model estimated that all year classes since 2014 have been at or well above the time series average and age 2+ biomass has nearly tripled from a time series low in 2015. Similarly, estimated spawning stock biomass has nearly doubled from the time series low in 2017.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Sablefish are managed under Tier 3a of the NPFMC harvest control rules. Spawning biomass is projected to increase rapidly in the near-term, continuing trends over recent years. For the 2023 sablefish risk table, fishery performance was rated as a "Major Concern" by the assessment authors (all other categories were rated Level 1) due to the extent of recent rapid changes in the fishery and limited socioeconomic analyses related to drivers of resource utilization. However, given the lack of major concerns related to the sablefish population, no reductions in ABC are recommended. The Teams agreed with the management recommendations, including ABC and OFL, put forth by the assessment authors.

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

In 2020, the SSC adopted a five-year average survey apportionment method based on a biological rationale. 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 are collected. This gives the following area-specific ABCs (including deductions for estimated whale depredation; grayed columns are simply sums over sub-areas and FMPs):

Year	Western	Central	WYAK*	SEO*	GOA Total	AK Total
2024	4,699	9,651	2,926	5,320	22,596	47,146
2025	4,719	9,693	2,940	5,343	22,695	47,350

*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 2024 and 2025. The shallow water flatfish (SWF) complex is comprised 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 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	Age-0+ Biomass	OFL	ABC	TAC	Catch
2022	442,424	62,273	50,610	42,604	1,307
2023	449,607	65,736	53,537	44,302	1,033
2024	453,606	68,121	55,565		
2025		69,354	56,623		

Changes from the previous assessment
Northern and southern rock sole are Tier 3a species and assessed separately from the other shallow water flatfish, which are Tier 5. The shallow water flatfish stock complex is on a 4-year assessment cycle; the last full assessment was completed in 2021. This year, the authors presented a harvest projection for shallow water flatfish which includes results from the projection model for northern and southern rock sole, and results from the random effects model for the Tier 5 species.

Spawning biomass and stock trends
The shallow-water flatfish complex 2024 biomass estimate is a slight increase from the 2023 biomass estimate. Overall, biomass for shallow water flatfish is stable. However, both northern and southern rock sole biomass and spawning biomass estimates show a decrease relative to last year's biomass estimates.

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 2023 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.

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	EYAK/SEO	Total
2024	23,337	27,783	2,778	1,667	55,565
2025	23,782	28,311	2,831	1,699	56,623

5. Deep-water flatfish

Status and catch specifications (t) of deepwater flatfish (Dover sole and others) and projections for 2024 and 2025. 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 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	Age-3+ Biomass	OFL	ABC	TAC	Catch
2022	83,131	7,026	5,908	5,908	131
2023	81,328	6,918	5,816	5,816	104
2024	86,182	8,387	7,062		
2025		8,257	6,953		

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 2019 and an update assessment was conducted in 2023. This year's assessment applied the 2019 model with minor changes.

Spawning biomass and stock trends
The model estimate of 2024 spawning stock biomass for Dover sole is 24,938 t, which is well above $B_{40\%}$ (6,387 t). Spawning stock biomass and total biomass are expected to remain stable through 2025. 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 2024 and 2025 are as follows:

Year	Western	Central	WYAK	EYAK/SEO	Total
2024	237	2,655	1,856	2,314	7,062
2025	234	2,614	1,827	2,278	6,953

6. Rex sole

Status and catch specifications (t) of rex sole and projections for 2024 and 2025. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	Age-3+ Biomass	OFL	ABC	TAC	Catch
2022	124,543	23,302	19,141	19,141	695
2023	127,297	25,135	20,664	20,664	416
2024	129,611	25,978	21,364		
2025		25,900	21,303		

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 increase through 2025. Projected total biomass (3+) is stable with a slight decrease projected through 2025.

