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Responsible Fishery Management (RFM)

Alaska Atka Mackerel and Rockfish

Full Assessment Report

Certification Body (CB)	MRAG Americas, Inc.		
Assessment team	Erin Wilson (team lead), Dr. Giuseppe Scarcella, Amanda Stern-Pirlot		
Fishery client	Alaska Seafood Cooperative		
Assessment type	Validation assessment	First full assessment	Reassessment #
			1st
Assessment stage	Peer review draft	Public comment draft	Final report
			X
Date	February 12, 2025		

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List of Abbreviations (some of which may also be acronyms)

ABC	Acceptable Biological Catch
ABM	Abundance Based Management
ADFG	Alaska Department of Fish and Game
AFDF	Alaska Fisheries Development Foundation
AFSC	Alaska Fishery Science Center
AI	Aleutian Islands
AKSC	Alaska Seafood Cooperative (client group)
APA	Administrative Procedures Act
AWT	Alaska Wildlife Troopers
BASIS	Bering-Aleutian Salmon International Survey
BMSY	Biomass that would provide maximum sustainable yield
BOF	Board of Fisheries
BS	Bering Sea
BSAI	Bering Sea and Aleutian Islands
CAAL	Condition-Age-At-Length
CDQ	Community Development Quota
CH	Critical Habitat
CPUE	Catch per unit effort
CFSR	Climate Forecast System Reanalysis
CP	Catcher Processor
CZMA	Coastal Zone Management Act
CWA	Clean Water Act
DEIS	Draft Environmental Impact Statement
DMR	Discard Mortality Rates
EBFM	Ecosystem-based fisheries management
EBS	Eastern Bering Sea
EEZ	Exclusive Economic Zone
EO	Emergency Order
ESA	Endangered Species Act
ESSRP	Economic and Social Sciences Research Program
FEP	Fisheries Ecosystem Plan
FMP	Fisheries Management Plan
FOFL	Maximum Allowable Fishing Mortality Rate
GHL	Guideline Harvest Levels
GOA	Gulf of Alaska
HCR	Harvest Control Rules
IPCC	Intergovernmental Panel on Climate Change
JEA	Joint Enforcement Agreement
MBTA	Migratory Bird Treaty Act
MCS	Monitoring, Control and Surveillance
MMPA	Marine Mammal Protection Act
MRA	Marine Reserve Area
MSA	Magnuson-Stevens Act
MSST	Minimum Stock Size Threshold
NBS	Northern Bering Sea
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOVA	Notice of Violation and Assessment
NPFMC	North Pacific Fishery Management Council
NPRB	North Pacific Research Board
OFL	Overfishing Limits
OLE	Office of Law Enforcement (NOAA)
PRI	Point of Recruitment Impairment
PSC	Prohibited species catch
RFM	Responsible Fisheries Management
RPA	Reasonable and Prudent Alternatives
SAFE	Stock Assessment and Fishery Evaluation
SSB	Spawning stock biomass
SSC	Scientific and Statistical Committee
SSL RPAs	Steller Sea Lion Reasonable and Prudent Alternatives
SOPP	Statement of Organization, Practices and Procedures (NPFMC)

TAC	Total Allowable Catch
UoA	Unit of Assessment
UoC	Unit of Certification
USCG	United States Coast Guard

2 Executive Summary

MRAG Americas was contracted by Alaska Seafood Cooperative to assess the Alaska Pacific Atka mackerel and rockfish fishery under the Responsible Fishery Management (RFM) certification program. An onsite site visit was held at the offices of the Alaska Seafood Cooperative on March 14th, 2024 in conjunction with the Marine Stewardship Council (MSC) 4th surveillance audit of Bering Sea and Aleutian Island (BSAI) & Gulf of Alaska (GOA) Atka mackerel, Pacific Ocean Perch, and rockfish, the MSC 3rd surveillance audit for BSAI&GOA flatfish, and the Responsible Fisheries Management (RFM) reassessments for BSAI&GOA AK flatfish.

At least 30 days prior to the site visit, all identified stakeholders were informed of the visit and the opportunity to provide information to the assessment team in advance of, or during, the site visit. Managers, stock assessment authors and various stakeholders provided information by email, joined remotely or participated in person during the site visit.

The team considered all the above information to assess conformance of the fishery with the RFM Standard. No issues were identified, and no changes in the fishery occurred that would result in a change in certification from the last surveillance. The fisheries had no non-conformances or recommendations. No clauses were rescored. Findings of the assessment team regarding conformance are summarized below at the level of the four Components:

Component	Non-Conformances			Summary of conformance
	Minor	Major	Critical	
A. The Fisheries Management System				Full conformance
B. Science and Stock Assessment Activities and the Precautionary Approach				Full conformance
C. Management Measures, Implementation, Monitoring, and Control				Full conformance
D. Serious Impacts of the Fishery on the Ecosystem				Full conformance
Total				

Main Strengths and Weaknesses of the fishery

Strengths	Weaknesses
• All stocks are above level consistent with maximum sustainable yield (MSY). Effective harvest strategies and harvest control rules (HCRs) are in place and effective. • Excellent data on removals of all non-target and ETP species; 100% observer coverage. • This is a very well managed fishery, with clear objectives, roles and responsibilities, a fishery management plan that is reviewed and regularly updated and effective decision-making in terms of the overall sustainability of the fishery.	• The use of a proxy for BMSY and the uncertainties in stock structure. • Data is not updated on habitats management or ETP species status—but this is not a weakness of the fishery, simply a function of the current assessment stage. • There were some notable infractions listed in recent enforcement reports. Evidence exists that sanctions are consistently applied and thought to provide effective deterrence. However, the assessment team only had access to Council reports to determine the extent to which if sanctions in place deter non-compliance. The enforcement contacts provided did not respond to meeting requests or provide further information.

Recommendation of the Team with respect to Certification

In accordance with the RFM Guidance, on this basis, the assessment team recommends that this fishery be recertified.

2.1 Assessment Team Details

Ms. Erin Wilson (team leader) joined MRAG Americas, Inc. in February 2015, where she currently works as a Senior Manager in the Fisheries Certification Division. She serves as the team leader on several MSC assessments, including North and South Pacific albacore tuna fishery, US West Coast Groundfish fishery, and all the Alaska Groundfish fisheries, and has served as a team member for several other fishery assessments, including both MSC and Responsible Fisheries Management (RFM). Prior to joining MRAG Americas, she worked at the Oregon Department of Fish and Wildlife (ODFW) as a Natural Resource Specialist and Biological Technician for the Oregon Marine Reserves. She has collaborated on a multitude of projects that focus on marine science and conservation in both a biological and social science aspect. She has completed ISO 19011 Lead Auditor for Management Systems, SA8000, the SRA training for Fishery Progress, and all the MSC and RFM required trainings for team leader and assessment team member. She received a M.Sc. in Marine Resource Management from Oregon State University and a B.S. in Zoology from Colorado State University, along with a Spanish minor.

Ms. Amanda Stern-Pirlot is an M.Sc graduate of the University of Bremen, Center for Marine Tropical Ecology (ZMT) in marine ecology and fisheries biology. Ms. Stern-Pirlot joined MRAG Americas in mid-June 2014 as MSC Certification Manager (now Director of the Fishery Certification Division) and is currently serving on several different assessment teams as team leader and team member. She has worked together with other scientists, conservationists, fisheries managers and producer groups on international fisheries sustainability issues for over 15 years. With the Institute for Marine Research (IFM-GEOMAR) in Kiel, Germany, she led a work package on simple indicators for sustainable within the EU-funded international cooperation project INCOFISH, followed by five years within the Standards Department at the Marine Stewardship Council (MSC) in London, developing standards, policies and assessment methods informed by best practices in fisheries management around the globe. Most recently she has worked with the Alaska pollock industry as a resources analyst, within the North Pacific Fisheries Management Council process, focusing on bycatch and ecosystem-based management issues, and managing the day-to-day operations of the offshore pollock cooperative. She has co-authored a dozen publications on fisheries sustainability in the developing world and the functioning of the MSC as an instrument for transforming fisheries to a sustainable basis.

Dr. Giuseppe Scarcella is an experienced fishery scientist and population analyst and modeller, with wide knowledge and experience in the assessment of demersal stocks. He holds a first degree in Marine Biology and Oceanography (110/110) from the Unversità Politecnica delle Marche, and a Ph.D. in marine Ecology and Biology from the same university, based on a thesis "Age and growth of two rockfish in the Adriatic Sea". After his degree he was offered a job as project scientist in several research programs about the structure and composition of fish assemblage in artificial reefs, off-shore platform and other artificial habitats in the Italian Research Council – Institute of Marine Science of Ancona (CNR-ISMAR, now CNR-IRBIM). During the years of employment at CNR-ISMAR he has gained experience in benthic ecology, statistical analyses of fish assemblage evolution in artificial habitats, fisheries ecology and impacts of fishing activities, stock assessment, otolith analysis, population dynamic and fisheries management. During the same years he attended courses of uni- multivariate statistics and stock assessment. He is also actively participating in the scientific advice process of FAO GFCM in the Mediterranean Sea. At the moment he is member of the Scientific, Technical and Economic Committee for Fisheries for the European Commission (STECF). He is author and co-author of more than 50 scientific paper peer reviewed journals and more than 150 national and international technical reports, most of them focused on the evolution of fish assemblages in artificial habitats and stock assessment of demersal species. For some years now, Dr Scarcella has been working in fisheries certification applying the Marine Stewardship Council standard for sustainable fisheries, currently concentrating on Principle 1 of the Standard. Furthermore, Dr Scarcella holds the credential as Fishery team leader (MSC v2.0) and he completed the MSC procedure training 2.1. He also holds the credential as certifier of Responsible Fisheries Management (RFM).

2.2 RFM program and documents

The RFM program is a voluntary certification program developed by the Alaska Seafood Marketing Institute (ASMI). The program was created to provide an independent, third-party verification that certified fisheries are responsibly managed. The documents detailed in the table below together form the basis for the RFM assessment and certification process described in the following section.

RFM document name	Full title	Version	Issued
Standard	Responsible Fisheries Management Certification Program Fisheries Standard	2.1	Sep 2020
Guidance	Alaska Responsible Fisheries Management Certification Program Guidance to Performance Evaluation for the Certification of Wild Capture and Enhanced Fisheries in Alaska	2.0*	May 2018
Procedure	RFM Procedure 2: Application to Certification Procedures for the RFM Fishery Standard Version 2.1	6	Sep 2020

2.3 Unit of Certification

The Unit of Certification (UoC) is defined by the Standard to specify "the fishery under assessment, the geographical area where the fishery is prosecuted, the gear type(s) employed, and the key management organization(s)". Under the RFM certification, there are 6 Units of Assessment (UoA):
UoA 1 BSAI Atka mackerel (*Pleurogrammus monopterygius*)
UoA 2 BSAI Pacific Ocean perch (*Sebastes alutus*)
UoA 3 BSAI Northern rockfish (*Sebastes polyspinis*)
UoA 4 GOA Northern rockfish (*Sebastes polyspinis*)
UoA 5 GOA Pacific Ocean perch (*Sebastes alutus*)
UoA 6 GOA Dusky rockfish (*Sebastes variabilis*)
The UoC considered by this assessment are detailed further in the table below.

Species	BSAI Atka mackerel (*Pleurogrammus monopterygius*): BSAI and GOA Pacific Ocean perch (*Sebastes alutus*): GOA Dusky rockfish (*Sebastes variabilis*): BSAI and GOA Northern rockfish (*Sebastes polyspinis*)
Geographical areas	Northeast Pacific, FAO 67
Gears/ methods	Bottom trawl
Client Group	Alaska Seafood Cooperative

3 Fishery Background, History, and Status

3.1 Species biology and stock structure

The following information is taken for the SAFE reports published in November/December 2023, are available at https://www.npfmc.org/library/safe-reports. In addition, when the 2023 SAFE reports were only a harvest projection and not a full assessment the information to draft the following sections was taken from the 2022 safe reports available in https://apps-st.fisheries.noaa.gov/stocksmart?app=browse-by-stock.

3.1.1 BSAI Atka mackerel (AKT, *Pleurogrammus monopterygius*)

Atka mackerel (*Pleurogrammus monopterygius*) are distributed across the North Pacific Ocean, from Asia to North America, and inhabit areas such as the Kuril Islands, the Aleutian Islands, and the Gulf of Alaska (GOA) (Rutenburg, 1962). They are substrate-spawning fish with males providing parental care, laying adhesive eggs on rocky substrates in colonies (Lauth et al., 2007a). Their nesting habitats range from the AI to the western GOA, with limiting factors such as water temperature and light penetration affecting nesting depth (Lauth et al., 2007b; Kendall and Dunn, 1985). Larvae are neustonic, hatching from October to January, and are dispersed widely, including offshore areas over 500 km from the Bering Sea and North Pacific coasts (Kendall and Dunn, 1985; Materese et al., 2003).

The reproductive cycle of Atka mackerel involves establishing territories, spawning, and brooding (Lauth et al., 2007b). The spawning season runs from late July to mid-October, with females laying multiple batches of eggs. Males

brood eggs, with incubation times affected by water temperature (Guthridge and Hillgruber, 2008). Cannibalism, both hetero- and filial, is common during the spawning season (Canino et al., 2008; Zolotov, 1993). Atka mackerel are preyed upon by groundfish, marine mammals, and seabirds, while their own diet consists mainly of copepods and euphausiids (Yang, 1999; Sinclair et al., 2013).

Evidence suggests there is no significant stock structure differentiation in Atka mackerel across their range, although some studies point to minor regional differences. Genetic studies have shown limited evidence of genetic structuring or isolation across the AI, GOA, and Japan, likely due to high dispersal rates and large population sizes (Canino et al., 2010).

3.1.2 BSAI Pacific ocean perch (POP, *Sebastes alutus*)

Pacific ocean perch (*Sebastes alutus*) inhabit the North Pacific Ocean and Bering Sea, specifically on the outer continental shelf and upper slope. From 1979 to 1990, the species was managed within a complex alongside four other rockfish species, known as the POP complex. In 1991, the North Pacific Fishery Management Council separated POP from this group to prevent overfishing, with *S. alutus* being the most abundant and contributing the most to commercial catches.

Research on POP stock structure utilizes various approaches, including age and length compositions, growth patterns, and genetic studies. Gunderson (1972, 1977) observed spatial differences in length and age in British Columbia, suggesting distinct population aggregations. Chikuni (1975) identified four distinct stocks in the eastern Pacific, with larvae potentially migrating between regions. Simulation modeling by Stockhausen and Hermann (2007) also suggested wide larval dispersal due to ocean currents.

Rockfish larvae analysis is challenging due to overlapping morphological characteristics, as revealed by Kendall (1991). Combining genetic and morphometric techniques has improved species identification, with initial samples showing agreement between methods (Seeb and Kendall 1991, Gharrett et al. 2001, Rocha-Olivares 1998). Further studies, like Palof et al. (2011), revealed fine-scale population structure based on microsatellite DNA, consistent with previous findings (Gunderson 1972, 1977; Withler et al. 2001). Seeb and Gunderson (1988) inferred genetic variation using protein electrophoresis but did not find discrete stock groups, whereas microsatellite studies detected finer population structure, demonstrating the sensitivity of different genetic analysis techniques.

The differing results of allozyme work by Seeb and Gunderson (1988) and microsatellite research by Withler et al. (2001) highlight the varied timescales assessed by these methods. Microsatellites, with a higher mutation rate, provide greater sensitivity to genetic isolation compared to allozymes, which focus on central metabolic enzymes (Park and Moran 1994).

3.1.3 BSAI Northern Rockfish (NOR, *Sebastes polyspinis*)

The Northern Rockfish (*Sebastes polyspinis*) is a rockfish found predominantly in the northern Pacific Ocean, especially along the continental shelf of the Gulf of Alaska, Aleutian Islands, and Bering Sea, extending to the Sea of Okhotsk and Japan (Orr and Hawkins 2008). This species is distinguished by its spiny appearance and prefers deeper, colder waters, typically inhabiting depths ranging from 100 to 500 meters (Love et al. 2002). Northern Rockfish are known for their longevity, with individuals often living more than 50 years, a trait that is characteristic of many rockfish species (Cailliet et al. 2001). They are viviparous, with internal fertilization and live birth, which contributes to their slow reproduction rates and susceptibility to overfishing (Leaman and Beamish 1984). Their diet primarily consists of zooplankton and small fishes, positioning them as an important intermediate trophic level within their ecosystem (Yang 1996). The Northern Rockfish's widespread distribution and significant role in marine food webs underscore its importance in North Pacific fisheries management and conservation strategies.

The stock structure of BSAI Northern Rockfish was previously evaluated in the 2012 stock assessment (Spencer and Ianelli, 2012). This evaluation incorporated genetic data, growth differences, and spatial differences in size and age structure. Genetic tests from 499 samples collected during the 2004 Aleutian Islands and Eastern Bering Sea (EBS) trawl surveys revealed three genetically distinct groups based on spatial analysis of molecular variance (SAMOVA): 1) the eastern Bering Sea, 2) the area west of Amchitka Pass, and 3) the region between Amchitka Pass and Unimak Pass (Gharrett et al., 2012). Significant genetic isolation by distance was found, with dispersal distances estimated to be under 250 km, consistent with other Sebastes species (Buonaccorsi et al., 2004; Buonaccorsi et al., 2005; Hyde and Vetter, 2009; Palof et al., 2011; Gomez-Uchida and Banks, 2005). Given that northern rockfish have a generation time of over 36 years, dispersal estimates are over generations rather than years.

Von Bertalanffy growth curves, derived from Aleutian Island trawl surveys, indicate a size-at-age increase from the western to the eastern Aleutians. The largest growth curve variation was observed in the rate parameter k), which was lowest in the western Aleutians, suggesting slower asymptotic size attainment in that region (Clausen and Heifetz, 2002). Size at age in the Gulf of Alaska (GOA) was also larger than in the Aleutians, revealing an east-west growth

cline. However, spatial age composition data from trawl surveys between 2002 and 2006 showed inconsistent patterns across years.

The unique deep passes of the Aleutian Islands, often exceeding 500 m, may hinder the movement of marine species, including northern rockfish. Logerwell et al. (2005) identified a biophysical transition zone at Samalga Pass. Although northern rockfish are typically found at 100–200 m depths, crossing deep passes may require occupying pelagic habitats or deeper waters. Larval movement between areas is influenced by ocean currents, with limited east-west connectivity due to the geographical break near Petral Bank and Bowers Ridge. The Alaska Stream's separation west of Amchitka Pass and the resulting eddies may further limit the connection between the eastern and western Aleutians.

3.1.4 GOA Northern Rockfish (NOR, *Sebastes polyspinis*)

Gulf of Alaska (GOA) northern rockfish (*Sebastes polyspinis*) shows similar biological features of the stock inhabiting the BSAI and, as evidenced above the two stocks are considered and managed as two different units. The stock assessment was conducted in 2022 (Williams et al., 2022).

In the GOA, northern rockfish are mainly caught using bottom trawls, often equipped with tire gear for easier towing over rough substrates. The primary fishing occurs in July, coinciding with the opening of the directed rockfish fishery, initially targeting the more valuable Pacific ocean perch (*S. alutus*) before switching to northern rockfish once the Total Allowable Catch (TAC) for Pacific ocean perch is met. Since 2007, catches have been more evenly distributed throughout the year due to the Central Gulf Rockfish Pilot Project.

Historically, bottom trawls have dominated the northern rockfish fishery, accounting for over 99% of the catch from 1990 to 1998 (Clausen and Heifetz, 2002). Prior to 1996, most of the slope rockfish trawl catch was processed by large factory trawlers at sea, but from 1996 onward, smaller shore-based trawlers contributed significantly, particularly in the Central Gulf, delivering to processing plants in Kodiak. However, factory trawlers continued to dominate the Western Gulf.

Between 1990 and 1998, 89% of the northern rockfish catch was concentrated in five key fishing grounds: Portlock Bank, Albatross Bank, the "Snakehead" (an unnamed bank south of Kodiak Island), Shumagin Bank, and Davidson Bank, with the Snakehead alone accounting for 46% of the total catch (Clausen and Heifetz, 2002). Data from the observer program indicated that 82% of the catch was from directed northern rockfish fishing, while 18% was incidental (Clausen and Heifetz, 2002).

From 1961 to 1976, northern rockfish catches were estimated as 5% of the foreign GOA Pacific ocean perch catch, as reported by Ackley and Heifetz (2001). Foreign fleets, particularly from the U.S.S.R. and Japan, heavily exploited the GOA for Pacific ocean perch, with northern rockfish likely caught as bycatch. During 1977-1983, catch estimates became more reliable due to the NMFS observer program, which collected sufficient data for species composition. A shift occurred in 1984 with the establishment of a domestic rockfish fishery, although domestic catch estimates for northern rockfish during 1984-1989 were based on the ratio of northern rockfish to slope rockfish catches reported in the NMFS observer program (Clausen and Heifetz, 2002).

3.1.5 GOA Pacific ocean perch (POP, *Sebastes alutus*)

Gulf of Alaska (GOA) Pacific ocean perch (POP, *Sebastes alutus*) shows similar biological features of the stock inhabiting the BSAI and, as evidenced above the two stocks are considered and managed as two different units.

The Pacific ocean perch trawl fishery began in the GOA in the early 1960s, driven by Soviet and Japanese fleets. Catches peaked in 1965 at nearly 350,000 metric tons, followed by a steep decline due to overfishing, reaching only 8,000 t by 1978. Foreign fishing dominated from 1977 to 1984, with Japan accounting for most of the catch (Carlson et al. 1986). The fishery's lowest point occurred in 1985 after foreign trawling was banned.

Domestic trawling gained significance from 1985, with catches expanding as quotas increased from 3,702 t in 1986 to 20,000 t by 1989. From 1991 to 1995, stricter management measures reduced catches. These measures included the division of slope rockfish into subgroups to limit harvest, reduced total allowable catches (TAC), and conservative in-season management, with closures to avoid exceeding the TAC. Since 1996, POP catches have risen due to good recruitment and increasing biomass, with most TACs being met. Southeast Outside has seen minimal catch due to trawling restrictions.

Traditionally, bottom trawls accounted for nearly all the POP catch. However, since 2006, the share of pelagic trawl catches increased to 24-31% of the total. Before 1996, factory trawlers processed over 90% of the catch at sea. After 1996, shore-based trawlers became more prominent, especially in the Central Gulf, where they took about 50% of the catch since 1998, increasing to 60% by 2008. Factory trawlers continue to dominate the Western Gulf.

In 2007, the Central GOA Rockfish Program was introduced to improve resource conservation and economic efficiency. This program established cooperatives among trawl vessels and processors, granting exclusive harvest rights for rockfish management groups, including POP.

In 1991, the NPFMC divided the slope rockfish assemblage in the GOA into three management subgroups: POP, shortraker/rougheye rockfish, and other slope species. Northern rockfish was added as a subgroup in 1993, and shortraker and rougheye were separated in 2004. These divisions aimed to protect key species from overfishing. Each subgroup now receives individual ABC and TAC, which are further apportioned across the GOA's three management areas (Western, Central, Eastern) based on survey biomass distribution.

3.1.6 GOA Dusky Rockfish (DUR, *Sebastes variabilis*)

The Gulf of Alaska (GOA) dusky rockfish (*Sebastes variabilis*) has traditionally been assessed biennially, in conjunction with new trawl survey data. Following the 2016 stock assessment prioritization process (Hollowed et al. 2016), it was recommended that this biennial schedule continue, with full stock assessments in even years and harvest projections in odd years. The 2023 projection model incorporated updated catch data to recommend harvest levels for the next two years without re-estimating model parameters (Omori et al. 2023). The biological and stock assessment information summarized here is from the 2022 full assessment (Williams et al. 2022).

Dusky rockfish are one of the northernmost-distributed rockfish species in the Pacific, ranging from southern British Columbia to the Bering Sea and Hokkaido Island, Japan, though they are most abundant in the GOA. Historically, two forms of dusky rockfish were recognized: “light” and “dark” dusky rockfish. These are now classified as separate species, *S. ciliatus* (dark rockfish) and *S. variabilis* (dusky rockfish) (Orr and Blackburn 2004), with the assessment focused on *S. variabilis*. Adults inhabit offshore banks and gullies on the outer continental shelf, typically at depths of 100-200 m (Reuter 1999), and are often found in rocky habitats and sponge beds. Juvenile habitat is largely unknown, though juveniles are infrequently caught in trawl surveys (Clausen and Heifetz 2002). Dusky rockfish are believed to be ovoviviparous, with parturition occurring in spring, and larvae are likely pelagic, though positively identified only through genetic analysis.

Adult dusky rockfish feed primarily on euphausiids (Yang 1993) and Pacific sand lance (Yang et al. 2006). Rockfish exhibit evolutionary strategies to spread reproductive output over many years to cope with variable larval survival (Leaman and Beamish 1984). Fishing can disproportionately target older, faster-growing fish, which could be detrimental to populations that experience episodic recruitment (Longhurst 2002). While maternal age effects on reproduction in dusky rockfish are not well-established, similar effects have been observed in other rockfish species, such as black rockfish (*S. melanops*) and Pacific ocean perch (*S. alutus*) (Berkeley et al. 2004; Bruin et al. 2004; Leaman 1991). Environmental factors influencing reproductive success are also important considerations for stock assessments (Hannah and Parker 2007; Rodgveller et al. 2012; Beyer et al. 2015). Abortive maturation has been observed in Alaska dusky rockfish (Conrath 2019).

A review of dusky rockfish stock structure presented in 2011 and included in the 2012 assessment (Lunsford et al. 2012) indicated no significant stock structure differences within the GOA, supporting the current spatial management approach. Dusky rockfish are managed as a separate stock under the GOA Federal Management Plan (FMP), which divides the region into Western, Central, and Eastern areas, with further subdivision of the Eastern area to account for trawl prohibitions in the East Yakutat/Southeast Outside region due to FMP Amendment 41. Further research is needed to evaluate stock structure and ensure effective management.

3.2 Fishery operations

The Alaska Atka mackerel and rockfish fisheries are conducted in the U.S. EEZ waters of the BSAI and GOA. The BSAI is bordered by Alaska, the Bering Strait, and northeastern Siberia to the north and by the Alaska Peninsula, AI, and Commander Islands to the south. It covers over 2 million km2 of the Pacific Ocean. The GOA is an inlet along the south coast of Alaska. It is bounded by the Alaska Peninsula and Kodiak Island and Cape Spencer. There are many fjords and inlets along the Alaska coast and large rivers like the Susitna and Copper Rivers that drain into the GOA.

The Alaska Seafood Cooperative (AKSC), located in Seattle, WA, is the client group for these fisheries. AKSC is a group of ‘catcher processor’ fishing companies that are interested in working to improve the management of Bering sea Atka mackerel, rockfish, flatfish and other non-pollock groundfish fisheries. The AKSC comprises of five seafood member companies, with approximately 17 vessels that participate in these fisheries.

The principle legislative instrument for fisheries management in the U.S. is the MSFCMA or the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (herewith MSA) and is implemented by the National Marine Fisheries Service (NMFS) under federal FMPs adopted by the North Pacific Fisheries Management Council (NPFMC). NMFS is responsible for evaluating the status of the federally managed fisheries in the GOA and BSAI areas and provides annual stock assessment and fishery evaluation (SAFE) reports. Within the BSAI and GOA areas,

groundfish fisheries that are within the U.S. exclusive economic zone (EEZ) from 3 nm out to 200 nm from the coast are under federal authority, and near shore groundfish resources within state territorial waters (0-3 nm from shore) are managed by the State of Alaska. For most federal groundfish fisheries, the state regulations duplicate the federal regulations so that there is cohesive management in place. The NPFMC primarily manages groundfish in the GOA and BSAI, targeting cod, pollock, flatfish, mackerel, sablefish, and rockfish species harvested by trawl, longline, jig, and pot gear. Alaska Atka mackerel and rockfish are harvested by commercial demersal and pelagic trawl gear.

The commercial FMP groundfish fisheries off Alaska had a total catch of 2.01 million metric tons (mt) in 2021 (including catch in federal and state waters) and accounted for about 81.84% of the total 2021 catch in Alaska (Abelman et al., 2023). Alaska's groundfish fishery is an important component of the total U.S. catches and accounted for 38% by weight of the total U.S. domestic landings (Abelman et al., 2023). There are two sectors in Alaska's FMP fisheries: (1) catcher vessels that deliver catch to processors on the coast and (2) at-sea processors that sell processed product directly to the first-wholesale market.

3.3 Management system

The AK Atka mackerel and rockfish fisheries are conducted in the U.S. EEZ waters of the BSAI and GOA. The principle legislative instrument for fisheries management in the U.S. is the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA, herewith MSA) and is implemented by the NMFS. The North Pacific Fishery Management Council, (NPFMC or Council) is one of eight regional councils established by the MSA to manage fisheries in the 200-mile EEZ. The Council primarily manages groundfish in the GOA and BSAI, targeting cod, pollock, flatfish, mackerel, sablefish, and rockfish species harvested by trawl, longline, jig, and pot gear. The Council works closely with the Alaska Department of Fish and Game (ADFG) and the Alaska Board of Fisheries (BOF) to coordinate management programs in federal and state waters (0-3 nm from shore). In coastal waters off the United States, AK Atka mackerel and rockfish catch is under the jurisdiction of the BSAI Groundfish FMP, GOA Groundfish FMP, and the MSA. In addition to the MSA, the Council adheres to a suite of "other applicable laws:" NEPA, ESA, MMPA, MBTA, the Administrative Procedure Act, Paperwork Reduction Act, Regulatory Flexibility Act, and Coastal Zone Management Act and other relevant U.S. laws, emergency orders (EOs), and regulations. In addition, Alaska natives have rights that are considered in the management of the fishery, coordinated by NMFS. Internationally, the Pacific Atka mackerel and rockfish fisheries are conducted in a manner consistent with provisions of the U.N. FAO Code of Conduct. The fishery is also governed by the U.S. High Seas Fishing Compliance Act of 1995. This federal legislation implements the U.N. Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. The management of the fishery complies with the Migratory Bird Act Treaty, and the NMFS have instituted several regulations to further reduce seabird interactions in the fishery.

The MSA, National Standards and other legislation include explicit, well-defined short- and long-term objectives for sustainable fishing and conservation. NMFS incorporated precautionary concepts to ensure compliance with the Sustainable Fisheries Act 1996, which includes 10 National Standards (NS) for conservation and management of fisheries in the U.S. The National Standards have been part of federal fishery legislation since the passage of the original Fishery Conservation and Management Act in 1976. The FCMA outlined 7 NS and required that the Secretary of Commerce develop NS Guidelines. Three more NS (8-10) were added when the Act was reauthorized as the Sustainable Fisheries Act in 1996[1].
In addition to the National Standard Guidelines, the Council has established nine specific objectives, each with several sub-objectives, for BSAI and GOA groundfish fisheries in Alaska. These objectives include: Prevent Overfishing; Promote Sustainable Fisheries and Communities; Preserve Food Web; Manage Incidental Catch and Reduce Bycatch and Waste; Avoid Impacts to Seabirds and Marine Mammals; Reduce and Avoid Impacts to Habitat; Promote Equitable and Efficient Use of Fishery Resources; Increase Alaska Native Consultation; Improve Data Quality, Monitoring and Enforcement.

The groundfish fisheries, including Atka mackerel and rockfish, in the BSAI and GOA are managed by two different, but complementary, FMPs: BSAI FMP and GOA FMP. Program policies and measures are developed by the Council through the preparation and maintenance of FMPs for groundfish, crabs, and scallop fisheries in the BS and GOA, as well as for all future fisheries in the Arctic Ocean. The FMPs are frequently amended by the Council to respond to new scientific information, changes in the environment, changes in policy, and operational changes in the fisheries. The plan amendments, together with regulatory amendments, are developed though the Council's open and transparent regulatory process and implemented by the NMFS Alaska Regional Office. Both the BSAI and GOA FMPs have been amended over 100 times (NPFMC 2020a; 2020b).

BSAI Groundfish FMP

The BSAI Groundfish FMP was adopted by the Council in 1980 and implemented in 1982. The FMP has been amended to meet the changing fishery management needs. The BSAI FMP management area is the U.S. EEZ of the

[1] https://www.fisheries.noaa.gov/national/laws-policies/national-standard-guidelines

BS and that portion of the North Pacific Ocean adjacent to the AI which is between 170E W. longitude and the U.S.-Russian Convention Line of 1867 (NPFMC, 2020). The BSAI FMP covers fisheries for all stocks of finfish and marine invertebrates except salmonoids, shrimps, scallops, snails, king crab, Tanner crab, Dungeness crab, corals, surf clams, horsehair crab, lyre crab, Pacific halibut, and Pacific herring (NPFMC, 2020). One of the major objectives of the Council in the early 1980s was to phase out foreign fishing vessel participation in the BSAI EEZ (NPFMC, 2016). The first ten amendments implemented in the BSAI Groundfish FMP specifically dealt with foreign fishing fleet participation in the fishery. After the foreign fleet was adequately addressed, the Council focused on managing and regulating the domestic fleet to allow for sustainable and profitable fisheries by limiting entry and addressing allocation issues, bycatch, and habitat conservation needs (NPFMC 2016). In recent years, the Council has adopted amendments to streamline catch share programs and address other science and management changes. The Council has prepared summaries of each amendment to the FMPs that provide an overview of the purpose and need, analysis, regulation, and results of each action, and are meant as a resource for anyone interested in understanding the development of a federal fishery management program in the North Pacific. A summary of these actions can be found at the following link: BSAI Groundfish FMP Summaries (2016).

GOA Groundfish FMP

The GOA Groundfish FMP was implemented on December 1, 1978 and governs groundfish fisheries of the GOA. The FMP management area is the U.S. EEZ of the North Pacific Ocean, exclusive of the BS, between the eastern AI at 170° E W longitude and Dixon Entrance at 132° E 40' W longitude. The FMP covers fisheries for all stocks of finfish except salmon, steelhead, Pacific halibut, Pacific herring and tuna (NPFMC 2020b). The focus of the FMP has changed from the regulation of foreign fisheries to the management of fully domestic groundfish fisheries (NPFMC 2020b). The revised version has been updated to remove obsolete references to foreign fishery management measures, as well as outdated catch data and other scientific information. A list of these amendments, similar to that prepared for the BSAI, can be found at the following link: GOA Groundfish Summaries (2019).

3.3.1 Roles, responsibilities and decision-making processes

The NPFMC consists of 11 voting members, including: 7 appointed members, 4 agency representatives (6 from AK, 3 from WA, 1 from OR, and 1 from NMFS). There are also 4 non-voting members that include representatives from the USFWS, U.S. Coast Guard (USCG), Pacific States Marine Fisheries Commission, and the U.S. Department of State. The Council meet 5 times per year, and each meeting is ~7 days. All meetings are open to the public, except for an occasional short, closed session in which the Council deals with personnel, administrative, or litigation issues.. Proposals for management measures may come from the public, state and federal agencies, advisory groups, or Council members. There is also a Scientific and Statistical Committee (SSC), Advisory Panel (AP), Plan Teams, and other committees that provide input to the Council at each meeting (NPFMC, 2023).

SSC

As required by the MSRA at Sec. 302(g)(1), the Council shall establish, maintain, and appoint the members of an SSC to assist it in the development, collection, and peer review of such statistical, biological, economic, social, and other scientific information as is relevant to the Council's development and amendment of any of its fishery management plans (MRAG 2015). The SSC is composed of scientists in economics, biology, social science and statistics. Members appointed by the Council to the SSC shall be federal employees, state employees, academics, or independent experts and shall have strong scientific or technical credentials and experience. Independent experts on the SSC cannot be employed by an interest group or advocacy group. The SSC will provide the peer review process for scientific information used to advise the Council about the conservation and management of the fishery. The review process, which may include existing committees or panels, is deemed to satisfy the requirements of the guidelines issued pursuant to section 15 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106–554—Appendix C; 114 Stat. 2763A–153). SSC members serve one-year terms with no term limits. Members may be reappointed or replaced by the Council annually at their December Council meeting (NPFMC, 2023, MRAG, 2020).

AP

The AP is represented by members of the fishing industry, catching and processing and subsistence and commercial fishermen, observers, consumers, environmental/conservation, and sport fishermen. The Council relies on the AP for comprehensive advice on how various fishery management alternatives will affect the industry and local economies, on potential conflicts between user groups of a given fishery resource or area, and on the extent to which the United States will utilize resources managed by the Council's fishery management plans[2]. The AP consists of 22 members, usually serving three-year terms. These members may be reappointed or replaced by the Council annually at their December Council meeting (NPFMC, 2023).

Groundfish Plan Teams (adapted from MRAG Americas, 2020)

[2] https://www.npfmc.org/about-the-council/advisory-groups/advisory-panel/

The Council appoints plan teams for each of the major FMPs. Members of each Plan Team are selected from those agencies and organizations having a role in the research and/or management of fisheries. At a minimum, Plan Teams shall be composed of one member from agencies having responsibility for management of the fishery resources under the jurisdiction of the Council. Nominations of these individuals are at the discretion of the agencies. Other individuals may be nominated by members of the Plan Team, Council, SSC, or AP. Appointments to the Plan Team will be made by the Council with recommendations from the SSC.

The Plan Teams review stock assessment information and assist in the preparation of the annual SAFE documents including formulation of recommendations on annual ABC levels for groundfish, crab, and scallop species under jurisdiction of the Council. The Plan Teams may also prepare and/or review plans, amendments and supporting analytical documents for the Council, SSC, and AP; aggregate and evaluate public/industry proposals and comments; summarize and evaluate data related to the biological, economic and social conditions of the fishery; conduct and evaluate analyses pertaining to management of the fisheries; evaluate the effectiveness of management measures in achieving the plan's objectives; and recommend when and how management measures need to be changed.
Alaska Seafood Cooperative and other industry staff participates in the Plan Team process soliciting peer reviews of stock assessments, and its meetings consider outside views regarding its analyses. As a participant in the Plan Team process, a panel of biologists, from various state and federal agencies and recognized as having considerable expertise in the field of groundfish population dynamics are consulted on an annual basis to review the most recent groundfish survey information from the NMFS. If new data points for biomass estimates suggest a higher or lower ABC, then the outside experts have some input with assessment authors relative to adjusting these parameters.
For proposals and routine management decisions, if the Council chooses to pursue it directs NMFS and/or Council staff to prepare an analysis considering a range of alternatives. The Council reviews the analysis and selects a range of alternatives within which a preliminary preferred alternative may be identified. The analysis is then made available for public review, and the Council makes a final decision at the next meeting the item is scheduled. After considering Council recommendations and public comments, NMFS publishes the adopted regulations. For non-routine and annual management decisions, NMFS publishes a Federal Register notice and provides a public comment period before finalizing the recommendations (NPFMC, 2023). The procedure for changing Federal fishing regulations follows a standardized process, set forth by a combination of laws, regulations, operational guidelines, policies, as well as adjustments and adaptations developed by the Council to increase efficiency, provide public participation, and produce quality outcomes (NPFMC 2009, 2012a). All documents are posted on the website in advance of the meeting, and public comment is taken by the Council and advisory bodies before any decisions are made. The following figure illustrates the Council process from proposal to implementation.

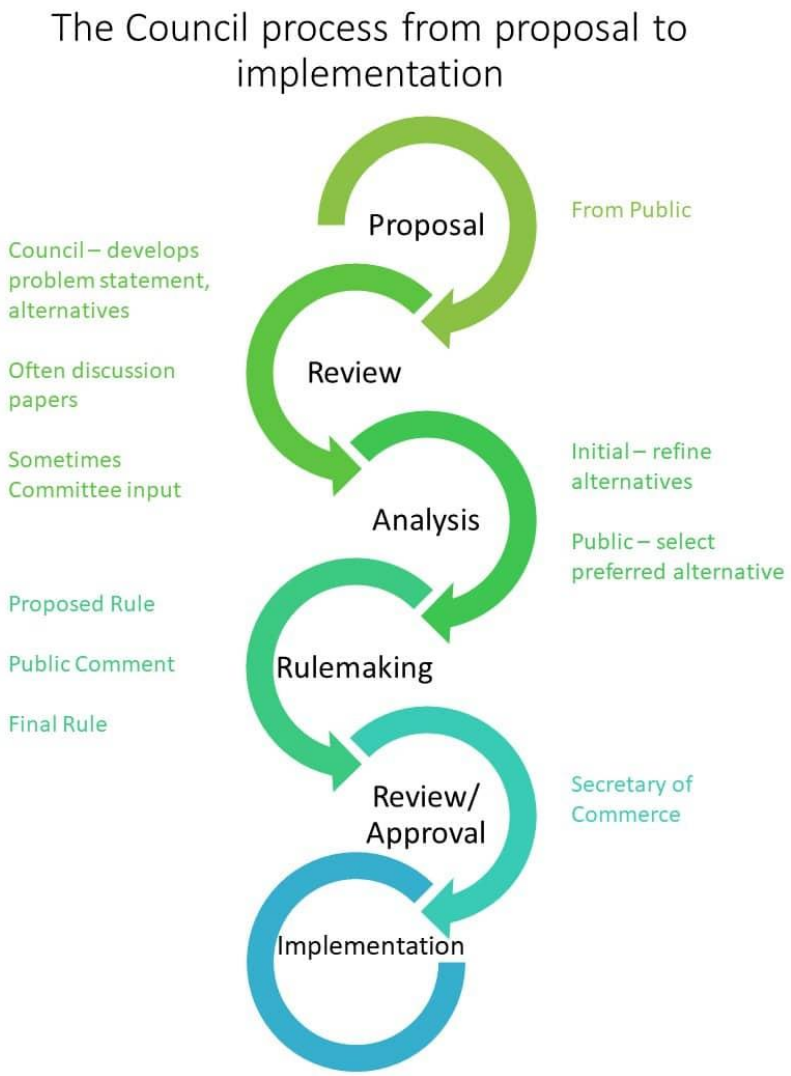


Figure 1 NPFMC process from proposal to implementation. Source: NPFMC, 2023

3.3.2 Consultation

Accountability and transparency of the management system is required by multiple laws and Executive Orders. The National Standard (NS) Guidelines for National Standard 2 specifically require transparency in the provision of scientific information for fishery management. Under the heading "Transparency and openness," the NS Guidelines state that: "The Magnuson-Stevens Act provides broad public and stakeholder access to the fishery conservation and management process, including access to the scientific information upon which the process and management measures are based. Public comment should be solicited at appropriate times during the review of scientific information. Communication with the public should be structured to foster understanding of the scientific process." They further require that: "Scientific information products should describe data collection methods, report sources of uncertainty or statistical error, and acknowledge other data limitations. Such products should explain any decisions to exclude data from analysis. Scientific products should identify major assumptions and uncertainties of analytical models. Finally, such products should openly acknowledge gaps in scientific information" (NOAA, 2018).
The Council's mandate is to manage and conserve fisheries for the greatest overall benefit of the nation by relying on scientific information and data, as well as the participation of fishing communities and the public. In accordance with the MSA, the Council has functions and responsibilities that are outlined in the Statement of Organization, Practices and Procedures (SOPP). The SOPP specifies how the Council and its advisory entities will run their meetings including how public comments will be entertained. These functions and roles pertaining to the consultation process are summarized below (NPFMC, 2023b):

- The agenda for each Council meeting is drafted by the Executive Director in consultation with the Council Chair. All Council members will have an opportunity to review and comment on a draft agenda before it is released to the public.
- Timely notice of each regular meeting, hearing, and each emergency meeting, including the time, place, and agenda of the meeting, shall be provided by any means that will result in wide publicity in the major fishing ports of the region (and in other major fishing ports having a direct interest in the affected fishery) except that

e-mail notification and website postings alone are not sufficient. Timely notice of each regular meeting shall also be published in the Federal Register.

- Each regular meeting and each emergency meeting shall be open to the public. Interested persons shall be permitted to present oral or written statements regarding the matters on the agenda at meetings, within reasonable limits established by the Chair. Written comments can be provided electronically in advance of the Council meeting; directions on submitting comments, and deadlines for posting comments, are posted on the Council website www.npfmc.org.
- A report of each meeting of the Council, except for any closed session, shall be kept and contain a record of the persons present, a complete and accurate description of matters discussed, and conclusions reached, and copies of all statements filed. The summary report, combined with the detailed newsletter, time log, and audio/visual recordings of the meeting, are intended to meet the requirements for minutes as described in Section 302(i)(2)(E) of the MSA.
- The Council may hold public hearings in order to provide the opportunity for all interested individuals to be heard with respect to the development of fishery management plans or amendments, and with respect to the administration and implementation of other relevant features of the Act. Notice of each hearing must be received by NMFS for publication in the Federal Register at least 23 calendar days prior to the proposed hearing. The Council will also issue notices to announce the time, location, and agenda for each hearing in a manner sufficient to assure all interested parties are aware of the opportunity to make their views known.

3.3.3 Regulatory framework

The U.S measures for regulating the BSAI and GOA fisheries are found in 50 CFR 600 and 50 CFR 679. Gear types authorized by the FMP are trawls, hook-and-line, pots, jigs, and other gear as defined in regulations. The fishery is primarily managed by required licenses and/or permits, fishing seasons, annual TACs, closed areas, catch restrictions. Annually, the Council develops harvest specifications based on information from the Groundfish Plan Teams, SSC, AP, the public, and any other relevant information. Harvest specifications include overfishing limit, acceptable biological catch (ABC), total allowable catch (TAC), ABC surplus and ABC reserve. Final harvest specifications are implemented by mid-February each year to replace those in effect for that year and based on current information contained in the latest groundfish SAFE reports. Current harvest specifications can be found at the following link: https://www.npfmc.org/fisheries-issues/issues/harvest-specs/.

The Council implemented Amendment 80 in 2008, which allocated BSAI yellowfin sole, flathead sole, Atka mackerel, and AI Pacific Ocean perch to the “head and gut” trawl CP sector and allows qualified vessels to form cooperatives. This action meets the broad goals of: (1) improving retention and utilization of fishery resources by the non-AFA trawl CP fleet by extending the groundfish retention standard to non-AFA trawl CP vessels of all lengths; (2) allocating fishery resources among BSAI trawl harvesters in consideration of historic and present harvest patterns and future harvest needs; (3) authorizing the allocation of groundfish species to harvesting cooperatives and establishing a limited access privilege program for the non-AFA trawl CPs to reduce potential groundfish retention standard compliance costs, encourage fishing practices with lower discard rates, and improve the opportunity for increasing the value of harvested species; and (4) limiting the ability of non-AFA trawl CPs to expand their harvesting capacity into other fisheries not managed under a limited access privilege program. In addition, Amendment 80 modified the management of halibut and crab PSC limits (NPFMC, 2018c).

Halibut PSC Reduction

Since the implementation of Amendment 80 in 2008, the Alaska groundfish sector and the Council have been working toward reducing the catch of halibut by the sector. The sector entered into a “Halibut Agreement” in 2016 to ensure a sector-wide accountability for halibut avoidance. The agreement consists of three components:

- Best Practices – The plan defines best operational practices for halibut avoidance for the Amendment 80 sector, including: monitoring halibut bycatch; communication protocols; excluder use and development; and halibut avoidance through changing a variety of fishing parameters, including location, target, depth, tow speed, and other factors.
- Halibut Avoidance Plan – The plan defines performance standards to incentivise all vessels in the fleet (through financial penalty) to achieve acceptable levels of halibut use in the fisheries. The program is intended to ensure that all vessels maintain minimum halibut rates annually using both annual and quarterly performance standards with a specific component to assess performance in the fourth quarter, when halibut rates have historically increased to the highest levels for the year.
- Deck sorting – The sector has spent several years developing a deck sorting program, which allows vessels to deck sort halibut to return halibut to the water quickly, thereby reducing halibut mortality. The sector is currently engaged in its fifth exempted fishing permit (EFP), allowing for continued development of deck sorting protocols that can be incorporated into a regulatory package in the future. Under these EFPs, the codend is pulled forward

of the aft live tank hatches to allow space for sorting and is gradually emptied onto the deck. Crewmembers carefully remove halibut while moving the other fish into the tanks. The halibut are slid or carried to a station/table where the observer on duty is positioned. The observer's table typically leads to a chute used to channel halibut off the vessel after counting and sampling. All observer tables must be pre-approved by NMFS prior to deck sorting and video monitoring is used in all locations where crew activities involving sorting and handling of halibut occur.

Essential Fish Habitat Components

To incorporate the regulatory guidelines for review and revision of essential fish habitat (EFH) FMP components, the Council will conduct a complete review of all the EFH components of each FMP once every 5 years and will amend those EFH components as appropriate to include new information. During the NPFMC February 2023 meeting, The Council reviewed the summary report of a 5-year review of essential fish habitat (EFH) components of the Council's FMPs, and initiated an analysis at this meeting to update the Council's BSAI Groundfish, GOA Groundfish, BSAI King and Tanner Crab, Salmon, and Arctic FMPs' descriptions and maps of Essential Fish Habitat (EFH). The Council elected not to initiate additional habitat-specific processes at this time (NPFMC, 2023).

Updates to Regulations and the Fishery Management Plan

NOAA Fisheries issued the final rule to implement Amendment 123 to the BSAI FMP. This final rule amends the regulations governing limits on Pacific halibut (*Hippolgossus stenolepis)* prohibited species catch (PSC) to link the halibut PSC limit for the Amendment 80 commercial groundfish trawl fleet in the BSAI groundfish fisheries to halibut abundance. This is necessary to comply with the Magnuson Stevens Act (MSA) that FMPs minimize bycatch to the extent practicable. Effective date of the final rule was January 1, 2024.

The NPFMC submitted to the Secretary of Commerce for review, Amendment 113 to the Gulf of Alaska (GOA) FMP, which would modify specific provisions for the central GOA Rockfish Program (RP) to change the season start date, remove the catcher vessel (CV) cooperative holding cap, and revise the processing and harvesting caps implemented in the RP. These actions are necessary to provide increased flexibility and efficiency to better ensure the rockfish species total allowable catch (TAC) is fully harvested and landed in Kodiak. This is currently a Proposed Rule (50 CFR 679).[3]

The North Pacific Fishery Management Council (NPFMC) reviewed the Fishery Management Plans (FMP) omnibus amendment analysis and proposed FMP amendment text based on the 2023 EFH 5 year Review. The Council took final action and selected Alternative 2, which is summarized as follows:

Alternative 2, the preferred alternative, will update the EFH information in the BSAI&GOA groundfish, BSAI crab and Arctic FMPs. These updates include updated EFH maps, text descriptions, results of the fishing effects (FE) on habitat, prey species tables, non-fishing effects report and research and information needs (NPFMC, 2023).

3.3.4 Monitoring, control and surveillance

The North Pacific fisheries has a comprehensive, industry-funded, at sea and on shore Observer Program. This is coupled with requirements for total weight measurement of most fish harvested. All sectors of the groundfish fishery may be required to carry one or more observers or an electronic monitoring system for at least a portion of their fishing time. All groundfish vessels and processors are included in one of two coverage categories: partial and full. Monitoring is done by the North Pacific Observer Program and requires full observer coverage on AK groundfish vessels. The BSAI and GOA Groundfish FMPs (NPFMC 2018a, 2018b) requires that U.S. fishing vessels that catch groundfish in the EEZ, or receive groundfish caught in the EEZ, and shoreside processors that receive groundfish caught in the EEZ, are required to accommodate NMFS-certified observers as specified in regulations, to verify catch composition and quantity, including at-sea discards, and collect biological information on marine resources.

NMFS is responsible for funding and overall administration of the program including observer training, debriefing and data management. In the full observer coverage category, the fishing industry is responsible for making arrangements with contracting companies that meet the North Pacific Observer Program NMFS-certification requirements for placement of NMFS-trained observers aboard their vessels and paying contractors for direct observer costs. The observer contractors are responsible for observer recruiting, deployment, logistics, and insurance/benefits (NMFS 2014). Observer coverage responsibilities are shared among the fishing industry and independent observer contractors (who are certified by NMFS). The contractors hire and deploy observers. The NMFS also provides other observer support services (sampling gear and training documents) and is responsible for maintaining information systems for scientific and operational data, and administrative support. In the partial coverage category NMFS contracts directly with the observer providers, and charges fees to the industry for running the observer program based on ex-vessel value.

[3] https://www.federalregister.gov/documents/2024/04/04/2024-07115/fisheries-of-the-exclusive-economic-zone-off-alaska-amendment-113-to-the-fishery-management-plan-for#:~:text=If%20approved%2C%20Amendment%20113%20would,caps%20implemented%20in%20the%20RP.

There are three entities that provide enforcement for Alaska fisheries: NOAA Office of Law Enforcement (OLE), US Coast Guard (USCG) and Alaska Wildlife Troopers (AWT). Monitoring, control, and surveillance (MCS) is conducted at-sea and shore-side for the federal fisheries by the OLE and the USCG. The AWT fulfils the MCS function for the state water fisheries. The Code of Federal Regulations list the sanctions to deal with non-compliance.

Monitoring, control and surveillance (MCS) is carried out at-sea and shore-side for the federal fisheries by the NMFS Office of Law Enforcement (OLE) and the U.S. Coast Guard (USCG). NOAA's OLE protects marine wildlife and habitat by enforcing domestic laws and international treaty requirements designed to ensure these global resources are available for future generations (NOAA, 2019). OLE special agents and enforcement officers ensure compliance with the nation's marine resource laws and take enforcement action when these laws are violated. All OLE work supports the core mission mandates of NOAA Fisheries—maximizing productivity of sustainable fisheries and fishing communities and protection, recovery, and conservation of protected species.
At-sea and shore-side enforcement activities include:

- Monitoring of commercial fishing activities to ensure compliance with fishery laws and regulations;
- Actions to close commercial fisheries once catch limits have been reached;
- Educating participants in the fishery on the laws and regulations; NMFS management, NMFS OLE, and the USCG all conduct extensive outreach and education programs that seek not only to explain the regulations, but also to help the fishing industry understand the rationale for those regulations.
- Penalizing violators. OLE agents and officers can assess civil penalties directly to the violator in the form of a summary settlement or can refer the case to NOAA's OGC for Enforcement and Litigation who can impose a sanction on the vessels permit or further refer the case to the U.S. Attorney's Office for criminal proceedings. Penalties may range from severe monetary fines, boat seizure and/or imprisonment (NMFS 2011).

The USCG is the primary agency for at-sea fisheries enforcement. The USCG objectives are to prevent encroachment into the US EEZ, ensure compliance with domestic fisheries regulations, ensure compliance with international agreements and high seas fishing regulations. The USCG use a software package (FishTactic) to assess risk of infringements and use this enforcement tool to assist the deployment of vessels and aircraft and target fisheries enforcement effort. If the USCG detect a fisheries infringement they gather evidence and hand over the investigation to the OLE.

The primary responsibility for enforcing fish and wildlife-related statutes and regulations in Alaska lies with the Alaska Department of Public Safety, through its Division of Alaska Wildlife Troopers (ADFG 2023). The division also enforces other types of regulations passed by the Board of Game and the BOF. This includes those designed to protect Alaska's native species from harmful invasive species, prevent importation of exotic pets, and prevent illegal export of animal parts from Alaska. Biologists and other staff of the ADFG sometimes participate in enforcement activities and assist the Wildlife Troopers as needed; however, law enforcement is not a primary function of ADFG (ADFG 2023).

The Cooperative Enforcement Program is a partnership with the federal and state agencies that increases the enforcement activities and promotes compliance with federal laws and regulations. The program uses two main tools:

1. Cooperative Enforcement Agreements – authorize state and US territorial marine conservation law enforcement officers to enforce federal laws and regulations.
2. Joint Enforcement Agreement JEA) – include formal operations plan that transfers funds to state and US territorial law enforcement agencies to perform law enforcement services in support of federal regulations (NOAA, 2021). The purpose of the JEA between NOAA-OLE and the Alaska Wildlife Troopers (AWT) is to support enforcement of Federal laws and regulations under the Magnuson-Stevens Act, Endangered Species Act, Marine Mammal Protection Act, Lacey Act, and Northern Pacific Halibut Act.

In the OLE AK Enforcement Division Report to NPFMC (December 2023), AWT recorded the following actions in direct support of OLE and marine resource protection:

- 339 vessels boarded (commercial, charter, sportfish, and subsistence)
- 946 contacts (industry and public) during the execution of field operations
- 1671 additional contacts through 11 outreach activities
- Completed cases involving 6 Federal violations, 21 State warnings, and 30 State citations (most often jointly, state/federal managed fisheries)
- Referred 5 cases to OLE for potential/confirmed Federal violations (Primary OLE authority enforcement actions) (NOAA, 2023c).

OLE agents/officers have the option to provide a written warning for minor offences however, these are taken into account for repeat offenders. More serious offences can be dealt with by a summary settlement, i.e. a violation which is not contested and results in a ticket which may include a discounted fine, thus allowing the violator to quickly resolve the case without incurring legal expenses. Thereafter, an offence is referred to NOAA's Office of General Counsel (OGC) for Enforcement and Litigation which can impose a sanction on the vessels permit or further refer the case to the US Attorney's Office for criminal proceedings. Penalties may range from severe monetary fines, forfeiture

of catch, boat seizure and/or imprisonment. The MSA has an enforcement policy section (50 CFR 600.740) that details these “remedies for violations” (MSA, 2007).
The Council follows the same enforcement procedures outlined by NOAA Fisheries OLE. There is a strong enforcement program to deter fisheries violations through successful prosecution and deterrent penalties. NOAA has authority and responsibility under more than 30 federal statutes to manage sustainable fisheries, and to protect living marine resources, including marine areas and species (NOAA Policy for Assessment of Penalties and Permit Sanctions – March 16, 2011, 56pp). Officers and agents in the NOAA Office of Law Enforcement, the US Coast Guard, Customs and Border Protection, Immigration and Customs Enforcement, US Fish and Wildlife Service, and State officers authorized under Cooperative Enforcement Agreements, monitor compliance and investigate potential violations of the statutes and regulations enforced by NOAA. Monitoring, control and surveillance are carried out across the fishing sectors to ensure observance of regulatory and statute requirements. Monitoring, control and surveillance actions include:

- Fishing permit requirements
- Fishing permit and fishing vessel registers
- Vessel and gear marking requirements
- Fishing gear and method restrictions
- Reporting requirements for catch, effort, and catch disposition
- Vessel inspections
- Record keeping requirements
- Auditing of licensed fish buyers
- Control of transshipment
- Monitored unloads of fish
- Information management and intelligence analysis
- Analysis of catch and effort reporting and comparison with landing and trade data to confirm accuracy
- Boarding and inspection by fishery officers at sea
- Aerial and surface surveillance

The Code of Federal Regulations list the sanctions to deal with non-compliance. Penalties for fisheries related violations include fines; permit cancellations or suspensions, permanent prohibitions on participation in the fishery, forfeiture of fish, vessels, other property and quota; and imprisonment. With respect to permit sanctions, where applicable, the statutes that NOAA enforces generally provide broad authority to suspend or revoke permits.