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	EYAK/SEO	Total
2024	3,367	13,639	1,453	2,905	21,364
2025	3,363	13,624	1,439	2,877	21,303

7. Arrowtooth flounder

Status and catch specifications (t) of arrowtooth flounder and projections for 2024 and 2025. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	Age-1+ Biomass	OFL	ABC	TAC	Catch
2022	1,268,140	143,100	119,779	96,501	11,643
2023	1,265,950	142,749	119,485	94,286	9,248
2024	1,295,410	142,485	119,249		
2025		142,074	118,912		

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 2025. Projected total biomass (1+) is stable with a slight increase projected through 2025.

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

Year	Western	Central	WYAK	EYAK/SEO	Total
2024	30,409	64,871	7,870	16,099	119,249
2025	30,323	64,688	7,848	16,053	118,912

8. Flathead sole

Status and catch specifications (t) of flathead sole and projections for 2024 and 2025. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	Age-3+ Biomass	OFL	ABC	TAC	Catch
2022	279,975	48,928	40,175	27,437	564
2023	294,188	48,161	39,480	35,337	464
2024	294,616	49,414	40,503		
2025		50,322	41,258		

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 2025. Projected total biomass (3+) is stable with a slight decrease projected through 2025.

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	EYAK/SEO	Total
2024	13,273	21,307	3,876	2,047	40,503
2025	13,521	21,702	3,949	2,086	41,258

9. Pacific ocean perch

Status and catch specifications (t) of Pacific ocean perch and projections for 2024 and 2025. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	age-2+ Biomass	OFL	ABC	TAC	Catch
2022	650,832	45,580	38,268	38,268	29,452
2023	636,129	44,302	37,193	37,193	29,793
2024	650,027	47,466	39,719		
2025		45,835	38,354		

Changes from the previous assessment
This was an operational update assessment (biennial to coincide with the NMFS bottom trawl survey). The model was unchanged from the last full assessment in 2021. Data were updated to include survey biomass estimates for 2023, survey age compositions for 2021, fishery age compositions for 2022, final catch for 2021 and 2022, and projected catch for 2023-2025.

Spawning biomass and stock trends
Spawning biomass is projected to decrease over the next several years; however, the stock remains well above $B_{40\%}$.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The GOA Pacific ocean perch stock was estimated to be in Tier 3a. The authors noted that while assessment-related concerns were raised due to a strong negative retrospective pattern, the maximum permissible ABC was appropriate because the stock is well above $B_{40\%}$. The Team concurred with the authors' recommended ABC and OFL, but recommended combining OFL values for POP into a single, Gulf-wide stock

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

Area apportionment
The following table shows the recommended apportionment for 2024 and 2025 ABCs from the random effects model. Because Amendment 41 prohibits trawling in the Eastern area east of 140° W longitude, the ABC allocation derived from the random effects model for the Eastern Gulf is split between W. Yakutat and E. Yakutat/Southeast Outside ('Southeast' or 'SEO') using a weighted average of area-specific biomass ratios obtained from the trawl survey.

Year	Western	Central	Eastern	Total
2024	1,787	28,757	9,175	39,719
2025	1,726	27,768	8,860	38,354

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 2021 assessment, and resulted in the following ABC apportionment of the Eastern Gulf area:

Year	WYAK	SEO	Total
2024	2,110	7,065	9,175
2025	2,038	6,822	8,860

The following table shows the apportionment of OFL between the Western/Central/W. Yakutat and E. Yakutat/Southeast WYK areas:

Year	Western/Central/W.Yakutat	SEO	Total
2024	32,654	7,065	39,719
2025	31,532	6,822	38,354

10. Northern rockfish

Status and catch specifications (t) of northern rockfish and projections for 2024 and 2025. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	Age-2+ Biomass	OFL	ABC	TAC	Catch
2022	100,371	6,143	5,146	5,146	1,898
2023	95,452	5,927	4,964	4,964	1,323
2024	94,319	5,750	4,815		
2025		5,548	4,646		

Changes from the previous assessment
Northern rockfish are assessed on a two-year cycle. 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
The 2024 spawning biomass estimate is above $B_{40\%}$ and is a -3% decrease compared to the 2023 ABC.