3.4 Stock assessment and reference points

3.4.1 BSAI Atka mackerel

In 2023, the Bering Sea and Aleutian Islands (BSAI) Atka mackerel stock shifted from an annual to a biennial assessment schedule, in line with groundfish stock prioritization efforts. Full assessments will now occur in even years, alongside the Aleutian Islands (AI) bottom trawl survey, while harvest projections (previously termed "partial" assessments) will take place in odd years. A harvest projection was performed in 2023, with the next full assessment scheduled for 2024 (Sulivan et al., 2023). The BSAI Atka mackerel is classified as a Tier 3 stock (Lowe and Ianelli, 2022). During full assessments, a statistical catch-at-age model is used to produce population estimates and biological reference points. In 2023, only the projection model was run using the 2022 assessment data and updated catch assumptions (Lowe and Ianelli, 2022).

Since 2002 BSAI Atka mackerel stock assessment has been implemented using the Assessment Model for Alaska (AMAK, 2015) from the Toolbox, which is similar to the stock synthesis application (Methot 1989, 1990; Fournier and Archibald 1982, Fournier 1998). The AMAK model allows increased flexibility in specifying models with uncertainty in changes in fishery selectivity and other parameters such as natural mortality and survey catchability (Lowe et al. 2002). This approach (AMAK) has also been adopted for the Aleutian Islands pollock stock assessment (Barbeaux et al. 2004).

The AMAK models catch-at-age with the standard Baranov catch equation. The population dynamics follows numbers-at-age over the period of catch history (here 1977-2021) with natural and age-specific fishing mortality occurring throughout the 11-age-groups that are modelled (1-11+). Age 1 recruitment in each year is estimated as deviations from a mean value expected from an underlying stock-recruitment curve. Deviations between the observations and the expected values are quantified with a specified error model and cast in terms of a penalized log-likelihood. The overall log-likelihood (L) is the sum of the log-likelihoods for each data component and prior specification (e.g., for affecting the extent selectivity is allowed to vary).

The 2016 assessment introduced Model 16.0 with sample sizes varied relative to the number of hauls sampled. The 2017 assessment introduced Model 16.0b which provided for statistical estimation of the amount of time variability in fishery selectivity through tuning of the time-varying selectivity term with the Francis method (2011), and the survey age composition sample sizes were also tuned using the Francis method.

The 2018 assessment responded to BSAI Plan Team and the SSC requests for further evaluations of the Francis (2011) weights and selectivity changes implemented in Model 16.0b. These requests included:

> Continue to investigate fishery selectivity time blocks, with blocks linked to identifiable changes in the fishery,
>
> Evaluate the sensitivity of model results to an assumed average sample size of one hundred for the fishery age composition data, or better yet (if possible), find a way to tune the sample size and the constraint governing the amount of time variability in fishery selectivity simultaneously and,
>
> Investigate which parameters (including derived quantities) are changing in the retrospective peels that might contribute to the relationship between historical scale and number of peels.

Model 16.0b (the accepted model configuration used for the 2021 assessment) was updated with new data in 2022. The 2021 catch was updated, and the 2022 total year catch was assumed to equal the 2022 TAC of 66,481 t. The 2021 fishery age compositions were added. Biomass estimates from the 2022 bottom trawl survey were added.

Atka mackerel have a reasonable retrospective pattern for the last 6-7 years of predicting spawning biomass, with periods that are lower and higher. The revised Mohn's rho statistic was calculated to be 0.062. However, after data from 2012-2014 were dropped from the model, most subsequent retrospective runs resulted in biomass that was historically considerably higher. We concluded that the reason for the odd pattern can be attributed to the survey age compositions (Lowe et al. 2017). Given the assumed natural mortality as fixed (and constant over time), and the recent period of data with relatively large numbers of Atka mackerel in the survey "plus age group," the survey selectivity was fairly asymptotically shaped (see Selectivity section below). However, for the retrospective peels which ignore those recent years of data, the survey selectivity becomes much more dome-shaped, hence the early period biomass estimates were estimated to be considerably higher.

The 2018 assessment investigated which parameters (including derived quantities) were changing in the retrospective peels that might contribute to the relationship between historical scale and number of peels. We concluded that the observed pattern is attributed to the addition of recent survey estimates, and suggested that the retrospective bias is a reflection of the data rather than issues with the model configuration (Lowe et al. 2018). In general, this type of retrospective pattern seems to be consistent with the uncertainty estimates of biomass for a species that is relatively patchily distributed, and trawl survey estimates that have a high level of variability. This interpretation still holds in the current assessment.

A comparison of the age 3+ biomass and spawning biomass trends from the current and previous assessments (Figure 2) indicates consistent trends throughout the time series, i.e., biomass increased during the early 80s and again in the late 80s to early 90s. After the estimated peak spawning biomass in 1992, spawning biomass declined for nearly 10 years until 2001 (Figure 2). Thereafter, spawning biomass began a steep increase which continued to 2005. The abundance trend has been declining since the most recent peak in 2005 which represented a build-up of biomass from the exceptionally strong 1999-2001 year classes. Estimates from the current assessment (Model 16.0b) are similar up to 2015 and higher since then relative to last year's assessment (Model 16.0b) results. Differences in spawning biomass levels are attributed to revised estimates of recent recruitment levels of the 2012, 2013-year classes, and in particular, the 2017 year class (Figure 2).

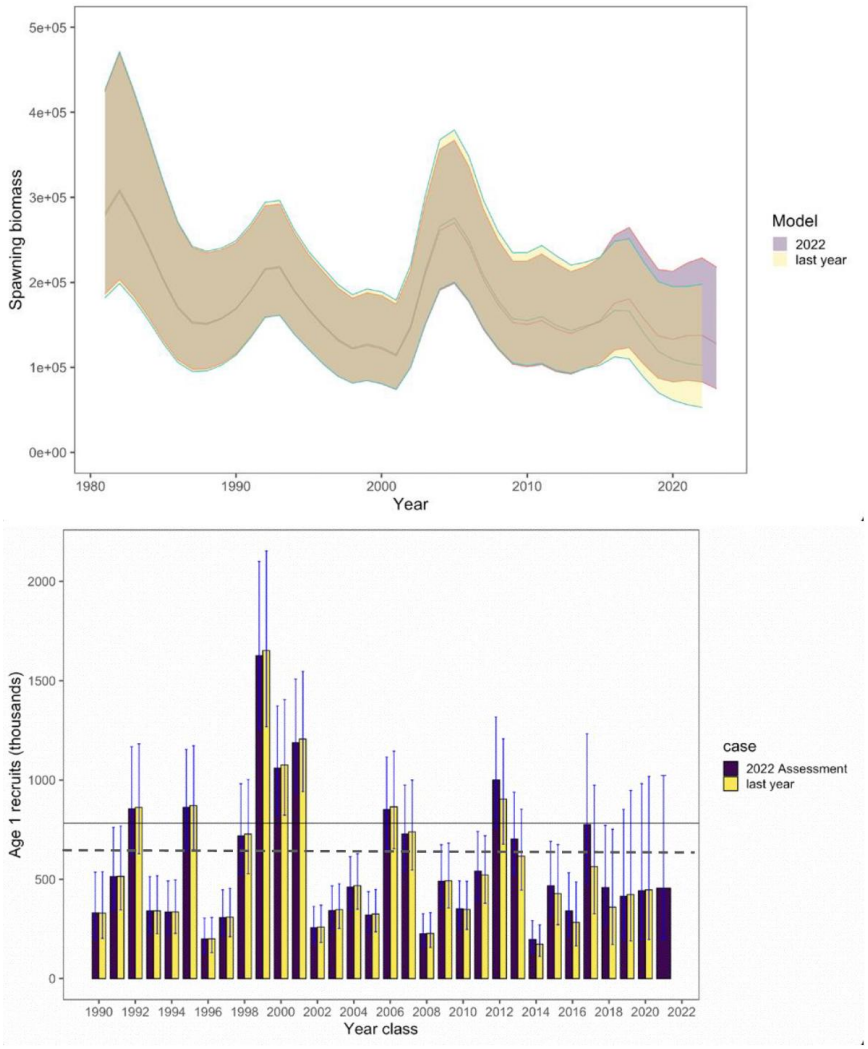


Figure 2: Time series of estimated Aleutian Islands Atka mackerel spawning biomass with approximate 95% confidence bounds (in t top), and recruitment at age 1 (thousands, bottom) from the current assessment (Model 16.0b) compared to last year's 2021 assessment results (Model 16.0b). Dashed line represents average recruitment over the time series from the current assessment (1978-2021, 577 million recruits). Source: Lowe and Ianelli (2022).

The estimated time series of age 1 recruits indicates the strong 1977 year class as the most notable in the current assessment, followed by the 1999, 2001, 1988, 2000 and 2012 year classes (Figure 2). The 1999, 2000, and 2001 year classes are estimated to be three of the five largest recent year classes in the time series (approximately 1.6, 1.1, and 1.2 billion recruits, respectively) due to the persistent observations of these year classes in the fishery and survey catches. The current assessment estimates above average (greater than 20% of the mean) recruitment from the 1977, 1988, 1992, 1995, 1998-2001, 2006-2007, 2012, 2017 year classes (Figure 2). The 2014, 1996, 2008, and 2002 year classes are the lowest in the time series, estimated at 197, 200, 226, and 256 million recruits, respectively.

The average estimated recruitment from the time series 1978-2021 is 577 million fish and the median is 465 million fish. The entire time series of recruitments (years 1977-2021) includes the 1976-2020 year classes. The Alaska Fisheries Science Center has recognized that an environmental "regime shift" affecting the long-term productive capacity of the groundfish stocks in the BSAI occurred during the period 1976-1977, and the 2022 estimate is only based on one year of data. Thus, the average recruitment value presented in the assessment is based on year classes spawned after 1976 through 2020 (1977-2020) year classes). Projections of biomass are based on estimated recruitments from the years 1978-2021 using a stochastic projection model described below.

The estimated time series of fishing mortalities on fully selected age groups and the catch-to-biomass (age 3+) ratios are presented in Figure 3.

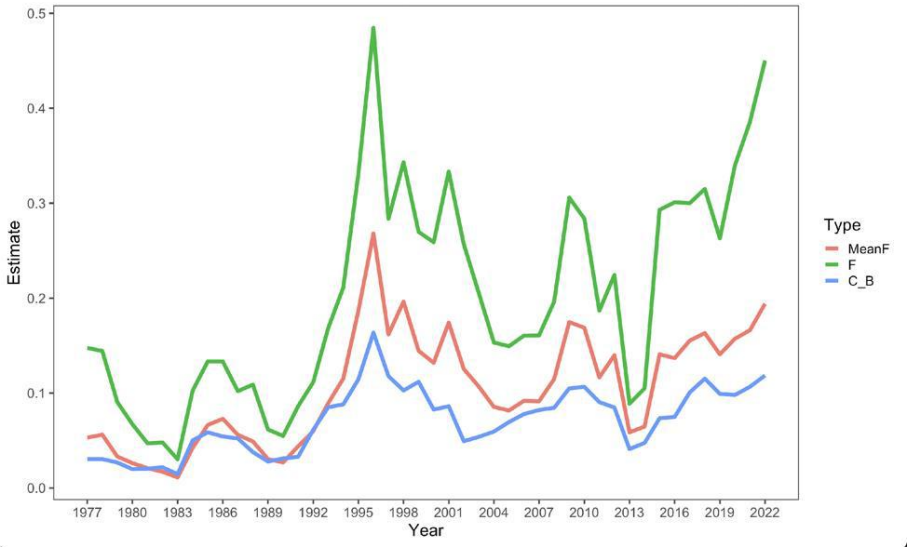


Figure 3: Estimated time series of Model 16.0b mean and full-selection fishing mortality and catch/biomass (C_B) exploitation rates of Atka mackerel, 1977-2022. Catch/biomass rates are the ratios of catch to beginning year age 3+ biomass. Source: Lowe and Ianelli (2022).

The recommended model (Model 16.0b) provides reasonable fits to the available data and previously has been selected as appropriate for providing advice on BSAI Atka mackerel catch levels. We note that the survey data remain highly uncertain with a large increase indicated by the 2022 survey. The 2022 survey biomass increase was observed across the Aleutian Islands, and in particular in the Central area relative to the 2018 survey. The 2017-year class showed up as an average year class in the 2020 fishery as 3 year olds, and above average (34%) in the 2021 fishery as 4 year olds. The assessment model estimates indicate a moderate declining trend in spawning biomass below B40% from 2024 through 2027, and then an increase to above B40% in 2028. Female spawning biomass is projected to remain above B40% through 2036. The maximum permissible Tier 3a FABC is appropriately precautionary (for Atka mackerel). Recent fishing mortality rates have been below FABC. For perspective, a plot of relative harvest rate (Ft /F35%) versus relative female spawning biomass (Bt/B35%) is shown in Figure 4. For all of the time series the current assessment estimates that relative harvest rates have been below 1, and the relative spawning biomass rates have been greater than 1.0.

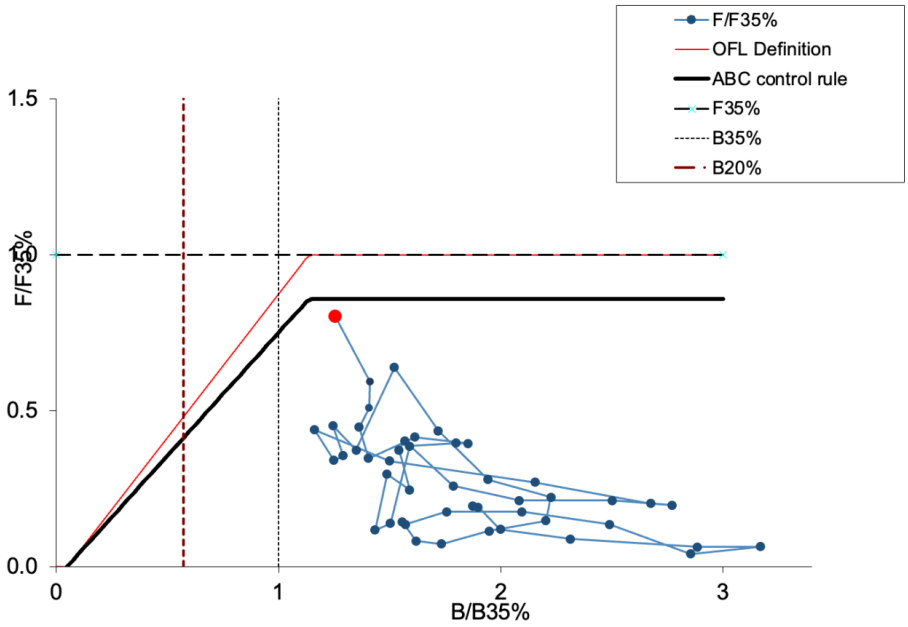


Figure 4: Aleutian Islands Atka mackerel spawning biomass relative to B35% and fishing mortality relative to FOFL (1977-2023). The ratio of fishing mortality to FOFL is calculated using the estimated selectivity pattern in that year. Estimates of spawning biomass and B35% are based on current estimates of weight-at-age and mean recruitment. Because these estimates change as new data become available, this figure can only be used in a

general way to evaluate management performance relative to biomass and fishing mortality reference levels. Source: Lowe and Ianelli (2022).

Harvest recommendations. Amendment 56 to the BSAI Groundfish Fishery Management Plan (FMP) defines "overfishing level" (OFL), the fishing mortality rate used to set OFL (FOFL), the maximum permissible ABC, and the fishing mortality rate used to set the maximum permissible ABC (max FABC). The fishing mortality rate used to set ABC (F_{ABC}) may be less than this maximum permissible level, but not greater. The overfishing and maximum allowable ABC fishing mortality rates are given in terms of percentages of unfished female spawning biomass ($F_{SPR\%}$), on fully selected age groups. The associated long-term average female spawning biomass that would be expected under average estimated recruitment from 1978-2021 (577 million age-1 recruits) and F equal to $F_{40\%}$ and $F_{35\%}$ are denoted $B_{40\%}$ and $B_{35\%}$, respectively. The Tiers require reference point estimates for biomass level determinations. Lowe and Ianelli (2022) present the following reference points for BSAI Atka mackerel for Tier 3 of Amendment 56:

- B100% = 280,456 t female spawning biomass
- B40% = 112,182 t female spawning biomass
- B35% = 98,160 t female spawning biomass

In the most updated assessment, Model 16.0b is configured with time-varying selectivity. Lowe and Ianelli (2022) used a 5-year average (2017-2021) to reflect recent conditions for projections and computing ABC (F2022 = 0.45; F40% = 0.61; F35% = 0.76; F2022/F40% = 0.74)

For specification purposes to project the 2023 ABC, a total 2022 year end catch of 66,481 t equal to the 2022 TAC was assumed. For projecting to 2024, an expected catch in 2023 is also required. Recognizing that the modified Steller sea lion RPAs implemented in 2015 require a TAC reduction in Area 543, a stock-wide catch based on a reduced overall BSAI-wide Atka mackerel catch for 2023 was assumed. Under the modified Steller sea lion RPAs, the Area 543 Atka mackerel TAC is set less than or equal to 65 percent of the Area 543 ABC. This percentage (65%) was applied to the Western Aleutian Islands maximum permissible 2023 ABC estimate, and that amount was summed with the maximum permissible ABC estimates for the Eastern and Central Aleutian areas for a total estimated 2023 catch. The total estimated 2023 catch was assumed to be caught in order to estimate the 2024 ABC and OFL values. Therefore, about 85% of the BSAI-wide 2023 ABC is likely to be taken.

It is important to note that for BSAI Atka mackerel, projected female spawning biomass calculations depend on the harvest strategy because spawning biomass is estimated at peak spawning (August). Thus, projections incorporate 7 months of the specified fishing mortality rate. The projected 2023 female spawning biomass (SSB2023) is estimated to be 122,541 t given assumed 2022 catch and 7 months of the estimated 2023 catch reflecting the Steller sea lion RPA adjustment to the 2023 ABC.

The projected 2023 female spawning biomass estimate is above the B40% value of 112,182 t, placing BSAI Atka mackerel in Tier 3a. The 2024 female spawning biomass estimate is just below B40% placing Atka mackerel in Tier 3b (Table 1).

Table 1: 2023 and 2024 maximum permissible ABC and OFL values under Tiers 3a and 3b. * = Catches in 2023 and 2024 are less than the recommended maximum permissible ABCs to reflect expected catch reductions under Steller sea lion RPAs. Source: Lowe and Ianelli (2022)

Year	Catch* (t)	ABC (t)	F_{ABC}	OFL (t)	F_{OFL}	SSB (t)	Tier
2023	83,800	98,588	0.61	118,787	0.76	122,541	3a
2024	73,495	86,464	0.56	101,188	0.65	111,122	3b

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

For each scenario, the projections begin with the vector of 2022 numbers at age estimated in the assessment. This vector is then projected forward to the beginning of 2035 using a fixed value of natural mortality of 0.3, the recent schedule of selectivity estimated in the assessment (in this case the average 2017-2021 selectivity), and the best available estimate of total (year-end) catch for 2022 (in this case assumed to be 66,481 t equal to TAC). In addition, the 2023 and 2024 catches are reduced to accommodate Steller sea lion RPA TAC reductions for Scenarios 1 and 2. In each subsequent year, the fishing mortality rate is prescribed on the basis of the spawning biomass in that year and the respective harvest scenario. In each year, recruitment is drawn from an inverse Gaussian distribution whose parameters consist of maximum likelihood estimates determined from recruitments estimated in the assessment. Spawning biomass is computed in each year based on the time of peak spawning (August) and the maturity and population weight schedules described in the assessment. Total catch is assumed to equal the catch associated with the respective harvest scenario in all years, except that in the first two years of the projection, a lower catch may be

specified for stocks where catch is typically below ABC (as is the case for Atka mackerel). This projection scheme is run 500 times to obtain distributions of possible future stock sizes, fishing mortality rates, and catches.

Five of the seven standard scenarios are designed to provide a range of harvest alternatives that are likely to bracket the final TACs for 2023 and 2024, are as follows ("max FABC" refers to the maximum permissible value of FABC under Amendment 56):

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

Scenario 2: In all future years, F is set equal to a constant fraction of max FABC, where this fraction is equal to the ratio of the FABC value for 2023 recommended in the assessment to the max FABC for 2023, and where catches for 2023 and 2024 are estimated at their most likely values given the 2023 and 2024 maximum permissible ABCs under this scenario. (Rationale: When FABC is set at a value below max FABC, it is often set at the value recommended in the stock assessment).

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

Scenario 4: In all future years, the upper bound on FABC is set equal to F60%. (Rationale: This scenario provides a likely lower bound on FABC that still allows future harvest rates to be adjusted downward when stocks fall below reference levels).

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

Two other scenarios are needed to satisfy the MSFCMA's requirement to determine whether a stock is currently in an overfished condition or is approaching an overfished condition. These two scenarios are as follows (for Tier 3 stocks, the MSY level is defined as B35%):

Scenario 6: In all future years, F is set equal to FOFL. (Rationale: This scenario determines whether a stock is overfished. If the stock is expected to be 1) above its MSY level in 2022 or 2) above ½ of its MSY level in 2022 and above its MSY level in 2032 under this scenario, then the stock is not overfished.)

Scenario 7: In 2023 and 2024, F is set equal to max FABC, and in all subsequent years, F is set equal to FOFL. (Rationale: This scenario determines whether a stock is approaching an overfished condition. If the stock is 1) above its MSY level in 2024 or 2) above 1/2 of its MSY level in 2024 and expected to be above its MSY level in 2034 under this scenario, then the stock is not approaching an overfished condition.).

The projections of female spawning biomass, fishing mortality rate, and catch corresponding to the seven standard harvest scenarios are shown in Table 2.

Under the MSFCMA, the Secretary of Commerce is required to report on the status of each U.S. fishery with respect to overfishing. Harvest scenarios 6 and 7 are intended to permit determination of the status of a stock with respect to its minimum stock size threshold (MSST). Any stock that is below its MSST is defined to be overfished. Any stock that is expected to fall below its MSST in the next two years is defined to be approaching an overfished condition. Harvest scenarios 6 and 7 are used in these determinations as follows:

Under the MSFCMA a stock is overfished in relation to the stock's estimated spawning biomass in 2022:

a) If spawning biomass for 2022 is estimated to be below ½ B35%, the stock is below its MSST.

b) If spawning biomass for 2022 is estimated to be above B35%, the stock is above its MSST.

c) If spawning biomass for 2022 is estimated to be above ½ B35% but below B35%, the stock's status relative to MSST is determined by referring to harvest scenario #6. If the mean spawning biomass for 2032 is below B35%, the stock is below its MSST. Otherwise, the stock is above its MSST.

Table 2: Projections of female spawning biomass in metric tons, full-selection fishing mortality rates (F) and catch in metric tons for Atka mackerel for the 7 scenarios. The values for B100%, B40%, and B35% are 280,456 t, 112,182 t, and 98,160 t, respectively. Source: Lowe and Ianelli (2022)

Catch	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*	*Scenario 7*
2023	83,800	83,800	83,800	62,257	83,800	83,800	118,787
2024	73,495	73,495	73,495	66,739	73,495	73,495	84,866
2025	80,839	80,839	68,344	61,318	21,003	0	77,259
2026	77,777	77,777	69,221	20,019	24,298	0	80,811
2027	80,537	80,537	72,154	23,832	27,525	0	86,630
2028	84,715	84,715	75,774	27,431	30,647	0	91,491
2029	87,346	87,346	78,666	30,428	33,193	0	94,378
2030	88,654	88,654	80,417	32,965	35,023	0	95,342
2031	89,115	89,115	81,152	34,643	36,130	0	95,520
2032	89,109	89,109	81,426	35,501	36,748	0	95,263
2033	88,865	88,865	81,471	35,847	37,137	0	94,991
2034	88,605	88,605	81,308	36,028	37,319	0	94,715
2035	88,577	88,577	81,190	36,135	37,419	0	94,592
2036	88,885	88,885	81,341	36,264	37,562	0	94,977
Fishing M.	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*	*Scenario 7*
2023	0.504	0.504	0.504	0.504	0.504	0.762	0.609
2024	0.483	0.483	0.483	0.483	0.483	0.647	0.563
2025	0.564	0.564	0.466	0.131	0	0.622	0.655
2026	0.549	0.549	0.466	0.131	0	0.634	0.645
2027	0.552	0.552	0.466	0.131	0	0.651	0.654
2028	0.561	0.561	0.466	0.131	0	0.664	0.665
2029	0.563	0.563	0.466	0.131	0	0.67	0.670
2030	0.564	0.564	0.466	0.131	0	0.670	0.670
2031	0.564	0.564	0.466	0.131	0	0.671	0.671
2032	0.564	0.564	0.466	0.131	0	0.669	0.669
2033	0.563	0.563	0.466	0.131	0	0.667	0.667
2034	0.562	0.562	0.466	0.131	0	0.667	0.667
2035	0.563	0.563	0.466	0.131	0	0.668	0.668
2036	0.564	0.564	0.466	0.131	0	0.669	0.669
Spawning biomass	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*	*Scenario 7*
2023	122,541	122,541	122,541	122,541	122,541	113,113	118,600
2024	111,122	111,122	111,122	111,122	111,122	96,078	104,213
2025	105,236	105,236	108,351	119,949	124,921	92,625	97,372
2026	106,221	106,221	112,436	139,833	153,195	96,169	97,840
2027	110,493	110,493	118,834	159,044	180,788	100,795	101,308
2028	113,880	113,880	123,992	174,592	204,444	103,763	103,909
2029	116,269	116,269	127,796	186,748	224,184	105,593	105,638
2030	117,263	117,263	129,771	195,257	239,499	106,143	106,163
2031	117,281	117,281	130,390	200,665	250,678	105,940	105,952
2032	117,310	117,310	130,740	204,382	259,050	105,926	105,932
2033	117,279	117,279	130,856	206,960	265,413	105,885	105,887
2034	116,943	116,943	130,544	208,278	269,642	105,560	105,561
2035	116,752	116,752	130,365	209,150	272,719	105,417	105,418
2036	117,090	117,090	130,743	210,260	275,526	105,799	105,799

Under the MSFCMA a stock is approaching an overfished condition by referring to harvest scenario #7:

a) If the mean spawning biomass for 2023 is below ½ B35%, the stock is approaching an overfished condition.

b) If the mean spawning biomass for 2023 is above B35%, the stock is not approaching an overfished condition.

c) If the mean spawning biomass for 2023 is above ½ B35% but below B35%, the determination depends on the mean spawning biomass for 2034. If the mean spawning biomass for 2034 is below B35%, the stock is approaching an overfished condition. Otherwise, the stock is not approaching an overfished condition.

Based on the above criteria, the BSAI Atka mackerel stock is not overfished and is not approaching an overfished condition.

Considerations for reducing the maximum permissible catch (ABC) involve evaluating four types of factors: stock assessment, population dynamics, environmental/ecosystem, and fishery performance following the approach of Dorn and Zador (2020), with four levels of concern (Level 1 = no concern; Level 4 = high concern). Examples of relevant

concerns include biased data inputs, poor model fits, estimation uncertainty, decreasing biomass trend, poor recruitment, adverse environmental indicators, and contrasting fishery catch patterns. These factors aid in making scientific recommendations for ABC reduction. This approach is applied also in the following stocks.

The Atka mackerel assessment shows a retrospective pattern due to model configuration and data variability. The fishery age data is well fit, while trawl survey estimates have high variability. The cancellation of the 2020 survey led to increased uncertainty in the assessment. The population dynamics of Atka mackerel show a decline in female spawning biomass since 2005, with strong and moderately strong year classes occurring every 4-6 years. The projected spawning biomass is expected to remain above the target level in the future. Environmental considerations include variations in bottom and water column temperatures in the Aleutian Islands, with recent years showing warmer temperatures.

A marine heatwave (MHW) occurred in the central and western Aleutians, with lesser impact in the eastern Aleutians. The MHW reached severe intensity in the western Aleutians and affected the entire region. Atka mackerel nests experienced potential risks due to high sea surface temperatures, which could lead to shorter incubation periods and early hatching. Higher ambient temperatures may also negatively impact Atka mackerel by increasing consumption demands beyond available prey. Prey availability for Atka mackerel was uneven, with some areas showing insufficient food for optimal growth. There is evidence of interaction between pink salmon and Atka mackerel, but no clear signs of changes in predation pressure. Sustained high temperatures, increased abundance of competitors, and below-average fish condition indicate potential negative cumulative impacts on Atka mackerel. However, the reproductive success of seabirds and increased biomass suggest sufficient prey availability in the western Aleutians in 2022. Environmental and ecosystem considerations show some adverse signals but are not consistent across all indicators. Fishery catches and performance have been consistent, and there are no apparent concerns. Assessment uncertainty, unresolved issues, and the need for continued monitoring of indicators are highlighted.

The recommended model (Model 16.0b) fits well with the available data for Atka mackerel catch levels. The survey data remains uncertain, but there has been a significant increase in biomass observed in the Aleutian Islands, particularly in the Central area. The assessment model predicts a declining trend in spawning biomass until 2027, followed by an increase. Female spawning biomass is projected to remain above a certain level through 2036. Recent fishing mortality rates have been low. The recommended ABC for 2023 is higher than the previous year.

3.4.2 BSAI Pacific ocean perch

In 2005, Bering Sea/Aleutian Islands (BSAI) rockfish assessments shifted to a biennial schedule, aligned with trawl surveys in the Aleutian Islands (AI) and eastern Bering Sea (EBS) slope. Following the 2017 National Stock Assessment Prioritization effort, the BSAI Pacific ocean perch (POP) maintained this schedule. A full assessment was conducted in 2022, available at https://apps-afsc.fisheries.noaa.gov/Plan_Team/2022/BSAIpop.pdf [Spencer and Ianelli (2022)]. The 2023 harvest projection uses updated catch data from 2022 without altering the 2022 methodology. The projection model updates catch estimates for 2022 and predicts the 2023 catch, while also estimating catch-to-biomass ratios using total biomass from the 2022 assessment.

An age-structured population dynamics model, implemented in the software program AD Model Builder, was used to obtain estimates of recruitment, numbers at age, and catch at age. Selectivity curves for the AI and EBS trawl surveys were modeled with logistic functions. To facilitate parameter estimation, prior distributions the natural mortality rate M, a lognormal distribution was also used for the natural mortality rate M, with the mean set to 0.05 and the CV set to 0.05.

Beginning in the 2014 assessment, fishery selectivity has been modelled with a bicubic spline. The number of age and year nodes are each set to 5 for a total of 25 selectivity parameters. Values at these nodes are the log-scale fishery selectivity and estimated as parameters, and fishery selectivity at ages and years between the nodes are interpolated with the bicubic spline. The smoothness of the surface is controlled by the number of nodes, and also by a series of penalties estimated within the model. Four types of penalties were used: 1) smoothness across the ages (modeled with the sum of second differences); 2) the slope of the rate of decline when selectivity decreases with age (modeled with the sum of first differences); 3) the inter-annual smoothness across years (modeled with the sum of second differences); and 4) the inter-annual variation across years (modeled with the first difference; this addresses situations in which the selectivity across years was relatively smooth but also non-constant, as would occur with a trend).

In the most updated assessment (Spencer and Ianelli, 2022), the accepted model from the 2020 assessment with data updated through 2022 (i.e., Model 16.3 (2022)) was used, and an alternative model in which the estimated survey abundances (rather than the estimated survey biomass) were fit. The alternative model was motivated by CIE review recommendation that fitting survey abundances, rather than survey biomass, may improve the retrospective behavior. A plot of the time series of survey biomass and abundance, and their CVs, is shown in Figure 5. Although the two time series show similar trends, there are slight differences; for example, the rate of increase between the 2006 and 2010 survey is slightly large for the biomass estimates than the abundance estimates.

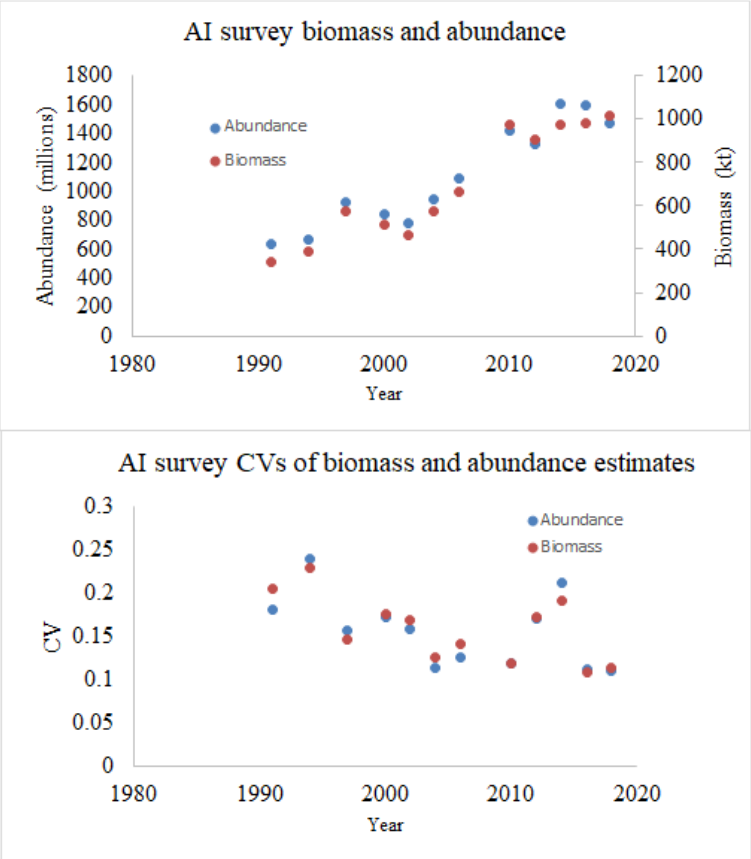


Figure 5: Time series of biomass and abundance estimates from the Aleutian Islands trawl survey, and their coefficients of variation. Source: Spencer and Ianelli (2022).

Fitting the survey abundance indices rather than the survey biomass indices does not substantially change the estimation of stock dynamics. The likelihood components are very similar between the two models. In particular, the RMSE values for the survey and abundance indices are shown for each model; when the model was fit to the abundance index, the RMSE for the biomass index represents a “ghost” fit (i.e., how well the model matches a data component that is not included in the likelihood equation). The RMSE values for the AI and EBS survey indices are very similar to each regardless of whether survey biomass or survey abundance is being fit. This can also be seen in Figure 6, which show that the estimated Aleutian Islands survey biomass index, when fitting the survey abundance indices, is very similar to the estimated Aleutian Islands survey biomass index when fitting the biomass indices. The root mean squared error indicates better fits to the AI survey indices than the EBS survey indices. The harmonic mean of effective N for the composition data components indicate better fits to the fishery age and length compositions than the survey composition data.

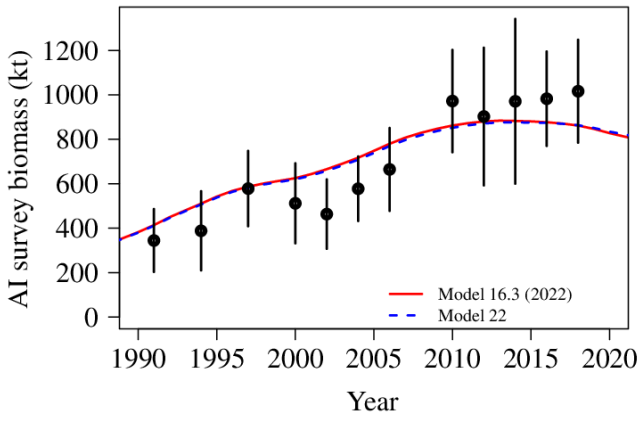


Figure 6: Fit to estimates of Aleutian Island survey biomass from Model 16.3 (2022) and Model 22. Source: Spencer and Ianelli (2022).

The plot of retrospective estimates of spawning biomass is shown in Figure 7. For each model, the 2022 model run shows the largest biomass than any of the retrospective runs, as new data in 2022 allows improved fit to the recent high AI trawl survey biomass or abundance index. Large changes in retrospective pattern also occur in 2016 and 2018, years coincident with high survey biomass estimates. Mohn's rho can be used to evaluate the severity of any retrospective pattern, and compares an estimated quantity (in this case, spawning stock biomass) in the terminal year of each retrospective model run with the estimated quantity in the same year of the model using the full data set. The Mohn's rho for this set of retrospective runs was -0.33 and -0.31 for Models 16.3 (2022) and Model 22, respectively, very similar to each other and higher in magnitude than the value of -0.24 obtained in the 2020 assessment.

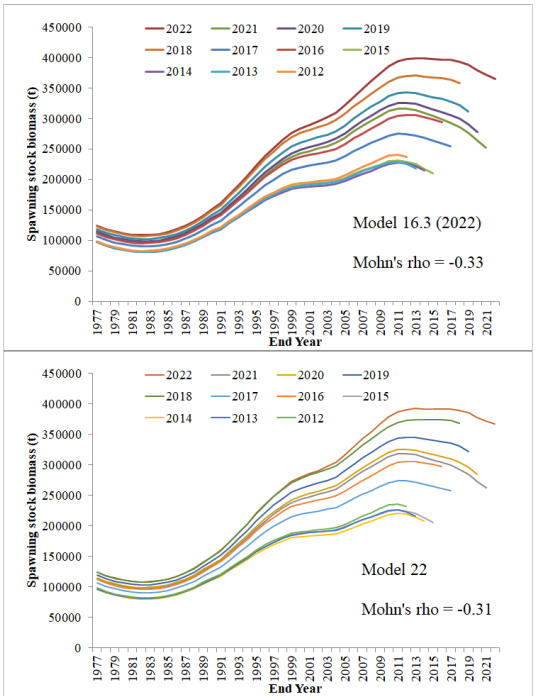


Figure 7: Retrospective estimates of spawning stock biomass for Model 16.3 (2022) and Model 22. Source: Spencer and Ianelli (2022).

Given that Model 22 did not improve the retrospective pattern of the assessment, and is very similar to the existing Model 16.3 (2022), we recommend Model 16.2 (2022). The updated data weights are shown in Figure 8, and are similar to those from the 2020 assessment.

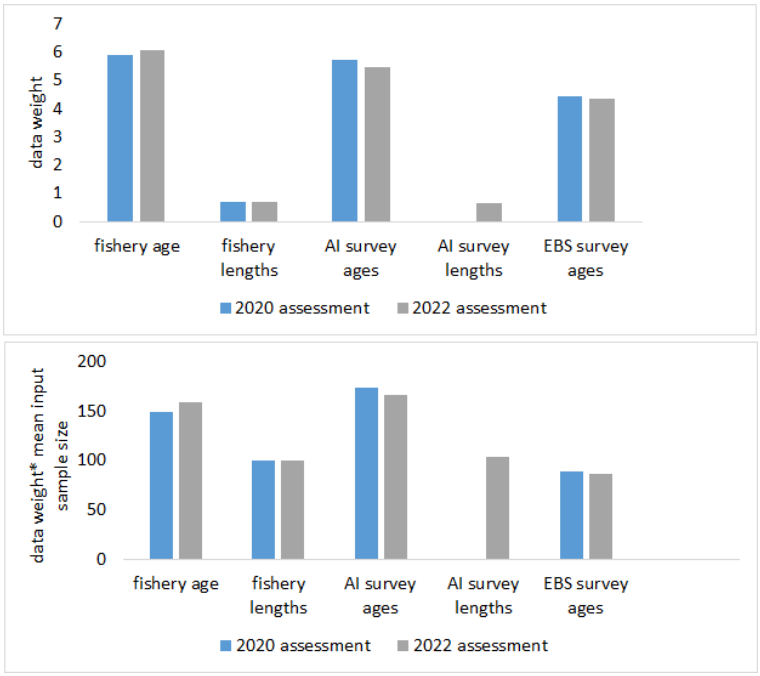


Figure 8: Data weights for the age and length composition data for this assessment and the 2020 assessment. Source: Spencer and Ianelli (2022).

In the most updated assessment, spawning biomass is defined as the biomass estimate of mature females age 3 and older. Total biomass is defined as the biomass estimate of POP age 3 and older. Recruitment is defined as the number of age 3 POP. The estimated AI survey biomass index has increased from 413,681 t in 1991 to 883,897 t in 2013, and declined to 796,681 in 2020. The addition of high AI survey biomass estimates has resulted in rescaling the population abundance (i.e., lowering survey catchability) relative to previous assessments in order to fit both the survey biomass time series and the composition data. The predicted EBS survey biomass generally matches the observed data, although the high biomass in 2016 is not fit well due to its high CV (Figure 9).

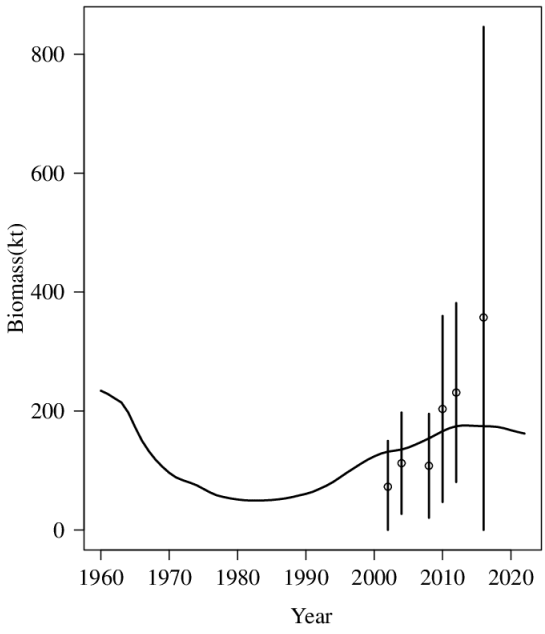


Figure 9: Observed EBS survey biomass (data points, +/- 2 standard deviations) and estimated survey biomass (solid line). Source: Spencer and Ianelli (2022).

The total biomass showed a similar trend as the survey biomass, with the 2022 total biomass estimated as 902,537 t. The estimated time series of total biomass and spawning biomass, with 90% credibility bounds obtained from MCMC integration, are shown in Figure 10.

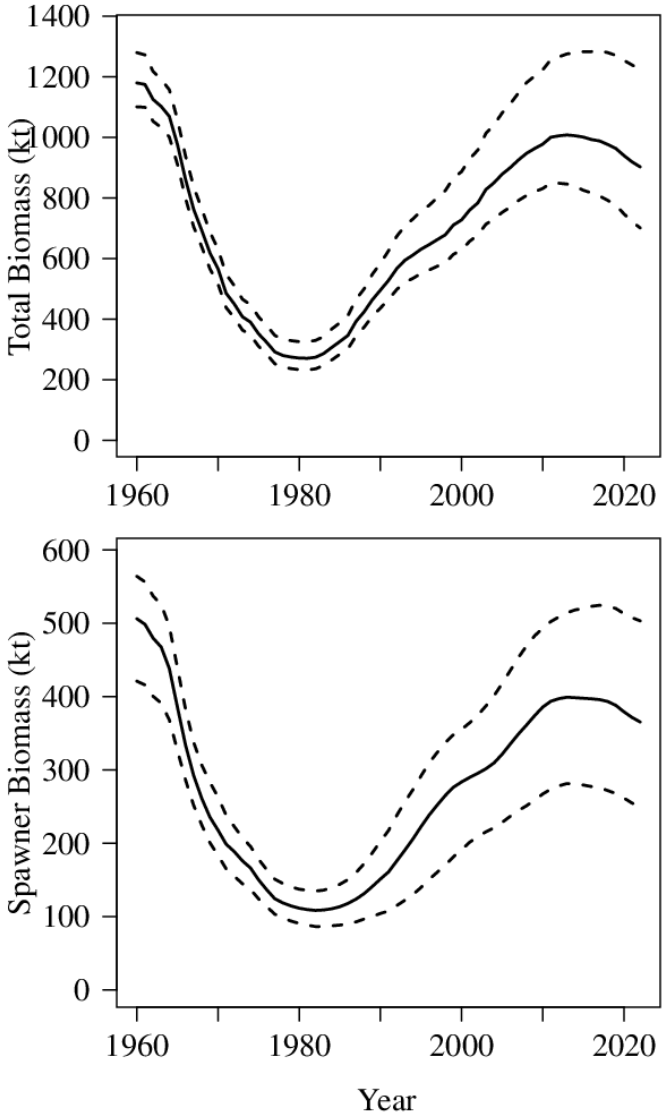


Figure 10: Total and spawner biomass for BSAI Pacific ocean perch, with 90% credibility intervals from MCMC integration. Source: Spencer and Ianelli (2022).

The estimates of instantaneous fishing mortality for POP range from highs during the 1970's to low levels in the 1980's (Figure 11). Fishing mortality rates since the early 1980's, however, have moderated considerably due to the phase out of the foreign fleets and quota limitations imposed by the North Pacific Fishery Management Council. Note that because of the change in the fishery selectivity over time, the fully-selected rates are not completely comparable over time with respect to the degree to which the stock has been harvested. Nonetheless, the average fully-selected fishing mortality from 1965 to 1980 was 0.41, whereas the average from 1981 to 2021 was 0.04. The plot of estimated fishing mortality rates and spawning stock biomass relative to the harvest control rules (Figure 12) indicate that BSAI POP would be considered overfished (using current definitions) during much of the period from the mid-1960s to the mid-1980s, although it should be noted the current definitions of B35% are based on the estimated recruitment of the post-1977 year classes and the average fishery selectivity from the most recent 5 years.

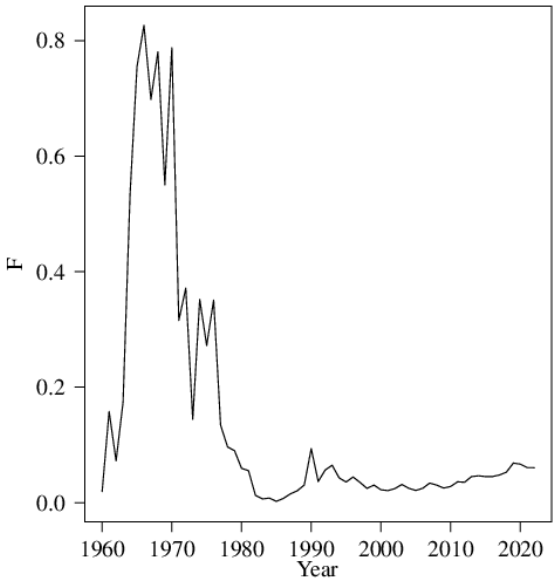


Figure 11: Estimated fully selected fishing mortality for BSAI POP. Source: Spencer and Ianelli (2022).

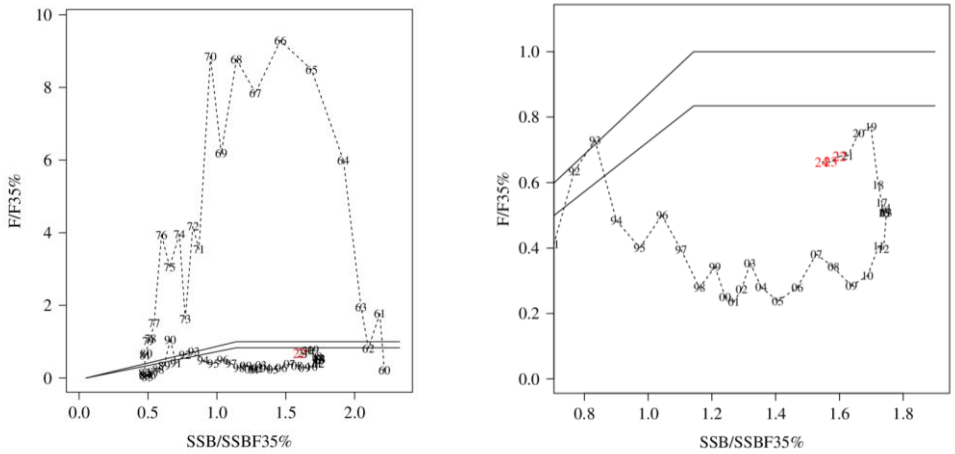


Figure 12: (Left panel) Estimated fishing mortality and SSB in reference to OFL (upper line) and ABC (lower line) harvest control rules, with 2022 shown in red. The right panel shows a reduced vertical scale, and the projected F and stock size for 2023 and 2024. Source: Spencer and Ianelli (2022).

Year-class strength varies widely for BSAI POP (Figure 13). The 1961-62 year classes are particularly large and sustained the heavy fishing in the 1960s. The rebuilding of the stock in the 1980s and 1990s was based upon recruitments for the 1981, 1984, 1986, and 1988-89 year classes. Recruitment appears to be lower in early 1990s, but several cohorts from 1994 to 2008 generally show relatively strong recruitment (with the exception the 1997 and 1999 year classes). The recent year classes of 2011-2012, 2014, and 2016 appear to be relatively strong, but the retrospective analyses suggests that recruitment estimates for these year classes may not have stabilized.

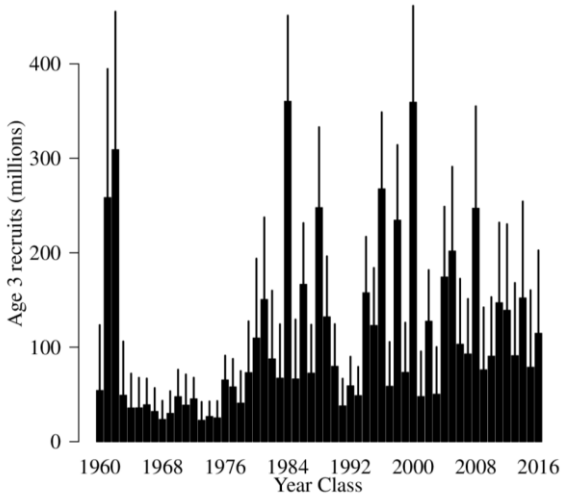


Figure 13: Estimated recruitment (age 3) of BSAI POP, with 90% credibility intervals obtained from MCMC integration. Source: Spencer and Ianelli (2022).

The reference fishing mortality rate for Pacific ocean perch is determined by the amount of reliable population information available (Amendment 56 of the Fishery Management Plan for the groundfish fishery of the Bering Sea/Aleutian Islands). Estimates of F0.40, F0.35, and SPR0.40 were obtained from a spawner-per-recruit analysis. Assuming that the average recruitment from the 1977-2016 year classes estimated in this assessment represents a reliable estimate of equilibrium recruitment, then an estimate of B0.40 is calculated as the product of SPR0.40 * equilibrium recruits, and this quantity is 261,050 t. The estimated spawning stock biomass for 2023 is 359,074 t. Since reliable estimates of the 2023 spawning biomass (B), B0.40, F0.40, and F0.35 exist and B>B0.40 (359,074 t > 261,050 t), POP reference fishing mortality have been classified in tier 3a. For this tier, FABC maximum permissible FABC is F0.40, and FOFL is equal to F0.35. The values of F0.40 and F0.35 are 0.074 and 0.089, respectively.

The 2023 ABC associated with the F0.40 level of 0.074 is 42,038 t. The estimated catch level for year 2022 associated with the overfishing level of F = 0.089 is 50,133 t. A summary of these values is below.

2023 SSB estimate (B) = 359,074 t

B0.40 = 261,050 t

FABC = F0.40 = 0.074

FOFL = F0.35 = 0.089

Max ABC = 42,038 t

OFL = 50,133 t

A standard set of projections is conducted for each stock managed under Tiers 1, 2, or 3 of Amendment 56. This set of projections encompasses seven harvest scenarios designed to satisfy the requirements of Amendment 56, the National Environmental Policy Act, and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). For each scenario, the projections begin with the vector of 2022 numbers at age estimated in the assessment. This vector is then projected forward to the beginning of 2023 using the schedules of natural mortality and selectivity described in the assessment and the best available estimate of total (year-end) catch for 2022. In each subsequent year, the fishing mortality rate is prescribed on the basis of the spawning biomass in that year and the respective harvest scenario. In each year, recruitment is drawn from an inverse Gaussian distribution whose parameters consist of maximum likelihood estimates determined from recruitments estimated in the assessment. Spawning biomass is computed in each year based on the time of peak spawning and the maturity and weight schedules described in the assessment. Total catch is assumed to equal the catch associated with the respective harvest scenario in all years. This projection scheme is run 1000 times to obtain distributions of possible future stock sizes, fishing mortality rates, and catches.

Five of the seven standard scenarios will be used in an Environmental Assessment prepared in conjunction with the final SAFE. These five scenarios, which are designed to provide a range of harvest alternatives that are likely to bracket the final TAC for 2021, are as follow (“max FABC” refers to the maximum permissible value of FABC under Amendment 56):

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

Scenario 2: In all future years, F is set equal to a constant fraction of max FABC, where this fraction is equal to the ratio of the FABC value for 2023 recommended in the assessment to the max FABC for 2021. (Rationale: When FABC is set at a value below max FABC, it is often set at the value recommended in the stock assessment).

Scenario 3: In all future years, F is set equal to the 2017-2021 average F. (Rationale: For some stocks, TAC can be well below ABC, and recent average F may provide a better indicator of FTAC than FABC.)

Scenario 4: In all future years, F is set equal to F75%. (Rationale: This scenario provides a likely lower bound on FABC that still allows future harvest rates to be adjusted downward when stocks fall below reference levels.)

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

Two other scenarios are needed to satisfy the MSFCMA's requirement to determine whether the Pacific ocean perch stock is currently in an overfished condition or is approaching an overfished condition. These two scenarios are as follow (for Tier 3 stocks, the MSY level is defined as B35%):

Scenario 6: In all future years, F is set equal to FOFL. (Rationale: This scenario determines whether a stock is overfished. If the stock is expected to be above 1) above its MSY level in 2022 or 2) above ½ of its MSY level in 2022 and above its MSY level in 2032 under this scenario, then the stock is not overfished.)

Scenario 7: In 2023 and 2024, F is set equal to max FABC, and in all subsequent years F is set equal to FOFL. (Rationale: This scenario determines whether a stock is approaching an overfished condition. If the stock is expected to be above its MSY level in 2034 under this scenario, then the stock is not approaching an overfished condition.)

The recommended FABC and the maximum FABC are equivalent in this assessment, and projections of the mean harvest and spawning stock biomass for the remaining six scenarios are shown in Table 3.

The assessment of Pacific Ocean Perch (POP) in the Aleutian Islands indicates a strong retrospective pattern, exceeding guidelines from previous studies. The retrospective pattern is attributed to increased AI survey biomass estimates since 2010, posing uncertainties in population dynamics or observational processes. The Aleutian Islands show an unusual increase in survey biomass estimates between 2006 and 2010, but recent recruitment remains within the normal range. The environmental context reveals rising temperatures in the region, impacting POP's body condition since 2012. Abundant zooplankton prey, influenced by a biannual cycle linked to pink salmon abundance, has contributed to improved fish condition.

Competitors and predators, including northern rockfish, Atka mackerel, and pink salmon, coexist with POP. While potential spatial dynamics in competition cannot be assessed, predator populations like Steller sea lions are stable. Habitat disturbance from trawling shows stable trends, and concerns are minimal.

Despite the retrospective pattern and increased temperatures, the assessment ranks the environmental and ecosystem concerns as level 1, indicating no apparent issues for the POP stock. The stock has been growing since the early 1990s, leading to increased catches. Fishery performance is considered stable, with a decline in catch per unit effort potentially linked to changes in fishing practices. The recommended maximum allowable biological catch (ABC) is 42,038 tons.

Table 3: Projections of BSAI spawning biomass (t), catch (t), and fishing mortality rate for each of the several scenarios. The values of B35% and B40% are 228,419 t and 261,050 t, respectively. Source: Spencer and Ianelli (2022).

Catch	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*	*Scenario 7*
2022	34,234	34,234	34,234	34,234	34,234	34,234	34,234
2023	42,038	42,038	33,789	10,956	0	50,133	42,038
2024	40,868	40,868	33,206	11,089	0	48,218	40,868
2025	39,819	39,819	32,692	11,232	0	46,499	47,486
2026	38,844	38,844	32,209	11,370	0	44,920	45,829
2027	37,968	37,968	31,775	11,508	0	43,508	44,337
2028	37,191	37,191	31,394	11,644	0	42,263	43,014
2029	36,555	36,555	31,098	11,791	0	41,226	41,902
2030	36,035	36,035	30,873	11,944	0	40,364	40,970
2031	35,615	35,615	30,707	12,100	0	39,549	40,167
2032	35,267	35,267	30,584	12,255	0	38,636	39,280
2033	34,955	34,955	30,491	12,408	0	37,779	38,402
2034	34,636	34,636	30,410	12,554	0	37,027	37,601
2035	34,320	34,320	30,335	12,693	0	36,384	36,895
Sp. Biomass	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*	*Scenario 7*
2022	365,390	365,390	365,390	365,390	365,390	365,390	365,390
2023	358,064	358,064	359,053	361,751	363,024	357,085	358,064
2024	347,753	347,753	352,516	365,777	372,182	343,095	347,753
2025	337,577	337,577	345,840	369,335	380,939	329,585	336,652
2026	327,898	327,898	339,380	372,712	389,540	316,914	323,497
2027	318,958	318,958	333,374	376,085	398,116	305,313	311,405
2028	311,056	311,056	328,136	379,752	406,938	295,057	300,663
2029	304,318	304,318	323,810	383,858	416,130	286,243	291,376
2030	298,714	298,714	320,389	388,415	425,691	278,807	283,485
2031	294,107	294,107	317,763	393,343	435,538	272,591	276,828
2032	290,286	290,286	315,742	398,479	445,502	267,418	271,205
2033	287,027	287,027	314,116	403,625	455,373	263,116	266,449
2034	284,167	284,167	312,721	408,634	465,000	259,495	262,395
2035	281,603	281,603	311,454	413,405	474,270	256,405	258,903
F	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*	*Scenario 7*
2022	0.059	0.059	0.059	0.059	0.059	0.059	0.059
2023	0.074	0.074	0.059	0.019	0	0.089	0.074
2024	0.074	0.074	0.059	0.019	0	0.089	0.074
2025	0.074	0.074	0.059	0.019	0	0.089	0.089
2026	0.074	0.074	0.059	0.019	0	0.089	0.089
2027	0.074	0.074	0.059	0.019	0	0.089	0.089
2028	0.074	0.074	0.059	0.019	0	0.089	0.089
2029	0.074	0.074	0.059	0.019	0	0.089	0.089
2030	0.074	0.074	0.059	0.019	0	0.089	0.089
2031	0.074	0.074	0.059	0.019	0	0.089	0.089
2032	0.074	0.074	0.059	0.019	0	0.088	0.088
2033	0.074	0.074	0.059	0.019	0	0.087	0.087
2034	0.074	0.074	0.059	0.019	0	0.086	0.087
2035	0.074	0.074	0.059	0.019	0	0.085	0.086

3.4.3 BSAI Northern Rockfish

The most recent full assessment for northern rockfish (*Sebastes polyspinis*) in the Bering Sea/Aleutian Islands (BSAI) was conducted in 2023 (Spencer and Laman, 2023), updating the 2021 SAFE report (Spencer and Ianelli, 2022). Northern rockfish inhabit the outer continental shelf and upper slope regions of the North Pacific Ocean and Bering Sea. Prior to 2004, northern rockfish in the BSAI were assessed under Tier 5 of Amendment 56 of the NPFMC BSAI Groundfish FMP. However, age-structured models have been used since 2003 after archived otolith readings from the Aleutian Islands surveys. Since 2004, northern rockfish have been assessed as a Tier 3 species.