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' recommendation on ABC and OFL values.

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

Area apportionment
Area apportionments of northern rockfish ABC's for 2024 and 2025 are based on the random effects model applied to GOA bottom trawl survey biomass estimates from the last full assessment. Northern rockfish area apportionments for ABCs in 2024 and 2025 are shown below:

Year	Western	Central	Eastern*	Total
2024	2,535	2,280		4,815
2025	2,446	2,200		4,646

* Note that one ton of northern rockfish ABC apportioned to the Eastern Gulf was combined with the other rockfish complex ABC in the West Yakutat management area for management purposes and are removed here from the Team recommended apportionments and ABC totals for northern rockfish.

11. Shortraker rockfish
Status and catch specifications (t) of shortraker rockfish and projections for 2024 and 2025. Biomass for each year corresponds to the projections given in the SAFE report issued in the preceding year. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	Biomass	OFL	ABC	TAC	Catch
2022	31,331	940	705	705	472
2023	31,331	940	705	705	488
2024	28,768	863	647		
2025		863	647		

Changes from the previous assessment
Shortraker rockfish in the GOA are assessed on a biennial schedule in odd years to align with the bottom trawl survey. A full stock assessment was conducted this year. Data were updated to include: 1) 2023 bottom trawl survey biomass and length compositions, 2) 2022 and 2023 longline survey length compositions, 3) 2022 and 2023 length compositions from the longline and trawl fisheries, 4) updated RPWs from 1992 to 2023 from the GOA longline survey, 5) removal of the 1984 and 1987 GOA trawl survey data, and 6) updated trawl survey biomass estimates from 1990 to 2023. The new model (23.3) was based on the REMA with updated weightings between the two surveys and an added component of observation error for the longline survey.

Spawning biomass and stock trends
Applying the random effects (REMA) model to trawl survey data from 1990-2023 and the longline survey RPW indices resulted in an approximately 8% decrease in the 2024 biomass estimate for shortraker rockfish, relative the 2023 estimate.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Shortraker rockfish are managed as a Tier 5 species. The Team agreed with the Tier 5 specification and the author recommended ABCs and the OFL.

Status determination
Available data are insufficient to determine stock status relative to overfished criteria. This stock was not being subjected to overfishing in 2023.

Area apportionment
This year, a new apportionment method was presented in September that uses the averages proportions of both the REMA-predicted biomass from the bottom trawl survey and the REMA-predicted relative

population weights from the longline survey. This method estimates area-specific scaling parameters, has a single shared process error, starts in 1990, and averages proportions of predicted longline survey RPW and trawl survey biomass by area. The previous method only used trawl survey biomass.

The Team recommended to take the difference in proportions between model versions 23.3 that uses trawl survey biomass only and trawl survey biomass + longline survey RPW to determine area-specific ABC's for 2024 and 2025 (bottom row in table below).

REMA model names	Apportionment Method	WGOA	CGOA	EGOA
M19*	Biomass	5.3%	29.5%	65.2%
M19*	Biomass + RPW	8.4%	20.7%	70.9%
M23.3	Biomass	5.2%	29.3%	65.5%
M23.3	Biomass + RPW	8.3%	20.7%	71.0%
Average apportionment approaches of M23.3		7%	25%	68%
Amount		44	162	441

This results in the following apportionments for 2024 and 2025:

Year	Western	Central	Eastern	Total
2024 and 2025	44 (7%)	162 (25%)	441 (68%)	647 (100.0%)

12. Dusky rockfish

Status and catch specifications (t) of dusky rockfish and projections for 2024 and 2025. Biomass for each year corresponds to the projections given in the SAFE report issued in the preceding year. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	age-4+ Biomass	OFL	ABC	TAC	Catch
2022	95,682	8,614	5,372	5,372	2,584
2023	107,160	9,638	7,917	7,917	3,491
2024	103,997	9,281	7,624		
2025		8,796	7,225		

Changes from the previous assessment
The dusky rockfish stock is assessed on a two-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
The estimates of spawning biomass for 2024 and 2025 from the current year's projection model are well above the $B_{40\%}$ estimate and total biomass is projected to decline slightly.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
Dusky rockfish 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. This corresponds to a slight increase in ABC for 2024.