An age-structured population model, implemented in the software program AD Model Builder, was used to obtain estimates of recruitment, numbers at age, and catch at age. The model is identical to the accepted model for the 2021

assessment, and uses the same ADMB modeling framework since the initial age-structured model for BSAI northern rockfish in 2003. McAllister-Ianelli (McAllister and Ianelli 1997) weighting is used for the composition data, and prior distributions were used for survey catchability, the natural mortality rate M, and the survey selectivity curve.

The assessment model is unchanged from the accepted 2021 model, and there are no alternative models to evaluate. The negative log-likelihoods of the data components and prior distributions, and the root mean squared errors, for the 2021 assessment and the 2023 assessment are shown in Table 4. The general pattern in these values are similar to each other between the two assessment years. The fishery and survey age composition likelihoods contribute most of the negative log-likelihood, with larger values in the 2023 assessment due to the increased amount of data. The root mean squared error for recruitment (reflecting the interannual variation) was larger in the 2023 assessment, which results from the updated ageing error matrix.

Table 4: Negative log likelihood of model components, root mean squared errors, and estimates and standard deviations of key quantities. Source: Spencer and Laman (2023).

	Model 21 (2021)	Model 21 (2023)
Negative log-likelihood		
Data components		
AI survey biomass	8.43	8.77
Catch biomass	0.00	0.00
Fishery age comp	237.93	257.77
Fishery length comp	75.33	84.10
AI survey age comp	172.67	198.34
Maturity	7.21	7.21
Priors and penalties		
Recruitment	-5.72	-2.91
Prior on survey q	0.00	0.00
Prior on M	0.23	0.35
penalty on survey sel	1.61	1.54
Fishing mortality penalty	5.73	5.91
Total negative log-likelihood	503.42	561.08
Parameters	135	139
Root mean square error		
AI survey biomass	0.375	0.355
Recruitment	0.571	0.622
Fishery age comp	0.015	0.015
Fishery length comp	0.030	0.029
AI survey age comp	0.017	0.016
Estimated key quantities		
M	0.054	0.052
standard deviation	0.005	0.004
CV	0.088	0.085
2023 total biomass		308,010
standard deviation		32,138
CV		0.10

A series of bridging models were conducted to evaluate the effect of each updated data component on the model output. The 2022 survey biomass estimate had the largest effect of any single model change, and increased the estimated total biomass for 2023 by 6% over the model with only the catch data updated. The combined effect of the updated composition data raised the estimated total biomass for 2023 by an additional 4%. Changes in size at age in recent years (i.e., more of the survey abundance in the southern Bering Sea) further increased the post-2018 biomass estimates. In contrast, the updated ageing error matrix had little effect on estimated total biomass. The data weights were very similar between the 2021 and 2023 assessments. In 2023 assessment, spawning biomass is defined as the biomass estimate of mature females age 3 and older. Total biomass is defined as the biomass estimate of northern rockfish age 3 and older. Recruitment is defined as the number of age-3 northern rockfish. The estimated survey biomass shows an increasing trend, starting at 91,159 t in 1977 and increasing to a peak of 256,819 t in 2014, and

declining to 236,604 t in 2023 (Figure 14). The estimated total biomass shows a similar trend, increasing to a peak value of 343,230 t in 2014, and the estimated spawning biomass increases from 55,180 in 1977 to its highest value of 151,130 in 2015 (Figure 15).

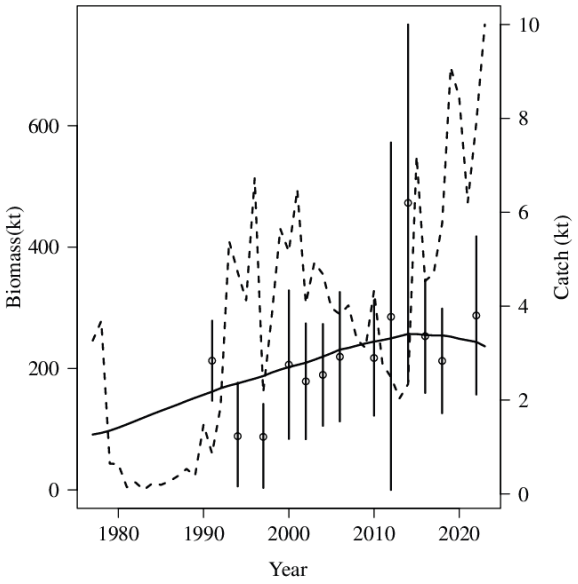


Figure 14: Observed Aleutian Islands survey biomass (data points, ± 2 standard deviations), predicted survey biomass (solid line) and BSAI harvest (dashed line). Source: Spencer and Laman (2023).

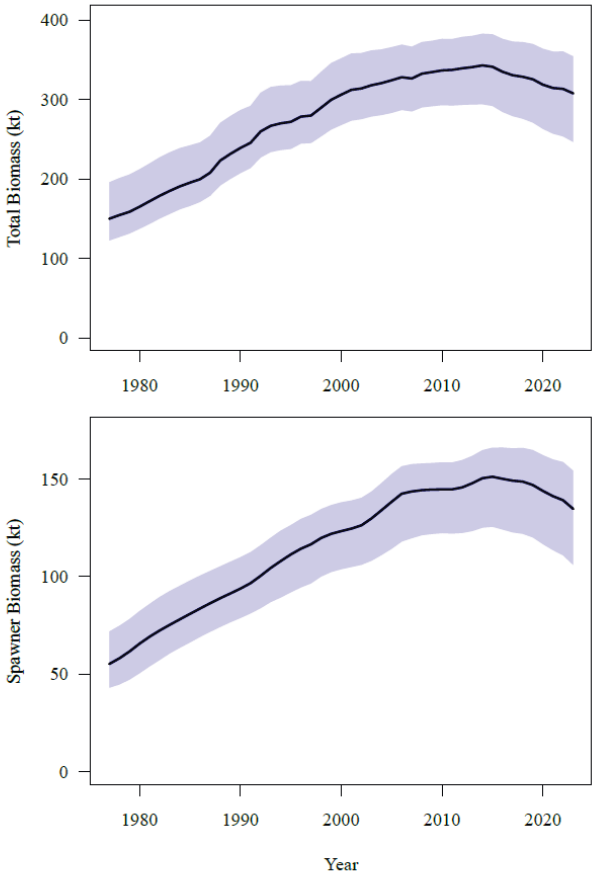


Figure 15: Total and spawning biomass for BSAI northern rockfish with 95% credible intervals from MCMC integration. Source: Spencer and Laman (2023).

The model fit the fishery and survey age composition data reasonably well (notwithstanding years with low sample sizes). The number of hauls in which otoliths or length measurements has increased in recent years (in part due to the random sampling of otoliths initiated in the AI survey beginning in 2016), which results in the higher weights placed on the recent composition data relative to the earlier years. The plus group in the fishery length composition data (38 cm+) and the fishery age plus group (40+ years) are often overestimated whereas the survey age plus group is often underestimated, reflecting a trade-off in the model. The estimated survey selectivity curve had an age at 50% selection of 11.3, similar to the estimate of 11.1 in the 2021 assessment. The selectivity slope parameter was 0.28, identical to the value in the 2021 assessment. The fishery selectivity had an age of 50% selection of 9.2, similar to the value of 9.1 obtained from the 2021 assessment. A relatively high rate in 1977 is estimated to account for the relatively high catch in this year, followed by very low levels of fishing mortality during the 1980s when catch was small. Fishing mortality rates began to increase during the early 1990s, and declined from the late 1990s to 2014. Fishing mortality rates have increased since 2014, and the 2023 estimate of 0.034 is the largest F in the estimated time series beginning in 1977. A plot of fishing mortality rates and spawning stock biomass in reference to the ABC and OFL harvest control rules indicates that the stock is currently below F35% and above B40% (Figure 16).

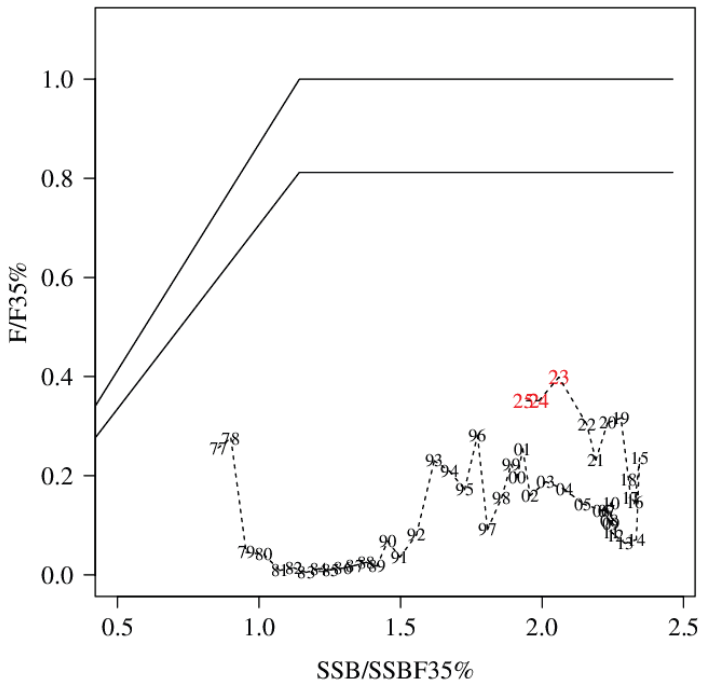


Figure 16: Estimated fishing mortality and SSB from 1977-2025 in reference to OFL (upper line) and ABC (lower line) harvest control rules (values for 2024 and 2025 are based on projections). Source: Spencer and Laman (2023).

Recruitment strengths by year class are shown in Figure 17. Relatively strong year classes are observed in 1984-1985, 1989, 1993, 1995-1998, and 2005, reflecting several of the strong year classes observed in the age composition input data. Most of these estimated strong year classes are larger than their estimates in the 2021 assessment, and years adjacent to the strong year classes are often smaller than estimated in the 2021 assessment (for example, the 1985, 1989, and 2005 year classes). This reflects the influence of the updated aging error matrix; the greater uncertainty in the observed ages allows stronger recruitments which will be distributed to a greater degree to adjacent observed ages.

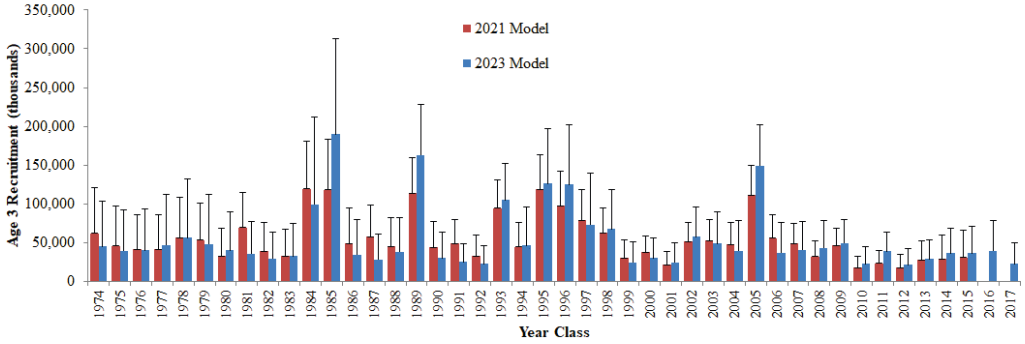


Figure 17: Estimated recruitment (age 3) of BSAI northern rockfish from the 2021 and 2023 assessment models, with 95% CI limits obtained from the Hessian approximation. Source: Spencer and Laman (2023).

A retrospective analysis was conducted to evaluate the effect of recent data on estimated spawning stock biomass. For the current assessment model, a series of model "peels" were conducted in which the end year of the model was varied from 2023 to 2013, and this was accomplished by sequentially dropping age and length composition data, survey biomass estimates, and catch from the input data files. The retrospective estimates show distinct groups that reflect years when survey data are included in the assessment. For example, all the retrospective runs ending in 2018 to 2021 are very similar to each other. The retrospective runs for 2022 and 2023 are also consistent with each other but show larger biomass than the 2018 – 2021 group due to the large 2022 survey biomass estimate. The 2022 and 2018 survey biomass estimates are influential, and exclusion of these data result in a lower group of retrospective SSB estimates for the 2014-2016 peels. Mohn's rho can be used to evaluate the severity of any retrospective pattern, and compares an estimated quantity (in this case, spawning stock biomass) in the terminal year of each retrospective model run with the estimated quantity in the same year of the model using the full data set. The absence of any retrospective pattern would result in a Mohn's rho of 0, and would result from either identical estimates in the model runs, or from positive deviations from the reference model being offset by negative deviations. The Mohn's rho for these retrospective runs was -0.16, similar to the value of -0.18 obtained in the in the 2021 assessment.

The reference fishing mortality rate for northern rockfish is determined by the amount of reliable population information available (Amendment 56 of the Fishery Management Plan for the groundfish fishery of the Bering Sea/Aleutian Islands). Estimates of F40%, F35%, and SPR40% were obtained from a spawner-per-recruit analysis. Assuming that the average recruitment from the 1977-2017 year classes estimated in this assessment represents a reliable estimate of equilibrium recruitment, then an estimate of B40% is calculated as the product of SPR0.40 * equilibrium recruits, and this quantity is 74,907 t. The year 2024 spawning stock biomass is estimated as 128,229 t.

Since reliable estimates of the 2022 spawning biomass (B), B40%, F40%, and F35% exist and B>B40% (128,229 t > 74,907 t), northern rockfish reference fishing mortality is defined in Tier 3a. For this tier, the maximum permissible (MaxPerm) FABC is defined as F40% and FOFL is defined as F35%. The values of F40% and F35% are 0.070 and 0.086, respectively. The estimated catch level for year 2024 associated with the overfishing level of F35% = 0.086 is 23,556 t. A summary of these values is below:

2024 SSB estimate (B) = 128,229 t

B40% = 74,907 t

MaxPerm FABC = 0.070

FABC = F40% = 0.070

FOFL = F35% = 0.086

ABC = 19,274 t

OFL = 23,556 t

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

For each scenario, the projections begin with the vector of 2023 numbers at age estimated in the assessment. This vector is then projected forward to the beginning of 2024 using the schedules of natural mortality and selectivity described in the assessment and the best available estimate of total (year-end) catch for 2023. In each subsequent year, the fishing mortality rate is prescribed on the basis of the spawning biomass in that year and the respective harvest scenario. In each year, recruitment is drawn from an inverse Gaussian distribution whose parameters consist

of maximum likelihood estimates determined from recruitments estimated in the assessment. Spawning biomass is computed in each year based on the time of peak spawning and the maturity and weight at age schedules described in the assessment. Total catch is assumed to equal the catch associated with the respective harvest scenario in all years. This projection scheme is run 1000 times to obtain distributions of possible future stock sizes, fishing mortality rates, and catches.

Five of the seven standard scenarios support the alternative harvest strategies analyzed in the Alaska Groundfish Harvest Specifications Final Environmental Impact Statement. These five scenarios, which are designed to provide a range of harvest alternatives that are likely to bracket the final TAC for 2024, are as follows ("max FABC" refers to the maximum permissible value of FABC under Amendment 56):

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

Scenario 2: In all future years, F is set equal to a constant fraction of max FABC. (Rationale: When FABC is set at a value below max FABC, it is often set at the value recommended in the stock assessment. For this assessment, the fraction used was 1.)

Scenario 3: In all future years, F is set equal to F75%. (Rationale: This scenario provides a likely lower bound on FABC that still allows future harvest rates to be adjusted downward when stocks fall below reference levels.)

Scenario 4: In all future years, F is set equal to the 2018-2022 average F. (Rationale: For some stocks, TAC can be well below ABC, and recent average F may provide a better indicator of FTAC than FABC.)

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

Two other scenarios are needed to satisfy the MSFCMA's requirement to determine whether a stock is currently in an overfished condition or is approaching an overfished condition. These two scenarios are as follows (for Tier 3 stocks, the MSY level is defined as B35%):

Scenario 6: In all future years, F is set equal to FOFL. (Rationale: This scenario determines whether a stock is overfished. If the stock is expected to be above 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.)

Scenario 7: In 2024 and 2025, F is set equal to max FABC, and in all subsequent years F is set equal to FOFL. (Rationale: This scenario determines whether a stock is approaching an overfished condition. If the stock is expected to be above its MSY level in 2035 under this scenario, then the stock is not approaching an overfished condition.)

The recommended FABC and the maximum FABC are equivalent in this assessment (scenarios one and two), and projections of the mean harvest, spawning stock biomass, and fishing mortality rate for the remaining five scenarios are shown in Table 5.

The assessment–related concerns relate to the retrospective pattern in the assessment, the use of strong priors for some key model parameters that cannot be reliably estimated (in effect understating the level of uncertainty in the assessment), and cancelation of the 2020 survey. A population dynamics concern is that the spatial management of the stock is not consistent with the genetic spatial structure, which could lead to subarea depletion and loss of fishery yield, particularly as the target fishery for northern rockfish is developing; however, this risk has not been realized yet.

The concerns identified above are not addressed in the assessment and Tier status for this stock. Issues such as the retrospective pattern and the use of strong prior distributions affect the results of the assessment, but are not mitigated or otherwise addressed within the assessment. These factors are also not addressed by our current Tier system. Additionally, the mismatch between the genetic spatial structure and the spatial management of the stock is also not addressed within the assessment or the Tier system, as this issue extends beyond the assessment itself. Simply lowering the ABC to a level below the max ABC would not be an effective remedy for a misspecification in the spatial management of the stock.

These assessment-related risk factors are concerning and motivate further continued monitoring of the stock. It is difficult to quantitatively assess the potential for the estimated maximum ABC to exceed the true OFL to due to these risk factors. Therefore, Spence and Laman (2023) recommended the maximum permissible ABC 19,274 t for 2024.

Table 5: Projections of BSAI northern rockfish catch (t), spawning biomass (t), and fishing mortality rate for each of the several scenarios. The values of B40% and B35% are 74,907 t and 65,544 t, respectively. Source: Spencer and Laman (2023).

Catch	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*	*Scenario 7*
2023	9,998	9,998	9,998	9,998	9,998	9,998	9,998
2024	19,274	19,274	4,528	6,555	0	23,556	19,274
2025	18,004	18,004	4,448	6,397	0	21,674	18,004
2026	16,912	16,912	4,385	6,265	0	20,068	20,672
2027	16,013	16,013	4,346	6,170	0	18,748	19,286
2028	15,305	15,305	4,332	6,115	0	17,701	18,180
2029	14,754	14,754	4,339	6,093	0	16,880	17,304
2030	14,311	14,311	4,359	6,090	0	16,215	16,590
2031	13,938	13,938	4,384	6,097	0	15,657	15,987
2032	13,616	13,616	4,411	6,109	0	15,177	15,468
2033	13,335	13,335	4,439	6,122	0	14,730	15,005
2034	13,087	13,087	4,466	6,137	0	14,278	14,547
2035	12,862	12,862	4,493	6,151	0	13,857	14,105
2036	12,653	12,653	4,517	6,164	0	13,476	13,699
Sp. Biomass	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*	*Scenario 7*
2023	132,760	132,760	132,760	132,760	132,760	132,760	132,760
2024	127,029	127,029	128,662	128,441	129,151	126,543	127,029
2025	119,057	119,057	126,724	125,663	129,100	116,851	119,057
2026	112,308	112,308	125,330	123,488	129,501	108,687	111,886
2027	106,800	106,800	124,570	122,003	130,450	102,019	104,873
2028	102,388	102,388	124,388	121,143	131,900	96,662	99,198
2029	98,827	98,827	124,625	120,743	133,706	92,323	94,570
2030	95,861	95,861	125,093	120,610	135,690	88,716	90,701
2031	93,336	93,336	125,690	120,637	137,756	85,661	87,410
2032	91,155	91,155	126,354	120,759	139,842	83,042	84,580
2033	89,260	89,260	127,053	120,945	141,921	80,792	82,139
2034	87,588	87,588	127,747	121,150	143,949	78,852	80,022
2035	86,105	86,105	128,423	121,364	145,916	77,194	78,198
2036	84,785	84,785	129,068	121,572	147,809	75,786	76,639
F	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*	*Scenario 6*	*Scenario 7*
2023	0.034	0.034	0.034	0.034	0.034	0.034	0.034
2024	0.070	0.070	0.016	0.023	0.000	0.086	0.070
2025	0.070	0.070	0.016	0.023	0.000	0.086	0.070
2026	0.070	0.070	0.016	0.023	0.000	0.086	0.086
2027	0.070	0.070	0.016	0.023	0.000	0.086	0.086
2028	0.070	0.070	0.016	0.023	0.000	0.086	0.086
2029	0.070	0.070	0.016	0.023	0.000	0.086	0.086
2030	0.070	0.070	0.016	0.023	0.000	0.086	0.086
2031	0.070	0.070	0.016	0.023	0.000	0.086	0.086
2032	0.070	0.070	0.016	0.023	0.000	0.086	0.086
2033	0.070	0.070	0.016	0.023	0.000	0.086	0.086
2034	0.070	0.070	0.016	0.023	0.000	0.085	0.085
2035	0.070	0.070	0.016	0.023	0.000	0.084	0.085
2036	0.070	0.070	0.016	0.023	0.000	0.083	0.084

3.4.4 GOA Northern Rockfish

This stock has been traditionally assessed biennially in alignment with new trawl survey data (odd years). Following the 2017 stock assessment prioritization process by the Alaska Fisheries Science Center (AFSC), it was recommended to maintain this biennial schedule, with a full stock assessment in even years and a partial assessment in odd years. The partial assessments, such as the one in Williams et al. (2023), update the projection model with new catch data to recommend harvest levels without re-estimating biological parameters. The most recent full assessment was conducted in 2022 (Williams et al., 2022).

The basic model for GOA northern rockfish is described as a separable age-structured model and was implemented using AD Model Builder software (Fournier et al. 2012). The assessment model is based on a generic rockfish model developed in a workshop held in February 2001 (Courtney et al. 2007) and follows closely the GOA Pacific ocean perch model (Hulson et al. 2021). The northern rockfish model is fit to a time series extending from 1961-2022. As with other rockfish age-structured models, this model does not attempt to fit a stock-recruitment relationship but estimates a mean recruitment, which is adjusted by estimated recruitment deviations for each year. Williams et al.

(2022) did this because there did not appear to be an obvious stock-recruitment relationship in the model estimates, and there have been very high recruitments at low stock size.

Definitions Spawning biomass is the biomass estimate of mature females in tons. Total biomass is the biomass estimate of all northern rockfish age-2 and greater in tons. Recruitment is measured as number of age-2 northern rockfish. Fishing mortality is fully-selected F, meaning the mortality at the age the fishery has fully selected the fish.

The estimates of current population abundance indicate that it is dominated by fish from the 1993 and 1998 year-classes. Since the early 1990s the total biomass estimated in the model plateaued close to 200,000 t through the early 2000s and has been decreasing since (Figure 18). Similarly, the spawning biomass estimated in the model has also been decreasing since the mid-2000s. From 1990 on total biomass is generally following the trend observed in the fit to VAST model-based survey biomass index.

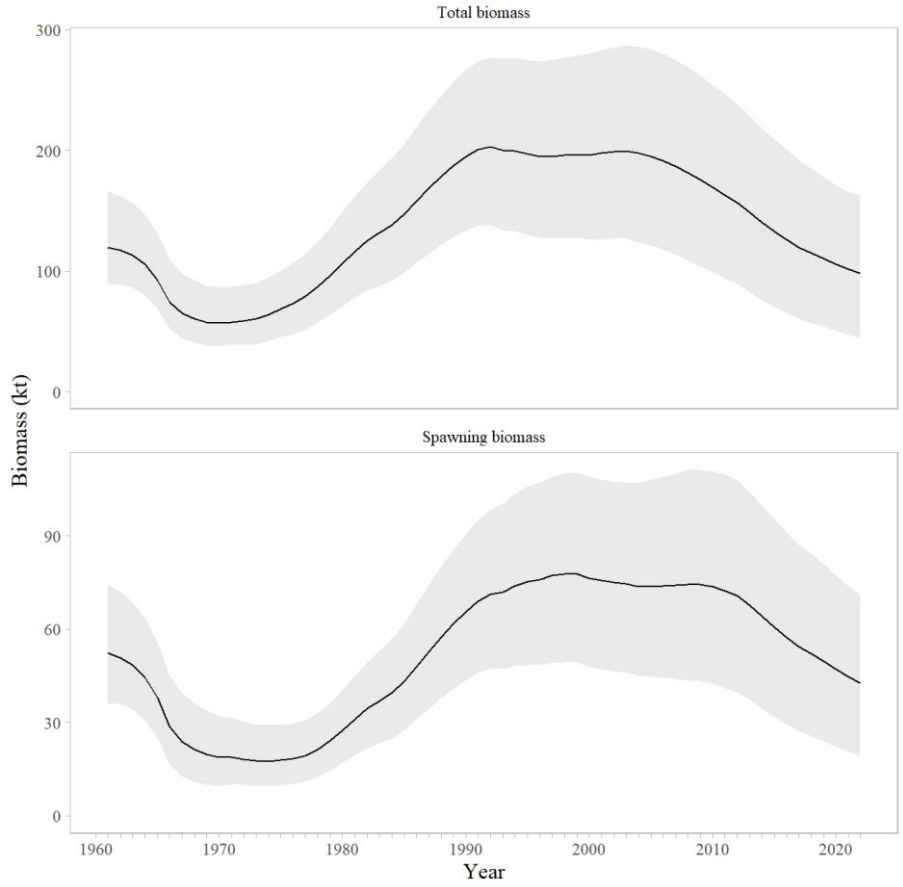


Figure 18: Model estimated total biomass and spawning biomass with 95% credible intervals determined by MCMC (shaded) for Gulf of Alaska northern rockfish. Source: Williams et al., 2022.

The estimated selectivity curve for the fishery and survey data suggested a pattern similar to previous assessments for northern rockfish. The commercial fishery targets slightly larger and (likely) older fish and the survey should sample a larger range of ages. Ninety-five percent of northern rockfish are selected in the fishery by age 10. The age at 50% selection is 9.1 for the survey and 8.2 for the fishery, age at 50% maturity is estimated at 10.6 years.

Goodman et al. (2002) suggested that stock assessment authors use a “management path” graph as a way to evaluate management and assessment performance over time. In the management path we plot the ratio of fishing mortality to FOFL (F35%) and the estimated spawning biomass relative to B35%. Harvest control rules based on F35% and F40% and the tier 3b adjustment are provided for reference. The historical management path for northern rockfish has been above the FOFL adjusted limit for only a few years in the 1960s. In recent years, northern rockfish have been above B35% and below F35% (Figure 19). The trajectory of fishing mortality has remained below the F40% level most of the time and below F35% in all years except 1964-76 during the period of intense fishing for Pacific ocean perch. Parameter estimates from this year’s model were similar to the previous northern rockfish assessment. Selectivity estimates for the fishery and the survey are similar, but with the survey selectivity increasing somewhat more gradually with age. Compared to the maturity at age curve that is estimated, selectivity occurs at slightly younger ages than the age of maturity. The fishing mortality rate F has been fairly consistent since 1990, and the exploitation rate has been generally around the long-term average.

Recruitment estimates show a high degree of uncertainty, but indicate several large year-classes in the early and late 1970's, early 1980's and mid 1990's (Figure 20). Recruitment since 2005 has been considerably lower than the 1970–2005 time period. There is no clear trend between recruitment and spawning stock biomass. Fits to the fishery and survey age compositions were reasonable with this year's recommended model. Increasing proportions of GOA northern rockfish in the plus age or length groups for both survey and fishery composition indicate a substantial number of individuals are successfully surviving natural and fishing mortality to attain old age and large size.

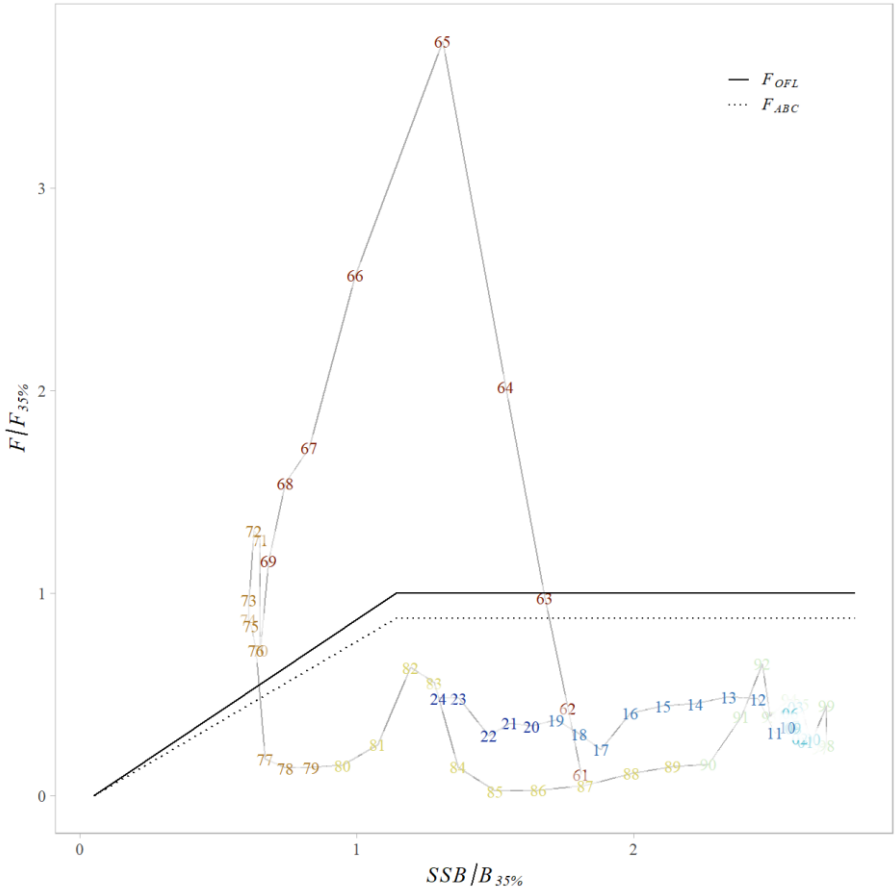


Figure 19: Time series of northern rockfish estimated spawning biomass (SSB) relative to B_(35%) and fishing mortality (F) relative to F_(35%) for author recommended model. Source: Williams et al., 2022.

Retrospective analysis From the MCMC chains described in the Uncertainty approach section, we summarize the posterior densities of key parameters for the recommended model using histograms and credible intervals. We also use these posterior distributions to show uncertainty around time series estimates such as total biomass, recruitment, and spawning biomass. A within-model retrospective analysis of the recommended model was conducted for the last 10 years of the time-series by dropping data one year at a time. The revised Mohn's "rho" statistic (Hanselman et al. 2013) in female spawning biomass was -0.082, an improvement from -0.236 in the previous model) indicating that the model slightly increases the estimate of female spawning biomass in recent years as data is added to the assessment.

Amendment 56 to the GOA Groundfish Fishery Management Plan defines the "overfishing level" (OFL), the fishing mortality rate used to set OFL (FOFL), the maximum permissible ABC, and the fishing mortality rate used to set the maximum permissible ABC. The fishing mortality rate used to set ABC (FABC) may be less than this maximum permissible level, but not greater. Because reliable estimates of reference points related to maximum sustainable yield (MSY) are currently not available but reliable estimates of reference points related to spawning per recruit are available, Northern rockfish in the GOA are managed under Tier 3 of Amendment 56. Tier 3 uses the following reference points: B40%, equal to 40% of the equilibrium spawning biomass that would be obtained in the absence of fishing; F35%,,equal to the fishing mortality rate that reduces the equilibrium level of spawning per recruit to 35% of the level that would be obtained in the absence of fishing; and FF40%, equal to the fishing mortality rate that reduces the equilibrium level of spawning per recruit to 40% of the level that would be obtained in the absence of fishing. Estimation of the B40% reference point requires an assumption regarding the equilibrium level of recruitment. In this assessment, it is assumed that the equilibrium level of recruitment is equal to the average of age-2 recruitments

between 1979 and 2020. Because of uncertainty in very recent recruitment estimates, we lag 2 years behind model estimates in our projection.

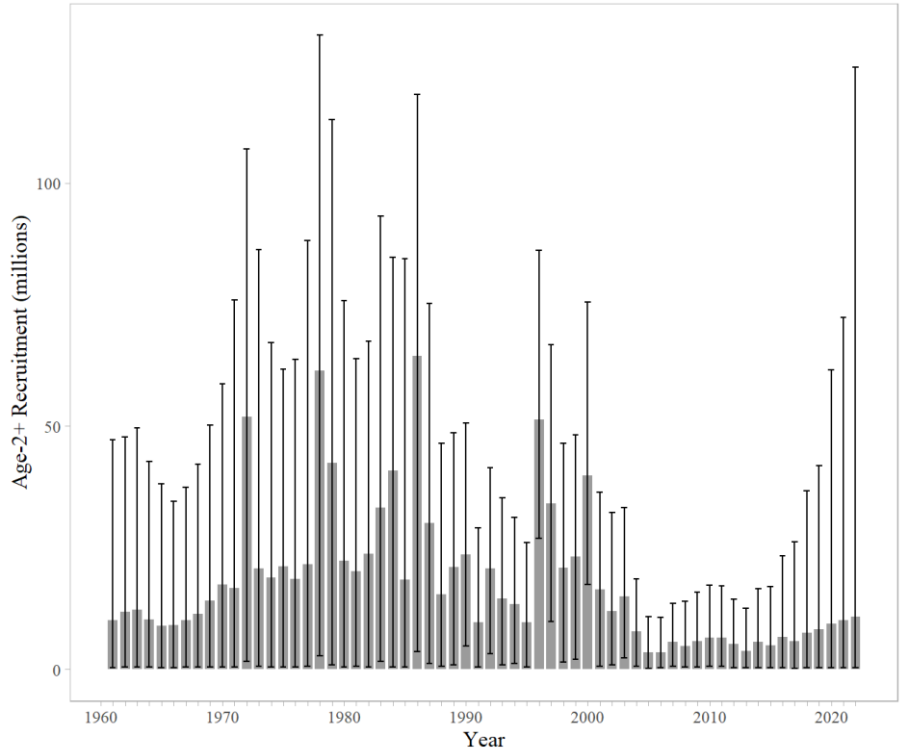


Figure 20: Estimates of age-4 recruitment with 95% credible intervals for GOA northern rockfish. Source: Williams et al., 2022.

Other useful biomass reference points which can be calculated using this assumption are B100% and B35%, defined analogously to B40%. The 2022 estimates of these reference points are:

B100% = 82,350

B40% = 32,940

B35% = 28,822

F40% = 0.074

F35% = 0.061

Female spawning biomass for 2022 is estimated at 39,445 t. This is above the B40% value of 32,940 t. Under Amendment 56, Tier 3, the maximum permissible fishing mortality for ABC is F40% and fishing mortality for OFL is F35%. Applying these fishing mortality rates for 2022, yields the following ABC and OFL are 4,965 t and 5,927 t, respectively.

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

For each scenario, the projections begin with the vector of 2022 numbers at age as estimated in the assessment. This vector is then projected forward to the beginning of 2023 using the schedules of natural mortality and selectivity described in the assessment and the best available estimate of total (year-end) catch for 2022. In each subsequent year, the fishing mortality rate is prescribed on the basis of the spawning biomass in that year and the respective harvest scenario. In each year, recruitment is drawn from an inverse Gaussian distribution whose parameters consist of maximum likelihood estimates determined from recruitments estimated in the assessment. Spawning biomass is computed in each year based on the time of peak spawning and the maturity and weight schedules described in the assessment. Total catch after 2022 is assumed to equal the catch associated with the respective harvest scenario in all years. This projection scheme is run 1,000 times to obtain distributions of possible future stock sizes, fishing mortality rates, and catches.

Five of the seven standard scenarios will be used in an Environmental Assessment prepared in conjunction with the final SAFE. These five scenarios, which are designed to provide a range of harvest alternatives that are likely to bracket the final TAC for 2023, are as follow ("maxFABC" refers to the maximum permissible value of FABC under Amendment 56):

- Scenario 1: In all future years, F is set equal to maxFABC. (Rationale: Historically, TAC has been constrained by ABC, so this scenario provides a likely upper limit on future TACs.)
- Scenario 2: In 2022 and 2023, F is set equal to a constant fraction of maxFABC, where this fraction is equal to the ratio of the realized catches in 2019-2021 to the ABC recommended in the assessment for each of those years. For the remainder of the future years, maximum permissible ABC is used. (Rationale: In many fisheries the ABC is routinely not fully utilized, so assuming an average ratio catch to ABC will yield more realistic projections.)
- Scenario 3: In all future years, F is set equal to 50% of maxFABC. (Rationale: This scenario provides a likely lower bound on maxFABC that still allows future harvest rates to be adjusted downward when stocks fall below reference levels.)
- Scenario 4: In all future years, F is set equal to the 2017-2021 average F. (Rationale: For some stocks, TAC can be well below ABC, and recent average F may provide a better indicator of FTAC than FABC)
- Scenario 5: In all future years, F is set equal to zero. (Rationale: In extreme cases, TAC may be set at a level close to zero.)

Two other scenarios are needed to satisfy the MSFCMA's requirement to determine whether a stock is currently in an overfished condition or is approaching an overfished condition. These two scenarios are as follows (for Tier 3 stocks, the MSY level is defined as B35%):

- Scenario 6: In all future years, F is set equal to FOFL (Rationale: This scenario determines whether a stock is overfished. If the stock is expected to be 1) above its MSY level in 2022 or 2) above ½ of its MSY level in 2022 and above its MSY level in 2032 under this scenario, then the stock is not overfished.)
- Scenario 7: In 2023 and 2024, F is set equal to maxFABC, and in all subsequent years F is set equal to FOFL. (Rationale: This scenario determines whether a stock is approaching an overfished condition. If the stock is 1) above its MSY level in 2024 or 2) above 1/2 of its MSY level in 2024 and expected to be above its MSY level in 2034 under this scenario, then the stock is not approaching an overfished condition.)

Spawning biomass, fishing mortality, and yield are tabulated for the seven standard projection scenarios (Table 6).

In addition to the seven standard harvest scenarios, Amendments 48/48 to the BSAI and GOA Groundfish Fishery Management Plans require projections of the likely OFL two years into the future. While Scenario 6 gives the best estimate of OFL for 2022, it does not provide the best estimate of OFL for 2023, because the mean 2022 catch under Scenario 6 is predicated on the 2022 catch being equal to the 2022 OFL, whereas the actual 2022 catch will likely be less than the 2022 OFL.

The three categories were ranked as 'Level 1: No apparent concern' and one as a 'Level 2, substantially increased concerns'. The GOA northern rockfish assessment appears to fit available data well, the 2021 GOA trawl survey was undertaken as planned and data are included in 2022 assessment, and the fishery and environmental considerations appear to be within normal bounds. Because GOA northern rockfish ABC has not been fully utilized in recent years a reduction in ABC was not recommended.

Table 6: Set of projections of spawning biomass (SB) and yield for northern rockfish in the Gulf of Alaska. Six harvest scenarios designed to satisfy the requirements of Amendment 56, NEPA, and MSFCMA. . Source: Williams et al., 2022.

Year	Maximum permissible F	Author's F (Estimated catches)	Half max.1	5-year average F	No Fishing	Overfished	Approaching overfished
			Spawning biomass (mt)				
2022	41,399	41,399	41,399	41,399	41,399	41,399	41,399
2023	39,069	39,445	39,467	39,544	39,869	38,910	39,069
2024	36,059	37,470	37,539	37,833	39,082	35,481	36,059
2025	33,425	35,398	35,838	36,328	38,435	32,512	33,290
2026	31,201	32,966	34,380	35,051	37,956	30,056	30,723
2027	29,448	30,960	33,181	34,024	37,674	28,161	28,723
2028	28,145	29,440	32,262	33,273	37,621	26,763	27,236
2029	27,266	28,374	31,658	32,824	37,834	25,820	26,219
2030	26,796	27,740	31,356	32,705	38,350	25,302	25,638
2031	26,707	27,508	31,375	32,930	39,198	25,175	25,455
2032	26,944	27,620	31,690	33,482	40,376	25,375	25,607
2033	27,416	27,983	32,239	34,298	41,833	25,803	25,995
2034	28,019	28,491	33,004	35,286	43,479	26,354	26,510
2035	28,665	29,057	33,891	36,360	45,226	26,940	27,067
			Fishing mortality				
2022	0.023	0.023	0.023	0.023	0.023	0.023	0.023
2023	0.061	0.032	0.031	0.025		0.074	0.074
2024	0.061	0.031	0.031	0.025		0.074	0.074
2025	0.061	0.061	0.031	0.025		0.073	0.073
2026	0.058	0.061	0.031	0.025		0.067	0.067
2027	0.054	0.057	0.031	0.025		0.062	0.062
2028	0.052	0.054	0.030	0.025		0.059	0.059
2029	0.050	0.052	0.029	0.025		0.057	0.057
2030	0.049	0.051	0.029	0.025		0.056	0.056
2031	0.049	0.051	0.029	0.025		0.055	0.055
2032	0.049	0.051	0.029	0.025		0.056	0.056
2033	0.050	0.051	0.030	0.025		0.057	0.057
2034	0.051	0.052	0.030	0.025		0.058	0.058
2035	0.052	0.053	0.031	0.025		0.059	0.059
			Yield (mt)				
2022	2,003	2,003	2,003	2,003	2,003	2,003	2,003
2023	4,965	4,965	2,519	2,039		5,927	4,965
2024	4,611	4,742	2,410	1,961		5,440	4,611
2025	4,313	4,560	2,319	1,898		4,964	5,149
2026	3,849	4,292	2,248	1,849		4,281	4,472
2027	3,467	3,827	2,189	1,814		3,801	3,953
2028	3,210	3,505	2,101	1,796		3,483	3,604
2029	3,075	3,321	2,066	1,803		3,313	3,412
2030	3,058	3,265	2,089	1,838		3,281	3,364
2031	3,125	3,300	2,150	1,889		3,347	3,417
2032	3,244	3,392	2,229	1,947		3,474	3,532
2033	3,385	3,509	2,311	2,005		3,629	3,677
2034	3,533	3,635	2,390	2,062		3,791	3,830
2035	3,679	3,762	2,467	2,119		3,953	3,984

3.4.5 GOA Pacific ocean perch

Gulf of Alaska (GOA) Pacific ocean perch (POP, *Sebastes alutus*) shows similar biological features of the stock inhabiting the BSAI and, as evidenced above the two stocks are considered and managed as two different units. The 2023 assessment of Pacific ocean perch (POP) in the Gulf of Alaska (GOA) by Kapur et al. (2023) builds upon prior biological and stock structure information and incorporates fisheries and management measures from Hulson et al. (2021).

Prior to 2001, the stock assessment was based on an age-structured model using an early FORTRAN version of the stock synthesis framework (Methot 1990). Since then it was modified and written in to AD Model Builder software as described in Courtney et al. (2007). Since its initial adaptation in 2001, the models' attributes have been explored and changes have been made to the template to adapt to POP and other species. The following changes have been adopted within the POP assessment since the initial model in 2001:

- 2003: Size to age matrix added for the 1960s and 1970s to adjust for density-dependent growth, natural mortality and bottom trawl survey catchability estimated within model
- 2009: Fishery selectivity estimated for three time periods describing the transition from a foreign to domestic fishery, MCMC projections used with a pre-specified proportion of ABC for annual catch
- 2014: Maturity at age estimated conditionally with addition of new maturity data
- 2015: Extended ageing error matrix adopted to improve fit to plus age group and adjacent age classes

- 2017: Length bins for fishery length composition data set at 1cm, removed 1984 and 1987 trawl survey data, time block added to fishery selectivity starting in 2007 to coincide with the Central GOA rockfish program
- 2020: Fishery age composition data constructed with age-length key, prior for bottom trawl catchability set at 1.15 (Jones et al. 2021), and prior for natural mortality set at 0.0614 (Hamel 2015)

Spawning biomass is the estimated weight of mature females. Total biomass is the estimated weight of all POP age two and greater. Recruitment is measured as the number of age-2 POP. Fishing mortality is the mortality at the age the fishery has fully selected the fish.

Estimated total biomass gradually increased from a low near 85,000 t in 1980 to over 596,000 t at its peak in 2015 (Figure 21).The recent estimates of spawning biomass are nearly at historical levels prior to the 1970s. Both trajectories show a rapid increase since 1992, which coincides with an increase in uncertainty. MCMC credible intervals indicate that the historic low is reasonably certain while recent increases are less certain. Spawning biomass shows a similar trend. Spawning biomass and age-2+ total biomass have increased in response to fitting the large trawl survey biomass estimates since 2013.

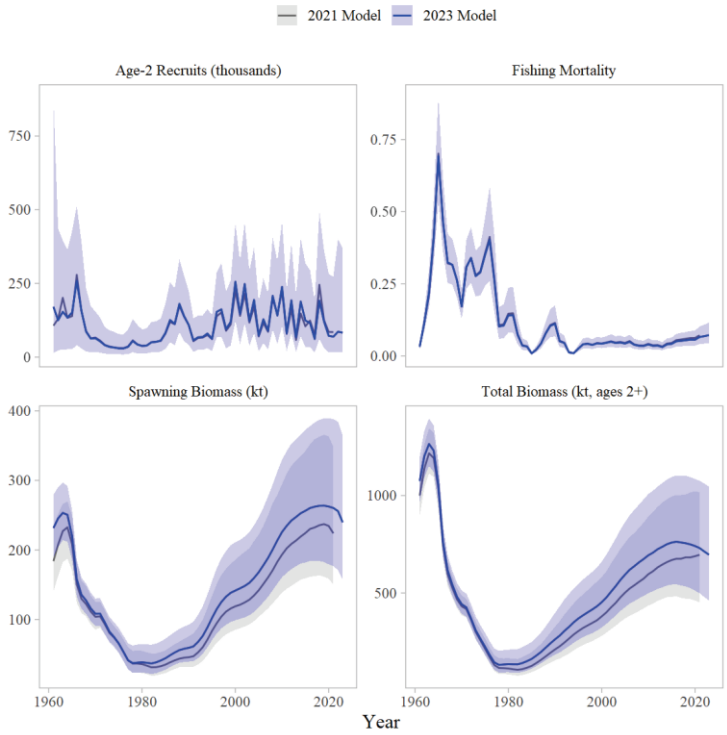


Figure 21: Comparison of recruitment, fishing mortality rates, spawning and total biomass for the 2023 Update model (blue) and 2021 Full model (grey). The shaded ribbon represents the 95% quantile obtained via MCMC; Age-2 recruits and F rates were not included in the MCMC analysis in 2021, so those figures show the mean estimates only. Source: Kapur et al., 2023.

Figure 22, the 'phase-plane' plot, compares fishing mortality relative to the target reference point FOFL (F35%) and spawning biomass relative to the corresponding biomass reference point BOFL (B35%) It includes two years of projected F and B. Fully-selected fishing mortality shows that fishing mortality has decreased dramatically from historic rates and has levelled out in the last decade. The fishing mortality rate for POP has been below the F40% and biomass has been above F40% since the mid-1980s.

Recruitment (as measured by age-2 fish) for POP is highly variable and large recruitment events comprise much of the biomass for future years (Figure 21). The model estimates that recruitment was below average from 1975-1985, after which it was above average for many years. The survey age data and the large survey biomass observations from 2013 onwards suggest that there were strong year classes in 2008, 2010, 2012, 2014 and 2018 (Figure 10). However, these recent recruitment events are still uncertain as indicated by the MCMC credible intervals in Figure 10, some of which cross the zero (average) line. The high recruitment estimate of 2018 has been revised downwards from the 2021 assessment with the addition of survey and fishery ages through 2021 and 2022, respectively, and is now of a similar scale to earlier estimates. POP do not seem to exhibit a stock-recruitment relationship because large recruitment has occurred during periods of high and low biomass. The POP model does not specify an explicit stock-

recruitment relationship. The average annual recruitment (in numbers) spawned after 1976 is estimated to be 85 million.

A within-model retrospective analysis of the recommended model was conducted for the last 10 years of the time series by dropping data one year at a time. The revised Mohn's "rho" statistic in female spawning biomass was -0.153 (slightly smaller than the 2021 value of -0.16), and the trajectories and uncertainty intervals from MCMC for 2021 and 2023 are nearly identical. Across retrospective peels, SSB estimates have usually increased with the addition of new survey observations and the increases have been large (up to 30%), which is sensible given the large and uncertain survey biomass observations from the trawl survey since 2013. The 2023 SSB trajectory does not exhibit as dramatic of an increase from the 2021 nor 2022 retrospective peels, despite the addition of a new survey observation, likely due to the high uncertainty in that terminal estimate.

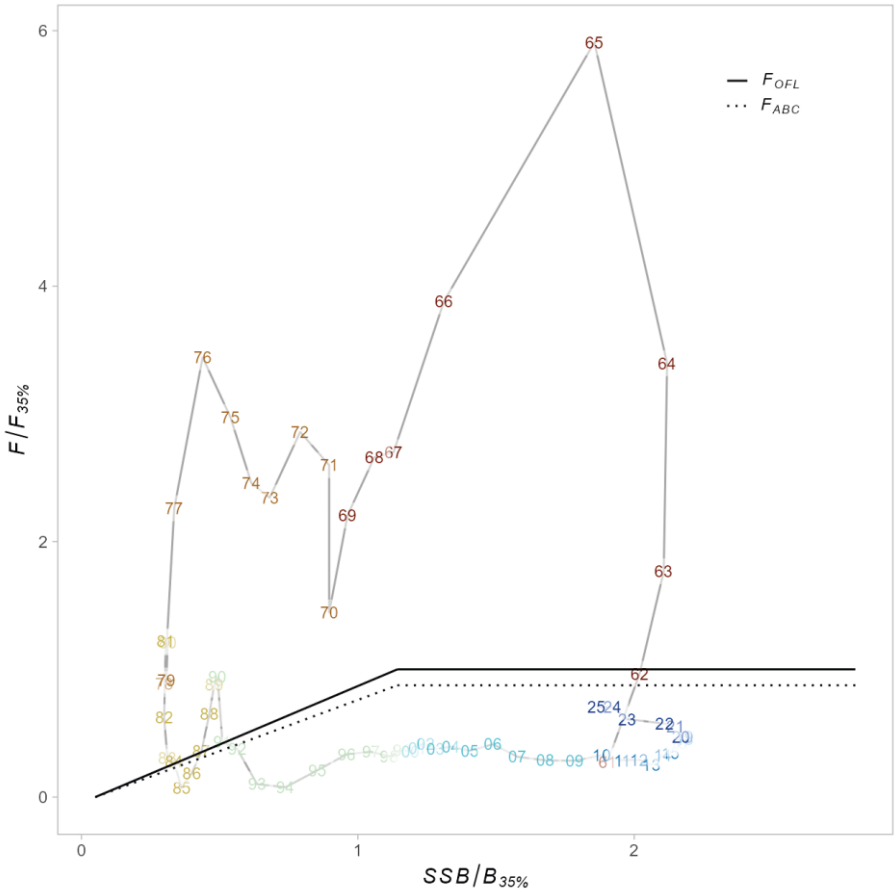


Figure 22: Time series of estimated fishing mortality versus estimated spawning stock biomass (phase-plane plot), including applicable OFL and maximum FABC definitions for the stock, including 2 years of projected values. Target levels correspond to B35% and F35% for author recommended model. Source: Kapur et al., 2023.

A historical comparison of key derived quantities from the base model and the most recent full assessment is shown in Figure 21. Parameter estimates and likelihood functions have remained similar to the 2021 model, and the MCMC-derived 95% credible intervals of the 2023 parameter estimates encompass the 2021 medians.

The description of Amendment 56 specifications for POP and details regarding the development of the Risk Table have been truncated to provide minimal background and highlight relevant updates or changes made for this cycle. The reader is referred to the last full assessment (Hulson et al. 2021) for the entirety of this section, including details on the projection approach.

POP in the GOA are managed under Tier 3 of Amendment 56. It is assumed that the equilibrium level of recruitment is equal to the average of age-2 recruitments between 1979 and 2021 (i.e., the 1977-2019 year classes). The most recent two years of recruitment are not included in the projection due to lack of data that would support these recruitment estimates. This definition of equilibrium recruitment is used to estimate the B40% reference point. Other useful biomass reference points which can be calculated using this assumption are B100% and B35/, defined analogously to B40%. Female spawning biomass for 2024 is estimated at 228,030 t. This is above B40% =137,447 t. Under Amendment 56, Tier 3, the maximum permissible fishing mortality for ABC is F40% and fishing mortality for

OFL is F35%. The 2024 estimates of biomass-based reference points, and the resultant ABC and OFL based on the fishing mortality rates are reported in Table 7.

A standard set of projections is required for each stock managed under Tier 3 of Amendment 56. Five of the seven standard scenarios support the alternative harvest strategies analyzed in the Alaska Groundfish Harvest Specifications Final Environmental Impact Statement. They are as follows ("maxFABC" refers to the maximum permissible value of FABC under Amendment 56).

- Scenario 1: In all future years, F is set equal to maxFABC (Rationale: Historically, TAC has been constrained by ABC, so this scenario provides a likely upper limit on future TACs.)
- Scenario 2: In 2024 and 2025, F is set equal to a constant fraction of maxFABC, where this fraction is equal to the ratio of the realized catches in 2020-2022 to the ABC (which is generally the same as the TAC) recommended in the assessment for each of those years. For the remainder of the future years, maximum permissible ABC is used. (Rationale: Using recent catch to ABC ratios will yield more realistic projections for the POP fishery, which rarely realizes its full TAC or ABC). The exact calculation of these values is shown below.
- Scenario 3: In all future years, F is set equal to 50% to 50% of maxFABC. (Rationale: This scenario provides a lower bound on FABC that still allows future harvest rates to be adjusted downward when stocks fall below reference levels.)
- Scenario 4: In all future years, F is set equal to the 2017-2021 average F. (Rationale: For some stocks, TAC can be well below ABC, and recent average F may provide a better indicator of FTAC than FABC.)
- Scenario 5: In all future years, F is set equal to zero. (Rationale: In extreme cases, TAC may be set at a level close to zero.)

Two other scenarios are needed to satisfy the MSFCMA's requirement to determine whether a stock is currently in an overfished condition or is approaching an overfished condition. These two scenarios are as follows (for Tier 3 stocks, the MSY level is defined as B35%):

- Scenario 6: In all future years, F is set equal to FOFL. (Rationale: This scenario determines whether a stock is overfished. If the stock is expected to be above 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.) While Scenario 6 gives the best estimate of OFL for 2023, it does not provide the best estimate of OFL for 2024, because the mean 2023 catch under Scenario 6 is predicated on the 2023 catch being equal to the 2023 OFL, whereas the actual 2023 catch will likely be less than the 2023 OFL. The executive summary contains the appropriate one- and two-year ahead projections for both ABC and OFL.
- Scenario 7: In 2024 and 2025, F is set equal to maxFABC, and in all subsequent years is set equal to FOFL. (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.)

The method for specifying catches in years 2023 to 2025 has not changed from the 2021 assessment. Projected catches, spawning biomass, and fishing mortality rates corresponding to the alternative harvest scenarios over a 13-year period are shown in Table 8.

Table 7: Reference points of GOA POP. Source: Kapur et al., 2023.

Reference Point	Description	Value
$B_{100\%}$	The equilibrium spawning biomass that would be obtained in the absence of fishing	343,618 t
$B_{40\%}$	40% of the equilibrium spawning biomass that would be obtained in the absence of fishing	137,447 t
$B_{35\%}$	35% of the equilibrium spawning biomass that would be obtained in the absence of fishing	120,266 t
$F_{40\%}$	The fishing mortality rate that reduces the equilibrium level of spawning per recruit to 40% of the level that would be obtained in the absence of fishing	0.1
ABC	Yield at $F_{40\%}$ in 2024	39,719 t
$F_{35\%}$	The fishing mortality rate that reduces the equilibrium level of spawning per recruit to 35% of the level that would be obtained in the absence of fishing	0.12
OFL	Yield at $F_{35\%}$ in 2024	47,466 t

The GOA POP assessment model exhibits a strong negative retrospective pattern (spawning biomass continues to increase with new data), though this effect was less pronounced in the 2023, likely due to high uncertainty in the observed survey biomass. This is driven by ongoing increases in the trawl survey biomass, which have been consistently under-estimated since 2013, and may be suggestive of model misspecification. This results in a Level 2 assessment considerations rating, a major concern.

The model estimates above-average recruitment events in the last three decades to account for the increasing survey biomass observations. The estimated recruitment events are still insufficient to satisfactorily fit the recent survey data; these increases are not observed in the early time series nor are they typical for an ecosystem that is warming (with the exception of sablefish). The unusual trend of rapid increases in stock size and recruitment estimates results in a Level 2 population dynamics rating, a major concern.