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

Area apportionment
Area apportionment for ABC of dusky rockfish is currently based on the proportion of trawl survey biomass projected for each area using the REMA model. 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 0.74. This results in the following apportionment to the W. Yakutat area:

Year	Western	Central	Eastern	Total
2024	145	7,365	114	7,624
2025	137	6,979	109	7,225

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 **0.74**. This results in the following apportionment to the W. Yakutat area:

Year	WYAK	EYAK/SEO	Total
2024	84	30	114
2025	81	28	109

13. Rougheye and blackspotted rockfish

Status and catch specifications (t) of rougheye and blackspotted rockfish and projections for 2024 and 2025. Biomass for each year corresponds to the projections given in the SAFE report issued in the preceding year. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

Year	Age-3+ Biomass	OFL	ABC	TAC	Catch
2022	26,060	947	788	788	470
2023	25,837	930	775	775	433
2024	46,029	1,555	1,037		
2025		1,566	1,041		

Changes from the previous assessment
The rougheye/blackspotted stock is assessed on a two-year schedule. This year a full operational assessment was conducted. In addition to updating input data, the authors recommended a change from Model 15.4 to Model 23.1b, which includes the following changes: (1) removal of the 1984 and 1987 bottom trawl survey data from the assessment and apportionment models; (2) a new natural mortality (M) prior, maturity curve, and ageing error matrix; (3) updated data used to estimate the weight-at-age vector and age-length transition matrix, which had not been updated since 2015; (4) constrained catchability (q) parameters for both surveys and fixed recruitment variability.

Spawning biomass and stock trends
Estimated female spawning biomass for 2024 and 2025 is a large increase from 2023. This is attributed to a change in population scale estimated by the author recommended model 23.1b. This change in scale is consistent with historical estimates for the stock but does not align with recent declines in both indices of abundance. Projected female spawning biomass is well above $B_{40\%}$ and projected to remain steady.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The rougheye/blackspotted complex are determined to be in Tier 3a. The Team evaluated and discussed model performance and agreed with the author on the poor fits and model uncertainty and agreed on the

need to recommend model 23.1b which estimates fewer parameters. The Team agreed with the justification for reductions from the model-estimated 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
This year a new apportionment method was used that averages proportions of both the REMA-predicted biomass from the bottom trawl survey and the REMA-predicted relative population weights from the longline survey. This method estimates area-specific scaling parameters, has a single shared process error, starts in 1990, and averages proportions of predicted longline survey RPW and biomass by area. This approach balances the data conflict between the two surveys.

Year	Western	Central	Eastern	Total
2024	197	315	525	1,037
2025	198	317	526	1,041

14. Demersal shelf rockfish
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 9th, 2023.

Year	Biomass	OFL	ABC	TAC	Catch
2022	12,388	579	365	365	163
2023	17,511	376	283	283	188
2024		376	283		
2025		376	283		

Area apportionment
The ABC and OFL for DSR are for the SEO District. DSR management is deferred to the State of Alaska and any further apportionment within the SEO District is at the discretion of the State.

15. Thornyhead rockfish

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 9th, 2023.

Year	Biomass	OFL	ABC	TAC	Catch
2022	86,802	2,604	1,953	1,953	359
2023	72,349	2,170	1,628	1,628	201
2024	72,349	2,170	1,628		
2025		2,170	1,628		

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

Year	Western	Central	Eastern	Total
2024	314	693	621	1,628
2025	314	693	621	1,628

16. Other rockfish

Status and catch specifications (t) of other rockfish. Biomass estimates for 2024 and 2025 are based on the random effects model for Tier 4 and 5 species from the last full assessment. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. *Note that 1 t 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 9th, 2023.