In 2023, the GOA ecosystem was characterized by moderate thermal conditions, mixed trends for zooplankton abundance, moderate predation, and increased competition for zooplankton prey resources. The warmer surface waters predicted for 2024 may be favorable for POP larval survival. Ecosystem: While optimal temperatures for POP life stages are not known, it is reasonable to expect that the 2023 average ocean temperatures at depth on the shelf edge (for adults) and surface temperatures (for larvae) were adequate for POP. POP are semi-demersal/pelagic, outer shelf and continental slope (150-420 m depths) dwellers as adults, with a pelagic then inshore benthic juvenile stage (age 1 to 3) in the Gulf of Alaska (GOA) (NPFMC 2010). There is evidence that POP are being observed higher in the water column, potentially a result of an expanding population. As warm spring temperatures are favorable for larval survival (Doyle 2009), cooler spring to above average summer temperatures varying from 5.8°C (WGOA Bottom Trawl Survey, O'Leary 2023) to 10.5°C (Icy Strait, SEAK, Fergusson 2023) were cooler than optimal, but not considered detrimental. While optimal temperatures are not known for adults, there is no indication of concern given bottom temperatures along the shelf edge in the GOA cooled to average in 2023 (AFSC longline survey). Surface temperatures are predicted to warm in late winter/early spring of 2024, in alignment with El Niño conditions. These warmer surface temperatures in April/May (larval release) may be favorable for larval survival. As it takes time for warm surface waters to extend to depth, shelf bottom temperatures are not expected to warm in the spring. Planktivorous foraging conditions were average to below average across the GOA in 2023. The primary prey of the adult POP include calanoid copepods, euphausiids, myctophids, and miscellaneous prey in the GOA. POP body condition increased to average in 2023 after below average condition (i.e. lower weights at length) since 2015 (Bottom Trawl Survey). The timing of this declining trend matches the period of increasing POP population since the 2014-2016 marine heatwave and could be explained by prey availability and competition within an expanding population. Zooplankton biomass in the WGOA progressed from below average in the spring (lower calanoid copepod biomass and higher euphausiid biomass) to improved conditions in the summer (above average biomass of large calanoid copepods and euphausiids, but continued lower small copepod biomass; Shelikof St.). Summer planktivorous foraging conditions were somewhat improved with above average large calanoid copepod and euphausiid biomass, but continued lower small copepod biomass. Eastern GOA inside waters had below average total zooplankton biomass, although euphuasiids were above average here as in the western GOA. Planktivorous seabird reproductive success, an indicator of zooplankton availability and nutritional quality, was approximately average south of Kodiak (Chowiet Isl.), and in the central GOA (Middleton Island on shelf edge off Seward), and above average in the EGOA (St. Lazaria Isl.).

Predation pressure is considered moderate and competition may have increased in 2023. Predators of juvenile POP include Pacific halibut, arrowtooth flounder, seabirds, rockfish, salmon, and lingcod. Predators of adults include Pacific halibut, sablefish, and sperm whales. Halibut and arrowtooth flounder populations remain low relative to previous levels, and, in general, there is no cause to suspect increased predation pressure on larval or adult demersal shelf rockfish. Potential competitors include large returns of pink salmon, a relatively large and increasing population of walleye pollock, other POP as the population continues to increase, and continued large year classes of juvenile sablefish. POP are being found shallower in the water column, increasing their habitat overlap and potential competition for zooplankton prey with walleye pollock. The most recent data available result in a Level 1 ecosystem rating, no apparent concerns.

Table 8: Table of 13-year projected catches (upper table), spawning biomass (middle table) and fishing mortality (lower table) rates corresponding to the alternative harvest scenarios, using stochastic methods if possible (mean values or other statistics may be shown in the case of stochastic recruitment scenarios). This set of projections encompasses six harvest scenarios designed to satisfy the requirements of Amendment 56, the

National Environmental Protection Act, and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). All units in t. Source: Kapur et al., 2023.

Year	Maximum permissible F	Author's F* (pre-specified catch)	Half maximum F	5-year average F	No fishing	Overfished	Approaching overfished
2023	30,381	30,381	30,381	30,381	30,381	30,381	30,381
2024	39,719	31,454	20,242	25,975	0	47,466	39,719
2025	37,742	29,890	19,968	25,346	0	44,423	37,742
2026	35,825	36,997	19,641	24,673	0	41,564	42,814
2027	33,990	35,038	19,271	23,970	0	38,908	40,007
2028	32,296	33,223	18,890	23,282	0	36,516	37,473
2029	30,769	31,580	18,513	22,625	0	34,411	35,234
2030	29,434	30,136	18,159	22,025	0	32,608	33,311
2031	28,310	28,913	17,842	21,499	0	31,131	31,725
2032	27,493	28,007	17,635	21,135	0	30,035	30,533
2033	26,892	27,326	17,486	20,862	0	29,258	29,684
2034	26,397	26,763	17,352	20,629	0	28,266	28,882
2035	26,019	26,326	17,273	20,485	0	27,354	27,899
2036	25,750	26,006	17,201	20,347	0	26,775	27,182

Year	Maximum permissible F	Author's F* (pre-specified catch)	Half maximum F	5-year average F	No fishing	Overfished	Approaching overfished
2023	234,352	234,352	234,352	234,352	234,352	234,352	234,352
2024	226,765	228,030	229,725	228,861	232,726	225,567	226,765
2025	216,578	221,384	227,781	224,465	239,611	212,171	216,578
2026	206,974	213,773	225,595	220,007	246,048	199,850	205,891
2027	197,586	203,755	222,795	215,129	251,570	188,200	193,593
2028	188,193	193,734	219,131	209,602	255,796	176,975	181,742
2029	179,136	184,065	214,932	203,770	258,934	166,485	170,659
2030	170,996	175,345	210,820	198,255	261,545	157,267	160,892
2031	164,278	168,090	207,417	193,652	264,271	149,755	152,883
2032	159,101	162,428	204,981	190,187	267,433	144,003	146,684
2033	155,297	158,192	203,487	187,798	271,096	139,836	142,097
2034	152,525	155,040	202,696	186,218	275,082	136,951	138,811
2035	150,497	152,676	202,390	185,206	279,233	134,990	136,506
2036	148,985	150,862	202,368	184,549	283,371	133,641	134,869

Year	Maximum permissible F	Author's F* (pre-specified catch)	Half maximum F	5-year average F	No fishing	Overfished	Approaching overfished
2023	0.070	0.070	0.070	0.070	0.070	0.070	0.070
2024	0.100	0.080	0.050	0.060	0.000	0.120	0.100
2025	0.100	0.080	0.050	0.060	0.000	0.120	0.100
2026	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2027	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2028	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2029	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2030	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2031	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2032	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2033	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2034	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2035	0.100	0.100	0.050	0.060	0.000	0.120	0.120
2036	0.100	0.100	0.050	0.060	0.000	0.110	0.120

3.4.6 GOA Dusky Rockfish

The Gulf of Alaska (GOA) dusky rockfish (*Sebastes variabilis*) has traditionally been assessed biennially, in conjunction with new trawl survey data. Following the 2016 stock assessment prioritization process (Hollowed et al. 2016), it was recommended that this biennial schedule continue, with full stock assessments in even years and harvest projections in odd years. The 2023 projection model incorporated updated catch data to recommend harvest levels for the next two years without re-estimating model parameters (Omori et al. 2023). The biological and stock assessment information summarized here is from the 2022 full assessment (Williams et al. 2022).

Williams et al. (2022) presented model results for dusky rockfish based on an age-structured model using AD Model Builder software (Fournier et al. 2012). The assessment model is based on a generic rockfish model developed in a workshop held in February 2001 (Courtney et al. 2007) and is similar to the GOA Pacific ocean perch and northern rockfish models (Courtney et al. 1999; Hanselman et al. 2007a). In 2003, biomass estimates from an age-structured assessment model were first accepted as an alternative to trawl survey biomass estimates. As with other rockfish age-structured models, this model does not attempt to fit a stock-recruitment relationship but estimates a mean recruitment, which is adjusted by estimated recruitment deviations for each year. We do this because there does not

appear to be an obvious stock-recruitment relationship in the model estimates, and there have been very high recruitments at low stock size.

Spawning biomass is the biomass estimate of mature females in tons. Total biomass is the biomass estimate of all dusky rockfish age four and greater in tons. Recruitment is measured as number of age four dusky rockfish. Fishing mortality is fully-selected F, meaning the mortality at the age the fishery has fully selected the fish.

The estimates of current population abundance indicate that it is dominated by fish from the 1993 and 1998 year-classes. The predicted survey biomass generally captures the trend in observed (VAST geospatial model) survey biomass similarly for the preferred and bridge models, but without matching the interannual variability that is present in observed values. The 2021 observed survey values are greater than the predicted model estimates for all models presented, indicating that the assessment model is tempering the observed increase in variability based on age compositional data. However, the model predicted survey biomass estimates for VAST models are quite similar with only the design-based survey estimator producing different results. Spawning biomass estimates are at a timeseries high (11). Total age-4+ biomass estimates for all model using VAST survey inputs indicate a steadily increasing trend with a peak around 2016.

The estimated selectivity curve for the fishery and survey data suggested a pattern similar to previous assessments for dusky rockfish. The commercial fishery targets larger and subsequently older fish and the survey should sample a larger range of ages. Ninety-five percent of dusky rockfish are selected survey by age 10. The age at 50% selection is 8.7 for the survey and 10.3 for the fishery.

The fully-selected fishing mortality time series indicates a rise in fishing mortality from late 1980's through the late 1990's and has been relatively stable from 2003-2022. Since 2003 fully-selected fishing mortality has ranged between 0.03 and 0.06 (Figure 23), and the exploitation rate has been generally around the long-term average. In 2012, the harvest exceeded TAC in the Western GOA. This occurred in all rockfish fisheries in response to a delayed closing of the fishery. Goodman et al. (2002) suggested that stock assessment authors use a "management path" graph as a way to evaluate management and assessment performance over time. In the management path we plot the ratio of fishing mortality to FOFL (F35%) and the estimated spawning biomass relative to B35%. Harvest control rules based on F35% and F40% and the Tier 3a adjustment are provided for reference. The historical management path for dusky rockfish has been above the FOFL adjusted limit in the early 1980s and early 1990s. In recent years, dusky rockfish have been above B40% and below F40% (Figure 24).

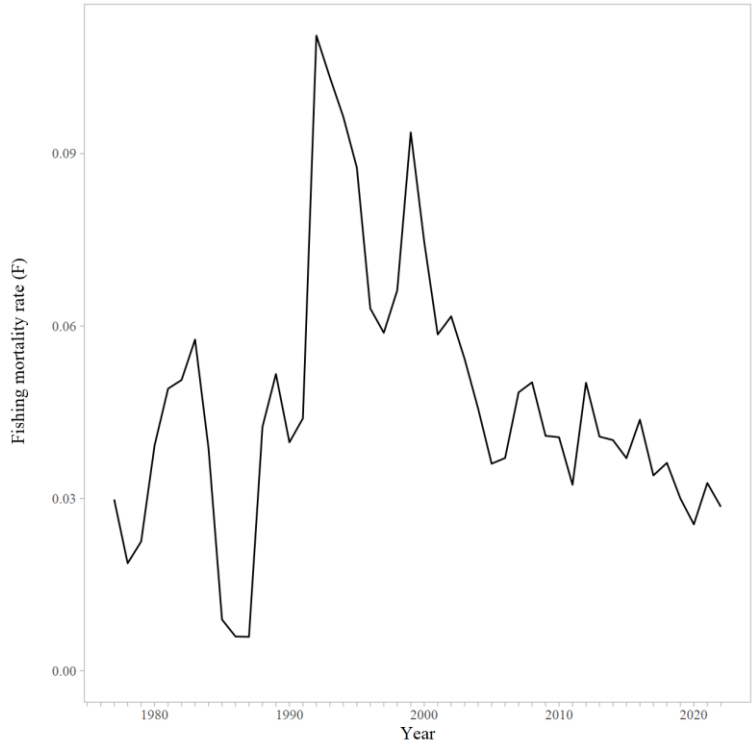


Figure 23: Time series of estimated fully selected fishing mortality for GOA dusky rockfish from the 2022 model. Source: Williams et al., 2022.

There is some lack of fit to the fishery size compositions for 1991-1999. This may be due to the increase in size of fish taken by the fishery in those years as mentioned in the Fishery data section. The fishery size composition fits from 2007+ are generally good. In general, the model fits the fishery age compositions well. Increasing the plus age group

to age-30 provides more resolution in the age composition data, while maintaining similar overall fits to the composition data. The strong year classes from 1992 and 1995 have largely moved into the plus age group. The 2018 age data suggest that there is a large pulse of age 11 fish (with ages 10 and 12 also high) observed in the compositional data and continues to be observed in the 2020 data.

The survey age compositions also track the 1992 year class well and try to fit the 1995 year class, which appeared consistently strong in surveys through 2013; in 2015 the model predicted a smaller proportion of fish to be in the plus age group than what was observed in the survey. Similar to the fishery age compositions, the survey age compositions show an increase in proportions of fish aged 11 and 12 in the 2019 and 2021 data.

Recruitment estimates show several above average events in the 1990s through early 2000s, and a large recruitment in 2014 (Figure 25). This high recruitment value has relatively high uncertainty, which is likely due to age composition data indicating higher proportions of ages 10-12 fish, instead of a single age class. In general, recruitment (age-4) is highly variable throughout the time series, particularly the most recent years, where typically very little information is known about the strength of incoming year classes. There also does not seem to be a clear spawner-recruit relationship for dusky rockfish as recruitment appears unrelated to spawning stock biomass. MCMC credible intervals for recruitment are fairly narrow in some years; however, the credible intervals nearly contain zero for many years which indicates considerable uncertainty, particularly for the most recent years (Figure 25).

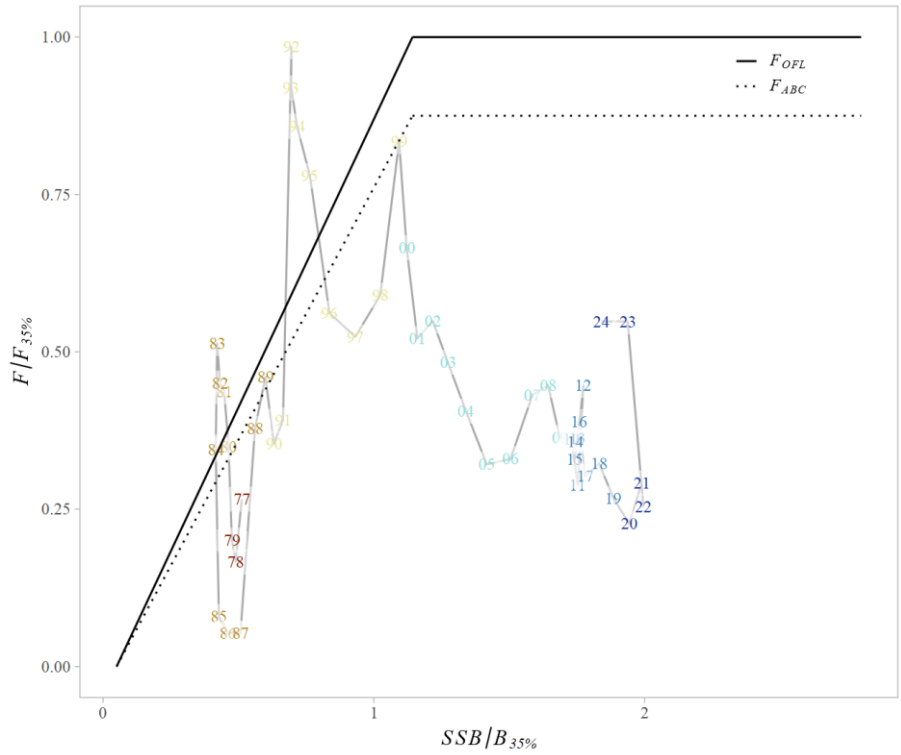


Figure 24: Time series of dusky rockfish estimated spawning biomass (SSB) relative to B_(35%) and fishing mortality (F) relative to F_(35%) for author recommended model. Source: Williams et al., 2022.

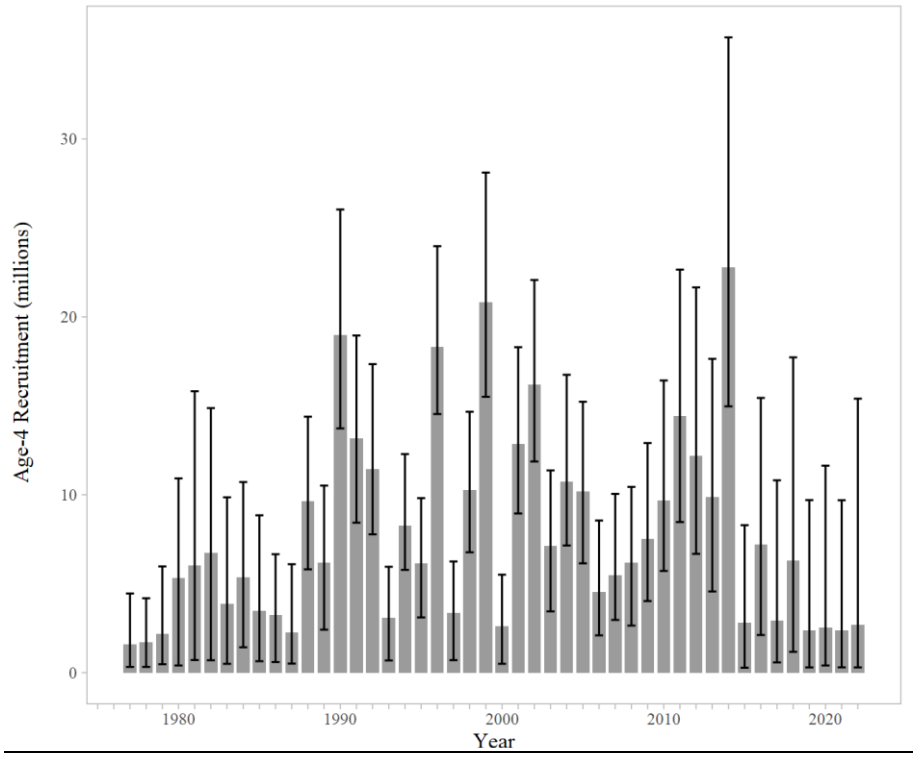


Figure 25: Estimates of age-4 recruitment with 95% credible intervals for GOA dusky rockfish. Source: Williams et al., 2022.

Amendment 56 to the GOA Groundfish Fishery Management Plan defines the "overfishing level" (OFL), the fishing mortality rate used to set OFL (FOFL), the maximum permissible ABC, and the fishing mortality rate used to set the maximum permissible ABC. The fishing mortality rate used to set ABC (FABC) may be less than this maximum permissible level, but not greater. Because reliable estimates of reference points related to maximum sustainable yield (MSY) are currently not available but reliable estimates of reference points related to spawning per recruit are available, dusky rockfish in the GOA are managed under Tier 3 of Amendment 56. Tier 3 uses the following reference points: B40%, equal to 40% of the equilibrium spawning biomass that would be obtained in the absence of fishing; F35%,,equal to the fishing mortality rate that reduces the equilibrium level of spawning per recruit to 35% of the level that would be obtained in the absence of fishing; and F40%, equal to the fishing mortality rate that reduces the equilibrium level of spawning per recruit to 40% of the level that would be obtained in the absence of fishing. Estimation of the B40% reference point requires an assumption regarding the equilibrium level of recruitment. In this assessment, it is assumed that the equilibrium level of recruitment is equal to the average of age-2 recruitments between 1979 and 2020. Because of uncertainty in very recent recruitment estimates, we lag 2 years behind model estimates in our projection. Other useful biomass reference points which can be calculated using this assumption are B100% and B35%, defined analogously to B40%. The 2022 estimates of these reference points are:

B100% = 65,565

B40% = 26,226

B35% = 22,948

F40% = 0.11

F35% = 0.09

Female spawning biomass for 2022 is estimated at 44,651 t. This is above the B40% value of 26,226 t. Under Amendment 56, Tier 3, the maximum permissible fishing mortality for ABC is F40% and fishing mortality for OFL is F35%.

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

For each scenario, the projections begin with the vector of 2022 numbers at age as estimated in the assessment. This vector is then projected forward to the beginning of 2023 using the schedules of natural mortality and selectivity described in the assessment and the best available estimate of total (year-end) catch for 2022. In each subsequent

year, the fishing mortality rate is prescribed on the basis of the spawning biomass in that year and the respective harvest scenario. In each year, recruitment is drawn from an inverse Gaussian distribution whose parameters consist of maximum likelihood estimates determined from recruitments estimated in the assessment. Spawning biomass is computed in each year based on the time of peak spawning and the maturity and weight schedules described in the assessment. Total catch after 2022 is assumed to equal the catch associated with the respective harvest scenario in all years. This projection scheme is run 1,000 times to obtain distributions of possible future stock sizes, fishing mortality rates, and catches.

Five of the seven standard scenarios will be used in an Environmental Assessment prepared in conjunction with the final SAFE. These five scenarios, which are designed to provide a range of harvest alternatives that are likely to bracket the final TAC for 2023, are as follow ("maxFABC" refers to the maximum permissible value of FABC under Amendment 56):

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

Scenario 2: In 2022 and 2023, F is set equal to a constant fraction of maxFABC, where this fraction is equal to the ratio of the realized catches in 2019-2021 to the ABC recommended in the assessment for each of those years. For the remainder of the future years, maximum permissible ABC is used. (Rationale: In many fisheries the ABC is routinely not fully utilized, so assuming an average ratio catch to ABC will yield more realistic projections.)

Scenario 3: In all future years, F is set equal to 50% of maxFABC. (Rationale: This scenario provides a likely lower bound on FABC that still allows future harvest rates to be adjusted downward when stocks fall below reference levels.)

Scenario 4: In all future years, F is set equal to the 2017-2021 average F. (Rationale: For some stocks, TAC can be well below ABC, and recent average F may provide a better indicator of FTAC than FABC)

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

Two other scenarios are needed to satisfy the MSFCMA's requirement to determine whether a stock is currently in an overfished condition or is approaching an overfished condition. These two scenarios are as follows (for Tier 3 stocks, the MSY level is defined as B35%):

Scenario 6: In all future years, F is set equal to FOFL. (Rationale: This scenario determines whether a stock is overfished. If the stock is expected to be 1) above its MSY level in 2022 or 2) above ½ of its MSY level in 2022 and above its MSY level in 2032 under this scenario, then the stock is not overfished.)

Scenario 7: In 2023 and 2024, F is set equal to maxFABC and in all subsequent years F is set equal to FOFL. (Rationale: This scenario determines whether a stock is approaching an overfished condition. If the stock is 1) above its MSY level in 2024 or 2) above 1/2 of its MSY level in 2024 and expected to be above its MSY level in 2034 under this scenario, then the stock is not approaching an overfished condition.)

Spawning biomass, fishing mortality, and yield are tabulated for the seven standard projection scenarios (Table 9). For projections in Scenario 2 (Author's F); we use pre-specified catches to increase accuracy of short-term projections in fisheries where the catch is usually less than the ABC.

Table 9: Set of projections of spawning biomass (SB) and yield for dusky rockfish in the Gulf of Alaska. Six harvest scenarios designed to satisfy the requirements of Amendment 56, NEPA, and MSFCMA. Source: Williams et al., 2022.

Year	Maximum permissible F	Author's F (Estimated catches)	Half max.1	5-year average F	No Fishing	Overfished	Approaching overfished
			Spawning biomass (mt)				
2022	45,051	45,051	45,051	45,051	45,051	45,051	45,051
2023	44,233	44,495	44,554	44,664	44,883	44,085	44,233
2024	40,869	42,581	42,967	43,693	45,190	39,939	40,869
2025	37,468	40,210	41,068	42,360	45,070	35,920	37,342
2026	34,217	36,639	39,037	40,836	44,664	32,205	33,436
2027	31,311	33,432	37,077	39,321	44,156	28,971	30,026
2028	28,933	30,777	35,362	38,024	43,749	26,383	27,278
2029	27,199	28,794	34,079	37,109	43,613	24,567	25,301
2030	26,123	27,485	33,234	36,651	43,847	23,572	24,140
2031	25,601	26,728	32,900	36,590	44,423	23,158	23,597
2032	25,433	26,355	32,830	36,803	45,244	23,080	23,419
2033	25,456	26,208	33,061	37,175	46,208	23,168	23,429
2034	25,570	26,181	33,327	37,624	47,235	23,323	23,523
2035	25,724	26,220	33,718	38,103	48,279	23,499	23,652
			Fishing mortality				
2022	0.029	0.029	0.029	0.029	0.029	0.029	0.029
2023	0.091	0.054	0.046	0.031		0.112	0.112
2024	0.091	0.052	0.046	0.031		0.112	0.112
2025	0.091	0.091	0.046	0.031		0.112	0.112
2026	0.091	0.091	0.046	0.031		0.112	0.112
2027	0.091	0.091	0.046	0.031		0.112	0.112
2028	0.091	0.091	0.046	0.031		0.111	0.111
2029	0.091	0.091	0.046	0.031		0.104	0.104
2030	0.089	0.091	0.046	0.031		0.100	0.100
2031	0.087	0.089	0.046	0.031		0.098	0.098
2032	0.086	0.088	0.046	0.031		0.097	0.097
2033	0.085	0.087	0.046	0.031		0.097	0.097
2034	0.085	0.087	0.046	0.031		0.098	0.098
2035	0.086	0.086	0.046	0.031		0.098	0.098
			Yield (mt)				
2022	2,644	2,644	2,644	2,644	2,644	2,644	2,644
2023	7,917	7,917	4,044	2,728		9,638	7,917
2024	7,262	7,520	3,873	2,650		8,668	7,262
2025	6,617	7,103	3,681	2,554		7,748	8,055
2026	5,992	6,418	3,474	2,443		6,885	7,150
2027	5,419	5,790	3,268	2,330		6,117	6,343
2028	4,950	5,272	3,094	2,232		5,463	5,693
2029	4,626	4,914	2,981	2,172		4,763	5,038
2030	4,365	4,698	2,938	2,157		4,425	4,633
2031	4,242	4,537	2,941	2,171		4,325	4,482
2032	4,211	4,452	2,963	2,198		4,335	4,453
2033	4,221	4,415	2,991	2,228		4,383	4,473
2034	4,249	4,404	3,020	2,258		4,441	4,509
2035	4,286	4,409	3,049	2,288		4,504	4,555

During the 2006 CIE review, it was suggested that projections should account for uncertainty in the entire assessment, not just recruitment from the endpoint of the assessment. We continue to present an alternative projection scenario using the uncertainty of the full assessment model harvesting at the same estimated yield ratio (0.67) as Scenario 2, except for all years instead of the next two. This projection propagates uncertainty throughout the entire assessment procedure and is based on an MCMC chain of 10 million. The projection shows wide credibility intervals on future spawning biomass. The B35% and B40% reference points are based on the 1981-2018 age-4 recruitments, and this projection predicts that the median spawning biomass will decrease quickly until average recruitment is attained.

The GOA dusky rockfish assessment appears to fit available data well, the 2021 GOA trawl survey was undertaken as planned and data are included in this year's assessment, and the fishery and environmental considerations appear to be within normal bounds. Williams et al. (2022) had some concerns about the estimated increase in biomass and resulting increase in ABC. The VAST-based abundance index has low uncertainty which may be driving the estimated increase in biomass and ABC. Additionally, there are unknown levels of skip spawning withing this population, the implications of which are not fully understood, though any increase in skip spawning reduces the spawning population, and therefore ABC estimate. Because GOA dusky rockfish ABC is not historically fully utilized and because there is some evidence of recruitment from age compositions, Williams et al. (2022) did not recommend a reduction in ABC in 2022.

3.5 Management strategy

The Council recommends harvest specifications, overfishing limits (OFLs), Acceptable Biological Catch (ABC) levels and total allowable catch (TAC) annually based on the Stock Assessment and Fishery Evaluation (SAFE) reports, consistent with the Science and Statistical Committee (SSC) recommendations. Additionally, the tier approach assigns groundfish stock to a tier according to available data and uncertainty associated with the fishery. The tier system

harvest control rules (HCRs) specify the maximum permissible ABC, and the OFL for each stock. As specified in the MSA, if stocks decline below the Minimum Stock Size Threshold (MSST), a rebuilding plan must be implemented to bring the biomass back to the BMSY level (biomass relative to maximum sustainable yield [MSY]) within a specified period.

3.6 Ecological impacts

Monitoring is carried out through the Observer Program operated by NMFS. The groundfish, Prohibited Species Catch (PSC), and non-target species catch composition for each fishery and area was updated for the most recent five full years. There have been no notable trends in any of this data over the past five years that would indicate fishery changes in need of further investigation.

3.6.1 Catch composition

The catch composition for landed and discarded associated species for the past five years was reviewed for both the BSAI and GOA (tables below), with target species in this fishery given in green, main associated species given in orange, minor associated species given in white, and species in the bottom 5% which need no further consideration in grey. The only major associated species is pollock, comprising 5.3% of the catch in the BSAI rockfish fishery. BSAI pollock is separately RFM certified and there are no issues with stock status, management or information. Catch composition has been relatively stable, with no notable trends to report.

Table 10. BSAI rockfish associated species catch from 2018 to 2022. Green indicates target species, yellow indicates main species, white indicates minor species and grey indicates species in the bottom 5% catch quantity which therefore need not further consideration. Quantities are given in metric tons.