Year	Biomass	OFL	ABC	TAC	Catch
2022	70,687	5,320	4,054	1,610	1,250
2023	70,687	5,320	4,054	1,610	1,026
2024	70,299	4,977	3,774		
2025		4,977	3,774		

Changes from the previous assessment
Other rockfish (OR) are assessed on a biennial stock assessment schedule to coincide with the availability of new survey data. This year a full assessment is provided for other rockfish. New data included in the assessment are 2023 Gulf of Alaska survey biomass estimates and updated total catch for 2003–2023. The GOA bottom trawl survey biomass estimates from 1984 and 1987 have been dropped to be consistent with advice regarding changes in the survey time series. The survey time series now begins in 1990.

The REMA model is now used for the Tiers 4 and 5 species and was updated to include the 2023 GOA trawl survey data. The Tier 5 model implemented an alternative weighted M approach (M by species applied to their REMA biomass estimates from 2019-2023). This was accepted as a proxy for F_{OFL} instead of a single year weighted M under Tier 5 specifications. The assessment for the Tier 5 components of this complex was based on four species. The other twelve species were moved to Tier 6 and based on the maximum catch from the updated (more recent) time series 2013-2022. The number of species in Tier 6 of this complex totals 21 species.

Spawning biomass and stock trends
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 ABC and OFL recommendations
The Team discussed and accepted the multi-year weighted *M* as an improvement over a single year weighted *M* for the Tier 5 species. The Team discussed the W/C GOA catch overages for OR that have occurred the past 3 years, which are predicted to continue. Harlequin rockfish comprise most of the fishery catch in the W/C GOA. There is a mismatch between survey catches (in trawlable habitat) and fishery catches (in trawlable and untrawlable habitat). The considerable uncertainty with the trawl survey catches, particularly among GOA subareas, leads to large subarea ABC fluctuations. Team discussion focused on whether there is a conservation concern for OR in the W/C GOA. OR are non-target species and are poorly sampled by the bottom trawl survey. OR have little to no genetic structure (preliminary studies) and the majority of biomass occurs in the Southeast where trawling is prohibited (east of 140º longitude). The Team agreed with the authors that there are currently no apparent conservation concerns for OR, including concerns of overfishing this complex. The Team accepted the recommended changes in tier designations due to unreliable biomass estimates, 12 Tier 5 species were moved to Tier 6. The Team also accepted the updated maximum catch time series of 2013-2022 for Tier 6 species.

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
The ABCs from the W/C GOA have been combined since 2014. The assessment provided an alternative apportionment scheme which combines the W/C/WYAK areas for consideration but did not recommend it for this year. The Team discussed allocation recommendations and whether there are biological concerns that need to be addressed and can be supported by reliable data. The Team agreed with the authors status quo apportionment for 2024 (WGOA and CGOA combined). The Team would like to revisit apportionment for 2025 when demersal shelf (DSR) rockfish will be split out of other rockfish and managed by the W/C/WYAK area. The Team recommends that the Council consider OR for the spatial management policy in 2024 to coincide with OR and DSR changes to occur in 2025.

Area apportionment is based on the sum of random effects model biomass (Tier 4 and 5 species) and catch history (Tier 6 species) by region. The Team again recommends a single ABC for the combined WGOA and CGOA areas to address concerns about the ability to manage smaller ABCs in the WGOA. The Team recommends the following apportionments which are updated to include the 2023 survey:

Year	W/C	WYAK[*]	EYAK/SEO	Total
2024	820	533	2,421	3,774
2025	820	533	2,421	3,774

[*]Note that the small northern rockfish ABC apportionments from EGOA are combined with OR in the WYAK management area and added for management purposes here from the Plan Team recommended apportionments for OR.

17. Atka mackerel

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 9th, 2023. Atka mackerel are managed under Tier 6 because reliable estimates of biomass are not available.

		Tier 6			
Year	Biomass	OFL	ABC	TAC	Catch
2022		6,200	4,700	3,000	880
2023		6,200	4,700	3,000	462
2024		6,200	4,700		
2025		6,200	4,700		

Area apportionment
Atka mackerel are managed Gulf-wide.

18. Skates

Status and catch specifications (t) of skates. Biomass for each year corresponds to the projection given in the SAFE report of the last full assessment. The OFL and ABC for 2024 and 2025 are those recommended by the Plan Team. Catch data are current through November 9th, 2023.

			Tier 5			
Species	Year	Biomass	OFL	ABC	TAC	Catch
Big Skate	2022		3,822	2,867	2,867	1,025
	2023	38,220	3,822	2,867	2,867	1,120
	2024	37,804	3,780	2,835		
	2025		3,780	2,835		
Longnose Skate	2022		3,616	2,712	2,712	991
	2023		3,616	2,712	2,712	1,178
	2024		3,380	2,536		
	2025		3,380	2,536		
Other Skates	2022		1,311	984	984	1,041
	2023		1,311	984	984	443
	2024		887	665		
	2025		887	665		

Changes from the previous assessment
No changes were made in assessment methodology.

Spawning biomass and stock trends
Big skate and longnose skate biomass is declining, but the catch rates are below the ABCs. Biomass of Other skates has decreased along with the ABC.

Tier determination/Plan Team discussion and resulting ABCs and OFLs
The skate complex is a Tier 5 assessment with three groups: big skate, longnose skate, and 'other' skates. The Team agreed with the authors' recommendation on ABC and OFL values.

Status determination
The skate 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
The author continued the use of the random effects (RE) model, a separate RE model was run for each managed group, and for each regulatory area. 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
2024	big_skate	745	1,749	341	2,835
2025		745	1,749	341	2,835
2024	longnose	104	1,894	538	2,536
2025		104	1,894	538	2,536
2024	skates				665
2025					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 9th, 2023.

Year	Biomass[*]	OFL	ABC	TAC	Catch
2022	23,289	5,006	3,755	3,755	2,160
2023	31,243	6,521	4,891	4,891	1,777
2024		6,521	4,891		
2025		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 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 9th, 2023.

Year	Biomass	OFL	ABC	TAC	Catch
2022		1,307	980	980	155
2023		1,307	980	980	154
2024		1,307	980		
2025		1,307	980		

Area apportionment
GOA octopus are managed Gulf-wide.

Appendix 1. Sculpins
Sculpins are managed as non-target species in in the GOA and are taken only as bycatch when directed fishing for other species. In 2020, sculpins were reclassified as an Ecosystem Component, non-target species in GOA and BSAI. The sculpin report is on a 4-year cycle; the last full GOA SAFE assessment was completed in 2015, and a partial assessment was completed in 2019. New data for the GOA assessment include 1) catch data through October 16, 2023, 2) 2021 and 2023 GOA survey data, and 3) GOA trawl survey biomass estimates through 2023 using REMA.

Tables

Table 1.   Gulf of Alaska groundfish 2024-2025 OFLs and ABCs, 2023 TACs, and 2023 catch (reported through 11/9/23). Note totals depend on sablefish apportionment methods.

Species	Area	2023 OFL	2023 ABC	TAC	Catch	Plan Team Rec 2024 OFL	Plan Team Rec 2024 ABC	Plan Team Rec 2025 OFL	Plan Team Rec 2025 ABC
Pollock	State GHL	n/a	3,723	n/a	-	n/a	5,814	n/a	3,942
	W (610)	n/a	26,958	26,958	26,226	n/a	47,404	n/a	32,144
	C (620)	n/a	77,005	77,005	65,384	n/a	110,866	n/a	75,179
	C (630)	n/a	33,729	33,729	33,394	n/a	61,674	n/a	41,821
	WYAK	n/a	7,523	7,523	6,888	n/a	6,785	n/a	4,601
	Subtotal	173,470	148,938	145,215	131,892	269,916	232,543	182,891	157,687
	EYAK/SEO	15,150	11,363	11,363	0	12,998	9,749	12,998	9,749
	Total	188,620	160,301	156,578	131,892	282,914	242,292	195,889	167,436
Pacific Cod	W	n/a	7,464	5,225	3,630	n/a	8,745	n/a	7,638
	C	n/a	14,830	11,123	10,836	n/a	20,590	n/a	17,981
	E	n/a	2,340	1,755	417	n/a	2,937	n/a	2,565
	Total	29,737	24,634	18,103	14,883	38,712	32,272	33,970	28,184
Sablefish	W	n/a	4,473	4,473	2,723	n/a	4,699	n/a	4,719
	C	n/a	9,921	9,921	6,413	n/a	9,651	n/a	9,693
	WYAK	n/a	3,205	3,205	2,401	n/a	2,926	n/a	2,940
	SEO	n/a	5,602	5,602	4,582	n/a	5,320	n/a	5,343
AK-wide OFL ABC[2]	GOA Total[1]	n/a		23,201	16,118	n/a		n/a	
	AK Total	47,390	23,201	n/a	22,746	55,084	47,146	55,317	47,350
Shallow-Water Flatfish	W	n/a	22,485	13,250	25	n/a	23,337	n/a	23,782
	C	n/a	26,769	26,769	1,002	n/a	27,783	n/a	28,311
	WYAK	n/a	2,677	2,677	6	n/a	2,778	n/a	2,831
	EYAK/SEO	n/a	1,606	1,606	0	n/a	1,667	n/a	1,699
	Total	65,736	53,537	44,302	1,034	68,121	55,565	69,354	56,623
Deepwater Flatfish	W	n/a	256	256	24	n/a	237	n/a	234
	C	n/a	2,105	2,105	72	n/a	2,655	n/a	2,614
	WYAK	n/a	1,407	1,407	4	n/a	1,856	n/a	1,827
	EYAK/SEO	n/a	2,048	2,048	4	n/a	2,314	n/a	2,278
	Total	6,918	5,816	5,816	105	8,387	7,062	8,257	6,953
Rex Sole	W	n/a	3,236	3,236	23	n/a	3,367	n/a	3,363
	C	n/a	13,110	13,110	392	n/a	13,639	n/a	13,624
	WYAK	n/a	1,439	1,439	1	n/a	1,453	n/a	1,439
	EYAK/SEO	n/a	2,879	2,879	0	n/a	2,905	n/a	2,877
	Total	25,135	20,664	20,664	415	25,978	21,364	25,900	21,303
Arrowtooth Flounder	W	n/a	30,469	14,500	384	n/a	30,409	n/a	30,323
	C	n/a	65,000	65,000	8,780	n/a	64,871	n/a	64,688
	WYAK	n/a	7,886	7,886	35	n/a	7,870	n/a	7,848
	EYAK/SEO	n/a	16,130	6,900	49	n/a	16,099	n/a	16,053
	Total	142,749	119,485	94,286	9,248	142,485	119,249	142,074	118,912
Flathead Sole	W	n/a	12,793	8,650	30	n/a	13,273	n/a	13,521
	C	n/a	21,487	21,487	434	n/a	21,307	n/a	21,702
	WYAK	n/a	2,320	2,320	0	n/a	3,876	n/a	3,949
	EYAK/SEO	n/a	2,880	2,880	0	n/a	2,047	n/a	2,086
	Total	48,161	39,480	35,337	464	49,414	40,503	50,322	41,258

Species	Area	2023				Plan Team Rec 2024		Plan Team Rec 2025	
		OFL	ABC	TAC	Catch	OFL	ABC	OFL	ABC
Pacific ocean perch	W	n/a	2,529	2,529	2,486	n/a	1,787	n/a	1,726
	C	n/a	29,940	29,940	25,941	n/a	28,757	n/a	27,768
	WYAK	n/a	1,370	1,370	1,366	n/a	2,110	n/a	2,038
	W/C/WYAK	40,308	33,839	33,839	29,793	n/a	n/a	n/a	n/a
	SEO	3,994	3,354	3,354	0	n/a	7,065	n/a	6,822
	Total	44,302	37,193	37,193	29,793	47,466	39,719	45,835	38,354
Northern Rockfish	W	n/a	2,614	2,614	388	n/a	2,535	n/a	2,446
	C	n/a	2,350	2,350	935	n/a	2,280	n/a	2,200
	E	n/a	0	0	0	n/a	0	n/a	0
	Total	5,927	4,964	4,964	1,323	5,750	4,815	5,548	4,646
Shortraker Rockfish	W	n/a	51	51	21	n/a	44	n/a	44
	C	n/a	280	280	263	n/a	162	n/a	162
	E	n/a	374	374	204	n/a	441	n/a	441
	Total	940	705	705	488	863	647	863	647
Dusky Rockfish	W	n/a	149	149	74	n/a	145	n/a	137
	C	n/a	7,647	7,647	3,415	n/a	7,365	n/a	6,979
	WYAK	n/a	90	90	1	n/a	84	n/a	81
	EYAK/SEO	n/a	31	31	1	n/a	30	n/a	28
	Total	9,638	7,917	7,917	3,491	9,281	7,624	8,796	7,225
Rougheye and Blackspotted Rockfish	W	n/a	180	180	101	n/a	197	n/a	198
	C	n/a	232	232	156	n/a	315	n/a	317
	E	n/a	363	363	176	n/a	525	n/a	526
	Total	930	775	775	434	1555	1037	1566	1041
Demersal shelf rockfish	Total	376	283	283	188	376	283	376	283
Thornyhead Rockfish	W	n/a	314	314	53	n/a	314	n/a	314
	C	n/a	693	693	91	n/a	693	n/a	693
	E	n/a	621	621	57	n/a	621	n/a	621
	Total	2,170	1,628	1,628	201	2,170	1,628	2,170	1,628
Other Rockfish	W/C	n/a	940	940	940	n/a	820	n/a	820
	WYAK	n/a	370	370	54	n/a	533	n/a	533
	EYAK/SEO	n/a	2,744	300	32	n/a	2,421	n/a	2,421
	Total	5,320	4,054	1,610	1,026	4,977	3,774	4,977	3,774
Atka mackerel	Total	6,200	4,700	3,000	462	6,200	4,700	6,200	4,700
Big Skate	W	n/a	591	591	117	n/a	745	n/a	745
	C	n/a	1,482	1,482	814	n/a	1,749	n/a	1,749
	E	n/a	794	794	189	n/a	341	n/a	341
	Total	3,822	2,867	2,867	1,120	3,780	2,835	3,780	2,835
Longnose Skate	W	n/a	151	151	66	n/a	104	n/a	104
	C	n/a	2,044	2,044	481	n/a	1,894	n/a	1,894
	E	n/a	517	517	631	n/a	538	n/a	538
	Total	3,616	2,712	2,712	1,178	3,380	2,536	3,380	2,536
Other Skates	GOA-wide	1,311	984	984	443	887	665	887	665
Sharks	GOA-wide	6,521	4,891	4,891	1,777	6,521	4,891	6,521	4,891
Octopuses	GOA-wide	1,307	980	980	154	1,307	980	1,307	980
TOTAL		646,826	539,072	468,796	222,863	765,608	641,587	673,289	562,224

Table 2.   2024 and 2025 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	69
	Mothership and catcher/processor	All	83
Hook-and-line	Catcher/processor	All	11
	Catcher vessel	All	10
Pot	Catcher vessel and catcher/processor	All	26

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 2024 and 2025 recommended fishing mortality rates and ABCs, for those species whose recommendations were below the maximum permissible.

		2024			
Species	Tier	$Max\ F_{ABC}$	Max ABC	F_{ABC}	ABC
Rougheye and blackspotted rockfish	3	0.038	1,302	0.030	1,037
		2025			
Species	Tier	$Max\ F_{ABC}$	Max ABC	F_{ABC}	ABC
Rougheye and blackspotted rockfish	3	0.038	1,310	0.030	1,041