Species	2018	2019	2020	2021	2022	5-year total	% of Total
POP	21,091	27,651	25,802	23,637	23,415	121,596	59.4%
Atka mackerel	5,513	8,734	8,527	6,846	6,173	35,793	17.5%
Northern rf	1,768	4,527	3,512	2,193	3,133	15,132	7.4%
Pollock	1,524	2,254	1,997	2,248	2,779	10,803	5.3%
P. cod	637	1,217	972	899	721	4,446	2.2%
Arrow fldr	257	465	579	672	708	2,681	1.3%
Kamchatka fldr	322	518	714	549	305	2,408	1.2%
Sablefish	147	286	370	475	707	1,985	1.0%
Rougheye rf	116	246	288	248	219	1,117	0.5%
Giant Grenadier	121	95	181	321	240	961	0.5%
Thornyhead rf	96	181	195	190	177	839	0.4%
Rex sole	87	156	140	159	244	785	0.4%
Shortraker rf	116	121	146	224	152	758	0.4%
Dusky rf	80	131	164	77	145	598	0.3%
Flathead sole	67	119	89	125	172	572	0.3%
Wht bltchd skate	71	166	143	90	75	545	0.3%

Species	2018	2019	2020	2021	2022	5-year total	% of Total
Turbot	53	119	165	115	91	543	0.3%
Sponge unidentified	77.81	96.75	92.48	72.86	53.41	393	0.2%
Misc fish	74.95	104.32	78.92	55.68	51.04	365	0.2%
Rock sole	36	67	61	49	59	272	0.1%
Sculpin				96.57	145.76	242	0.1%
Aleutian skate	26	45	63	63	44	240	0.1%
Squid		23.41	56.42	75.80	79.23	235	0.1%
Alaska skate	44	56	55	41	31	227	0.1%
Sculpin	48	52	54			154	0.1%
yellow irish lord	19	63	63			146	0.1%
Harlequin rf	20	29	45	16	32	142	0.1%
Bigmouth Sculpin	28	60	44			132	0.1%
Sea star	45.25	32.69	16.01	12.45	12.78	119	0.1%
Skate	24	26	21	21	24	116	0.1%

Table 11. BSAI Atka mackerel associated species catch from 2018 to 2022. Green indicates target species, and white indicates minor species, and grey indicates species in the bottom 5% catch quantity which therefore need no further consideration. Quantities are given in metric tons

Species	2018	2019	2020	2021	2022	5-Year total	% of Total
Atka mackerel	64,070	48,250	49,660	53,740	51,475	267,196	74.8%
POP	9,140	6,871	6,977	7,816	8,519	39,323	11.0%
Northern rf	3,865	4,361	4,682	3,858	4,502	21,268	6.0%
P. cod	3,361	2,226	2,201	1,965	2,486	12,239	3.4%
Pollock	910	589	521	457	1,453	3,931	1.1%
Wht bltchd skate	658	375	370	272	286	1,960	0.5%
Dusky rf	498	241	260	301	328	1,629	0.5%
Kamchatka fldr	442	429	188	251	228	1,537	0.4%
Arrow fldr	353	98	181	225	229	1,086	0.3%
Sculpin				328	376	705	0.2%
yellow irish lord	230	226	194			650	0.2%
Misc fish	177	115	119	118	111	641	0.2%
Sponge unidentified	153	173	110	81	80	599	0.2%
Sablefish	28	49	19	241	221	558	0.2%
Rougheye rf	83	54	51	144	133	465	0.1%
Rock sole	105	77	67	65	101	414	0.1%
Alaska skate	132	72	66	77	47	393	0.1%
Giant Grenadier	64	106	68	88	36	365	0.1%
Turbot	79	76	98	57	24	335	0.1%

Harlequin rf	75	65	53	54	64	311	0.1%
Sculpin	101	42	56			199	0.1%

Table 12. GOA rockfish associated species catch from 2018 to 2022. Green indicates target species, and white indicates minor species, and grey indicates species in the bottom 5% catch quantity which therefore need no further consideration Quantities are given in metric tons.

Species	2018	2019	2020	2021	2022	5-year total	% of total
POP	22,172	22,258	22,881	27,399	26,358	121,068	66.5%
Dusky rf	2,691	2,151	2,061	2,669	2,483	12,055	6.6%
Northern rf	2,152	2,313	2,317	2,303	1,813	10,897	6.0%
Arrow fldr	761	733	890	2,523	2,823	7,730	4.2%
Pollock	917	686	647	1,559	1,588	5,397	3.0%
Atka mackerel	1,140	824	602	674	867	4,107	2.3%
Sablefish	708	801	646	893	995	4,043	2.2%
Giant Grenadier	1,690.59	815.99	301.74	252.11	197.39	3,258	1.8%
P. cod	401	322	170	660	670	2,222	1.2%
Harlequin rf	549	340	223	387	335	1,833	1.0%
Misc fish	154.25	764.22	87.03	164.01	86.83	1,256	0.7%
Shortraker rf	269	269	225	240	181	1,185	0.7%
Rougheye rf	317	320	89	162	221	1,109	0.6%
Thornyhead rf	362	177	138	113	215	1,004	0.6%
Redstripe rf	160	117	83	166	230	756	0.4%
Rex sole	136	117	189	99	132	672	0.4%
Sharpchin rf	162	67	65	118	51	463	0.3%
Flathead sole	48	40	95	135	74	393	0.2%
Yelloweye rf	93	90	55	75	61	374	0.2%
Silvergray rf	22	63	29	142	88	344	0.2%
Widow rf	26	28	54	62	90	260	0.1%
State-managed Rockfish	52.88	46.43	53.11	12.35	33.26	198	0.1%
Longnose skate	46	28	24	31	31	160	0.1%
Rock sole	48	33	19	28	19	145	0.1%
Dover sole	42	38	15	18	30	144	0.1%
Spiny dogfish	39	53	13	18	11	134	0.1%
Squid		10.87	31.80	27.77	43.36	114	0.1%
Redbanded rf	31	14	17	18	17	97	0.1%

Catches of Prohibited Species (PSC; species that must be discarded if caught) were also reviewed for both the BSAI and GOA fisheries. Decreased bycatch of PSC crabs and salmon in the Bering Sea and Aleutian islands reflects the decreasing stock abundances of these species groups. These declines prompted a complete closure of the Red King Crab and snow crab fisheries in the Bering Sea, as well as disaster relief responses in coastal western Alaska, where chinook and other salmon runs have been experiencing unprecedented declines (NOAA Fisheries 2022).

Table 13. Catches of crab and salmon species in the BSAI rockfish trawl fishery from 2018-2022. Units are numbers of individuals.

Prohibited Species (Numbers)	2018	2019	2020	2021	2022
Blue King Crab	0				
Bairdi Tanner Crab	844	616	251	7,660	704

Chinook	274	1,037	173	395	208
Golden King Crab	4,951	6,298	3,656	3,301	3,325
non-Chinook	764	1,281	406	775	950
Opilio Tanner Crab	14,541	715	97	2,313	142
Red King Crab	477	327	63	206	

Table 14. Catches of crab and salmon species in the BSAI Atka mackerel trawl fishery from 2018-2022. Units are numbers of individuals.

PSC Species (Numbers)	2018	2019	2020	2021	2022
Golden King Crab	7,074	14,236	2,107	4,012	1,728
non-Chinook	1,507	3,640	1,194	1,511	1,255
Red King Crab	239	149	131	5	
Chinook	652	532	680	354	1,192
Bairdi Tanner Crab					
Opilio Tanner Crab		40	9		

Table 15. Catches of crab and salmon species in the GOA rockfish trawl fishery from 2018-2022. Units are numbers of individuals.

PSC Species (Numbers)	2018	2019	2020	2021	2022
Bairdi Tanner Crab	322	67	1,146	2,279	191
Chinook salmon	336	410	655	1,042	1,137
Golden King Crab	324	223	60	114	136
non-Chinook salmon	326	380	723	1,628	4,002
Opilio Tanner crab					
Red King crab	0			0	

PSC species generally do not meet the definition of ETP, but they should be avoided by the groundfish fisheries, must be discarded, and in many cases, there are limits on their permissible catch. None of these species rise to the level of "main" associated species.

3.6.2 ETP species

The ESA (United States 1983), signed in 1973, provides for the conservation of species that are endangered or threatened and the conservation of the ecosystems on which they depend. NOAA has jurisdiction over endangered and threatened marine species and works with the U.S. Fish and Wildlife Service (USFWS) to manage ESA-listed species. Generally, NOAA manages marine species, while USFWS manages land and freshwater species.

Section 4(f) of the ESA directs NOAA's National Marine Fisheries Service (NMFS) to develop and implement recovery plans for threatened and endangered species. NMFS Office of Law Enforcement works with the U.S. Coast Guard and other partners to enforce and prosecute ESA violations (NOAA).

Recovery plans for ESA-listed species must include: (1) a description of site-specific management actions necessary to conserve the species or populations; (2) objective, measurable criteria which, when met, will allow the species or populations to be removed from the endangered and threatened species list; and (3) estimates of the time and funding required to achieve the plan's goals. Each ESA-listed species has a recovery plan, and regular updates on progress toward recovery.

When a species is listed as endangered it is illegal to "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. However, Section 10 of the ESA allows NOAA Fisheries Service to issue permits for incidental take (Incidental Take Statements; ITS), with the requirement of a conservation plan to minimize and mitigate impacts to the affected species.

Section 7(a)(2) of the ESA requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a federal agency may affect species listed as threatened or endangered, that agency is required to consult with either NOAA's National Marine Fisheries Service (NMFS) or the USFWS, depending upon the species that may be affected. In instances where NMFS or USFWS are themselves proposing an action that may affect listed species, the agency must conduct intra-service consultation.

The product of a formal consultation is a biological opinion (BiOp) that determines if the action is likely to jeopardize the continued existence of any ESA-listed species or result in the destruction of adverse modification of critical habitat. If an opinion determines that the proposed action is likely to jeopardize listed species or destroy of adversely modify critical habitat, it must include a "reasonable and prudent alternative (RPA)" that avoids the likelihood of jeopardy or adverse modification or otherwise indicate that to the best of the agency's knowledge, there are no RPAs. If the analysis concludes with a determination that the proposed action is not likely to jeopardize a listed species or destroy or adversely critical habitat and incidental take of listed species is reasonably certain to occur, then the biological opinion includes an incidental take statement (ITS) with the anticipated level of take of the listed species and "reasonable and prudent measures (RPM)" to avoid and minimize the take.

As for ETP species, there are six marine mammals on the MMPA List of Fisheries known to interact with these UoAs: Bearded seal (Alaska), Killer whale (eastern North Pacific Alaska resident), Killer whale (GOA, AI, and BS transient), Ribbon seal (Alaska), and Steller sea lion (western US stock). In addition, there are two ETP seabird species protected by ACAP: Laysan albatross, short-tailed albatross, and Leach's storm petrel.

Bearded seal[4]

The most recent MOAA stock assessment report for bearded seal is from 2021 (Muto et al 2021). Bearded seals are listed as threatened under the Endangered Species Act (ESA) and thus designated depleted under the MMPA and listed as "strategic." The best estimate of total human caused mortality and serious injury in the portion of the stock in US waters is 6,709 which is less than the negatively biased PBR of 8,210. The minimum estimated mean annual rate of US commercial fishery-related mortality and serious injury is 1.8 seals and therefore can be considered insignificant and approaching zero mortality and serious injury rate. The primary threat to this population is a lack of sea ice cover due to climate change. In addition, the majority of mortalities is due to hunting in native Alaska communities, with a statewide total from last count (in 2015) of 6,707 individuals. There are no recorded interactions with any of the fisheries in the present assessment.

Killer whale (eastern North Pacific Alaska resident)[5]

The minimum estimated mean annual level of human-caused mortality and serious injury for Alaska Resident killer whales between 2016 and 2020 is 1.3 killer whales: 1.1 in commercial fisheries and 0.2 in unknown (commercial, recreational, or subsistence) fisheries. Potential threats most likely to result in direct human-caused mortality or serious injury of this stock include oil spills, vessel strikes, and interactions with fisheries. Between 2016 and 2020, mortality and serious injury of killer whales occurred in two of the federally-regulated U.S. commercial fisheries that are monitored for incidental mortality and serious injury of marine mammals by fishery observers: the Bering Sea/Aleutian Islands flatfish trawl (two individuals) and Bering Sea/Aleutian Islands Pacific cod longline fisheries (one individual; Table 2; Breiwick 2013; MML, unpubl. data). Resident killer whales are known to depredate longline fisheries for cod and sablefish and increasingly to follow catcher-processor boats such as for flatfish, actively feeding on waste from at-sea processing. This activity accounts for one of the two mortalities in the flatfish trawl fishery due to propellor strike rather than direct capture.

The Eastern North Pacific Alaska Resident stock of killer whales is not designated as depleted under the MMPA or listed as threatened or endangered under the Endangered Species Act. The minimum abundance estimate for the Alaska Resident stock is likely underestimated because researchers continue to encounter new whales in the Gulf of Alaska and in western Alaska waters. Because the population estimate is likely to be conservative, the PBR is also conservative.

Based on currently available data, a minimum estimate of the mean annual mortality and serious injury rate due to U.S. commercial fisheries (1.1 killer whales) is less than 10% of the PBR (10% of PBR = 1.9) and, therefore, is considered to be insignificant and approaching a zero mortality and serious injury rate. A minimum estimate of the total annual level of human-caused mortality and serious injury (1.3 killer whales) is not known to exceed the PBR (19). Therefore, the Eastern North Pacific Alaska Resident stock of killer whales is not classified as a strategic stock.

[4] https://media.fisheries.noaa.gov/2021-08/BEARDED-SEAL-Erignathus-barbatus-nauticus-Beringia-Stock.pdf
[5] https://www.fisheries.noaa.gov/s3/2023-08/Killer-Whale-AK-Resident-2022.pdf

Killer Whale (GOA, AI, and BS transient)[6]

The minimum estimated mean annual level of human-caused mortality and serious injury for Gulf of Alaska, Aleutian Islands, and Bering Sea Transient killer whales between 2014 and 2018 is 0.8 killer whales in U.S. commercial fisheries. Potential threats most likely to result in direct human-caused mortality or serious injury of this stock include oil spills, vessel strikes, and interactions with fisheries. Two of the federally-regulated U.S. commercial fisheries, monitored for incidental mortality and serious injury of marine mammals by fishery observers, incurred serious injury and mortality of killer whales of unknown stock between 2014 and 2018: the Bering Sea/Aleutian Islands flatfish trawl and Bering Sea/Aleutian Islands Greenland turbot longline fisheries (Table 1; Breiwick 2013; MML, unpubl. data). A minimum estimate of the mean annual mortality and serious injury rate incidental to U.S. commercial fisheries between 2014 and 2018 is 0.8 Gulf of Alaska, Aleutian Islands, and Bering Sea Transient killer whales, based on observer data (0.6) and stranding data (0.2). It is less likely that transient killer whales are involved in fishery interactions due to depredation because transient killer whales are known to be mammal eaters rather than fish eaters.

The Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock of killer whales is not designated as depleted under the MMPA or listed as threatened or endangered under the Endangered Species Act. Based on currently available data, a minimum estimate of the mean annual mortality and serious injury rate due to U.S. commercial fisheries (0.8 whales) is greater than 10% of the PBR (10% of PBR = 0.6) and, therefore, cannot be considered to be insignificant and approaching a zero mortality and serious injury rate. A minimum estimate of the total annual level of human-caused mortality and serious injury (0.8 whales) is less than the PBR (5.9). Therefore, the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock of killer whales is not classified as a strategic stock.

Ribbon seal (Alaska)[7]

The minimum estimated mean annual level of human-caused mortality and serious injury for the portion of the ribbon seal stock in U.S. waters between 2014 and 2018 is 163 seals: 0.9 in U.S. commercial fisheries and 162 in the Alaska Native subsistence harvest (average statewide harvest, including struck and lost animals, in 2015, based on a recently published analysis (Nelson et al. 2019) that is higher and likely more accurate than previous estimates but also revealed stable or decreasing trends in harvest numbers; see below). Additional potential threats most likely to result in direct human-caused mortality or serious injury of this stock include the increased potential for oil spills due to an increase in vessel traffic in Alaska waters (with changes in sea-ice coverage).

Between 2014 and 2018, incidental mortality and serious injury of ribbon seals in U.S. waters occurred in four of the federally-managed U.S. commercial fisheries in Alaska monitored for incidental mortality and serious injury by fisheries observers: the Bering Sea/Aleutian Islands flatfish trawl, Bering Sea/Aleutian Islands pollock trawl, Bering Sea/Aleutian Islands Pacific cod trawl, and Bering Sea/Aleutian Islands rockfish trawl fisheries (Table 1; Breiwick 2013; MML, unpubl. data). For the present fishery, the BSAI rockfish UoA is responsible for one recorded mortality in 2014. The minimum estimated mean annual mortality and serious injury rate incidental to U.S. commercial fisheries between 2014 and 2018 is 0.9 ribbon seals, based exclusively on observer data.

Ribbon seals are not designated as depleted under the Marine Mammal Protection Act (MMPA) or listed as threatened or endangered under the Endangered Species Act (ESA). NMFS completed a comprehensive status review of ribbon seals under the ESA in 2013 (Boveng et al. 2013) and concluded that listing ribbon seals was not warranted at that time (78 FR 41371, 10 July 2013). The ribbon seal stock is not considered a strategic stock. The best estimate of the mean annual level of human-caused mortality and serious injury in the portion of the stock in U.S. waters is 163 ribbon seals, which is less than the PBR (9,785 seals). The minimum estimated mean annual rate of U.S. commercial fishery-related mortality and serious injury (0.9 seals) is less than 10% of the PBR (10% of PBR = 979) and, therefore, can be considered insignificant and approaching a zero mortality and serious injury rate.

Steller sea lion (western US stock; Muto et. al. 2021)[8]

The minimum estimated mean annual level of human-caused mortality and serious injury for Western U.S. Steller sea lions between 2014 and 2018 is 254 sea lions: 37 in U.S. commercial fisheries, 0.8 in unknown (commercial, recreational, or subsistence) fisheries, 3.6 in marine debris, 3.6 due to other causes (illegal shooting, mortality incidental to Marine Mammal Protection Act (MMPA)-authorized research), and 209 in the Alaska Native subsistence harvest. No observers have been assigned to several fisheries that are known to interact with this stock and estimates of entanglement in fishing gear and marine debris based solely on stranding reports in areas west of 144°W longitude may underestimate the entanglement of Western stock animals that travel to parts of Southeast Alaska.

[6] https://media.fisheries.noaa.gov/2021-08/KILLER-WHALE-Orcinus-orca-Eastern-North-Pacific-Gulf-of-Alaska-Aleutian-Islands-and-Bering-Sea-Transient-Stock.pdf
[7] https://www.fisheries.noaa.gov/s3/2021-08/RIBBON-SEAL-Histriophoca-fasciata-.pdf
[8] https://www.fisheries.noaa.gov/s3/2023-06/STELLERSEALIONEumetopiasjubatusWesternU.S.Stock-.pdf

Based on historical reports and their geographic range, Steller sea lion mortality and serious injury could occur in several fishing gear types, including trawl, gillnet, longline, and troll fisheries. However, observer data are limited. Of these fisheries, only trawl fisheries are regularly observed and gillnet fisheries have had limited observations in select areas over short time frames and with modest observer coverage. Consequently, there are little to no data on Steller sea lion mortality and serious injury in non-trawl fisheries. Therefore, the potential for fisheries-caused mortality and serious injury may be greater than is reflected in existing observer data.

Between 2014 and 2018, mortality and serious injury of Western Steller sea lions was observed in 10 of the federally-managed commercial fisheries in Alaska that are monitored for incidental mortality and serious injury by fisheries observers: Bering Sea/Aleutian Islands Atka mackerel trawl (six individuals in 2017 and 2018), Bering Sea/Aleutian Islands flatfish trawl, Bering Sea/Aleutian Islands Pacific cod trawl, Bering Sea/Aleutian Islands pollock trawl, Bering Sea/Aleutian Islands Pacific cod longline, Gulf of Alaska Pacific cod trawl, Gulf of Alaska Pacific cod longline, Gulf of Alaska flatfish trawl, Gulf of Alaska rockfish trawl (one in 2015), and Gulf of Alaska pollock trawl fisheries, resulting in a mean annual mortality and serious injury rate of 22 sea lions (Table 3; Breiwick 2013; MML, unpubl. data). The minimum estimated mean annual mortality and serious injury rate in U.S. commercial fisheries between 2014 and 2018 is 37 Steller sea lions from this stock (37 from observer data + 0.4 from stranding data) (Tables 3 and 4). No observers have been assigned to several fisheries that are known to interact with this stock, thus, the estimated mortality and serious injury is likely an underestimate of the actual level.

The minimum estimated mean annual U.S. commercial fishery-related mortality and serious injury rate (37 sea lions) is more than 10% of the PBR (10% of PBR = 32) and, therefore, cannot be considered insignificant and approaching a zero mortality and serious injury rate. Based on available data, the minimum estimated mean annual level of human-caused mortality and serious injury (254 sea lions) is below the PBR level (318) for this stock. The Western U.S. stock of Steller sea lions is currently listed as endangered under the ESA and, therefore, designated as depleted under the MMPA. As a result, the stock is classified as a strategic stock.

Seabirds

There are several ESA listed seabirds, and the ACAP listed Laysan albatross, which can potentially interact with the UoA fisheries. These are: the endangered short-tailed albatross (*Phoebastria albatrus*), the threatened spectacled eider (*Somateria fischeri*), and the threatened Alaska-breeding population of Steller's eider (*Polysticta stelleri*). Two other populations of Steller's eider occur in waters off Alaska but only the Alaska-breeding population is listed under the ESA.

The March 8, 2021 USFWS Biological Opinion (2021 USFWS) for Alaskan groundfish fisheries provides incidental take statements for ESA-listed seabirds:

- The reported take should not exceed six short-tailed albatrosses in a 2-year period.
- The reported take should not exceed 25 spectacled eiders in a floating 4-year period.
- The reported take should not exceed three Steller's eiders in a floating 4-year period.

These three incidental take statements for ESA-listed seabirds have not been exceeded by all groundfish fisheries at the time of publication of the NMFS seabird report (April 2024) and there were no reported takes of ESA-listed threatened spectacled eider (*Somateria fischeri*) or threatened Alaska-breeding population of Steller's eider (*Polysticta stelleri*) in 2023 (NMFS 2024).

Table 16 shows the observed mortalities with seabirds in all trawl (pelagic and demersal) fisheries in all waters off Alaska from 2011 to 2020. In this sector, the largest number of interactions are with shearwaters and fulmars, neither of which are threatened, endangered or otherwise of conservation concern. No black footed or short-tailed albatrosses have been encountered in the past 10 years, whereas there have been 91 Laysan albatross interactions since 2018 (80 of them in 2018). Table 13 in Krieger and Eich (2021) breaks this down by groundfish fishery, and shows, of the UoA fisheries, only the BSAI rockfish UoA has catches of Laysan albatrosses—80 in 2018 and none in any other year.

Table 16. Estimated seabird bycatch for Alaska groundfish fisheries using pelagic and non-pelagic trawl gear combined, all fishery management plan areas combined, 2011 to 2020 (this includes all UoA areas of the Bering Sea, Aleutian Islands, and Gulf of Alaska). Source: Krieger and Eich (2021).

Species/ Species Group	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Ann Avg.
Laysan Albatross	0	0	0	0	0	0	0	80	3	8	9
Black-footed Albatross	0	60	0	0	0	0	0	0	0	0	6
Northern Fulmars	329	297	463	85	463	307	372	418	306	391	343
Shearwaters	3	56	1	72	62	238	928	132	1,781	1	327
Storm Petrels	0	0	0	0	0	0	0	177	0	0	18
Gulls	1	0	3	0	0	3	0	1	0	0	1
Kittiwakes	0	0	0	0	0	0	0	0	13	3	2
Murres	14	0	3	47	0	45	1	0	0	0	11
Auklets	0	0	4	66	0	0	0	102	0	0	17
Cormorants	0	0	0	0	3	0	0	0	0	0	0
Other Alcids	0	0	0	0	0	0	0	0	6	0	1
Other Birds	0	0	0	0	0	0	63	0	0	0	6
Unidentified Birds	0	0	0	0	6	6	0	0	3	0	2
Grand Total	347	413	474	270	534	599	1,364	910	2,112	403	743

Short-tailed albatross

Short-tailed albatross is listed as vulnerable on the IUCN red list, owing to its very small breeding range and relatively small breeding population size at 1,734 individuals (Birdlife International 2023b; ACAP 2017). The population trend is increasing, determined with high confidence (ACAP 2017).

Historical declines were driven by exploitation, the species being targeted primarily for its feathers, but also eggs and oil (ACAP 2009). Today, the main threat is posed by commercial fisheries. The species' distribution overlaps with fisheries that occur in the shallower waters along continental shelf break and slope regions off the coasts of Alaska and British Columbia (Guy *et al*. 2013). The species is also known to be killed in U.S. and Russian longline fisheries for Pacific Cod *Gadus microcephalus* and halibut. Since 1983, a total of 15 birds have been reported killed by fishing gear (USFWS 2012), but it is widely considered that the actual mortality from bycatch is considerably higher (USFWS 2008, COSEWIC 2013). However, there have been no reports of this species being taken in any of the UoA fisheries in this assessment in recent history.

Laysan albatross (*Phoebastra immutabilis*)

Laysan albatross is an ETP species because it is listed on ACAP, however it is not ESA listed, and it's IUCN status is near-threatened, owing to the difficulty in predicting long-term population trends for long-lived bird species, although the population has rebounded from declines in the late 1990s and early 2000s. The population is currently estimated at 1,600,000 mature individuals globally (Birdlife International 2024). The only UoA in the present assessment with recorded interactions with this bird is the BSAI rockfish fishery, with 80 interactions in 2018, and none in the years prior or since.

Seabird Mitigation Measure Research

AFSC staff are coordinating with the National Seabird Program to implement a proof-of-concept trial to determine if UV-phased lighting could be a deterrent to procellarid (albatross, fulmar, and shearwater) interactions with vessels. This technology has been tested on airport runways with success. If the technology works on seabirds it could have wide application to reducing seabird mortalities and a follow-up collaborative study would be implemented.

3.6.3 Habitat and ecosystems

Habitat in the EBS, AI and GOA has been mapped at a scale of 5 km^2 grids, and while this level is likely under sampling habitat, the data provide an estimated probability of occurrence of predominant habitat types on the seafloor (Figure 27). Figure 27, Figure 28, and Figure 29 show the percentage of area within each grid cell that has been disturbed (2003-2017) for BS, AI, and GOA, respectively. Figure 26 shows a high occurrence of mud and sand and lesser amounts of gravel, cobble, and boulders.

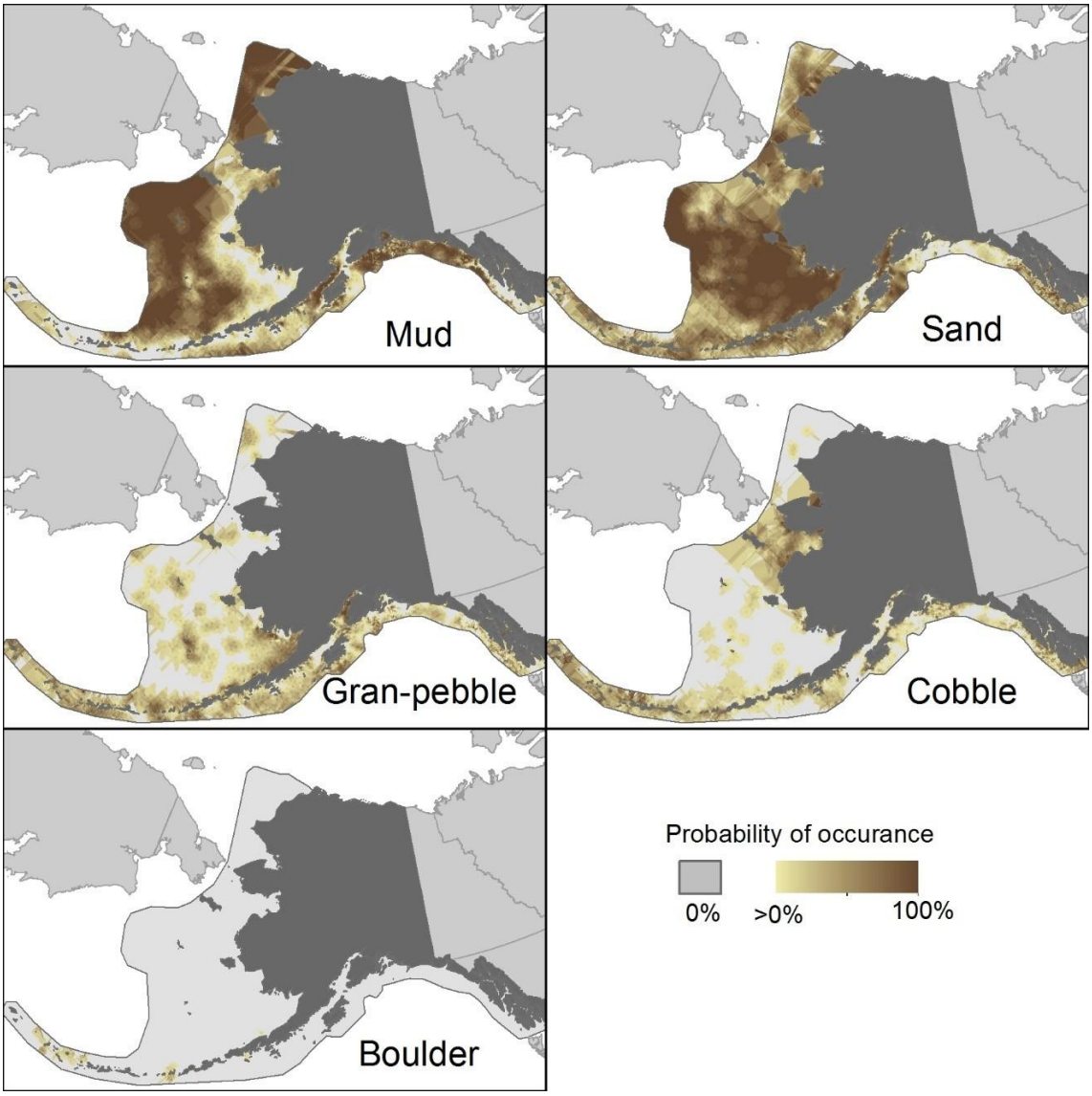


Figure 26. Habitat maps showing the probability of occurrence of the predominant habitat types in the BSAI and GOA. Source: NOAA

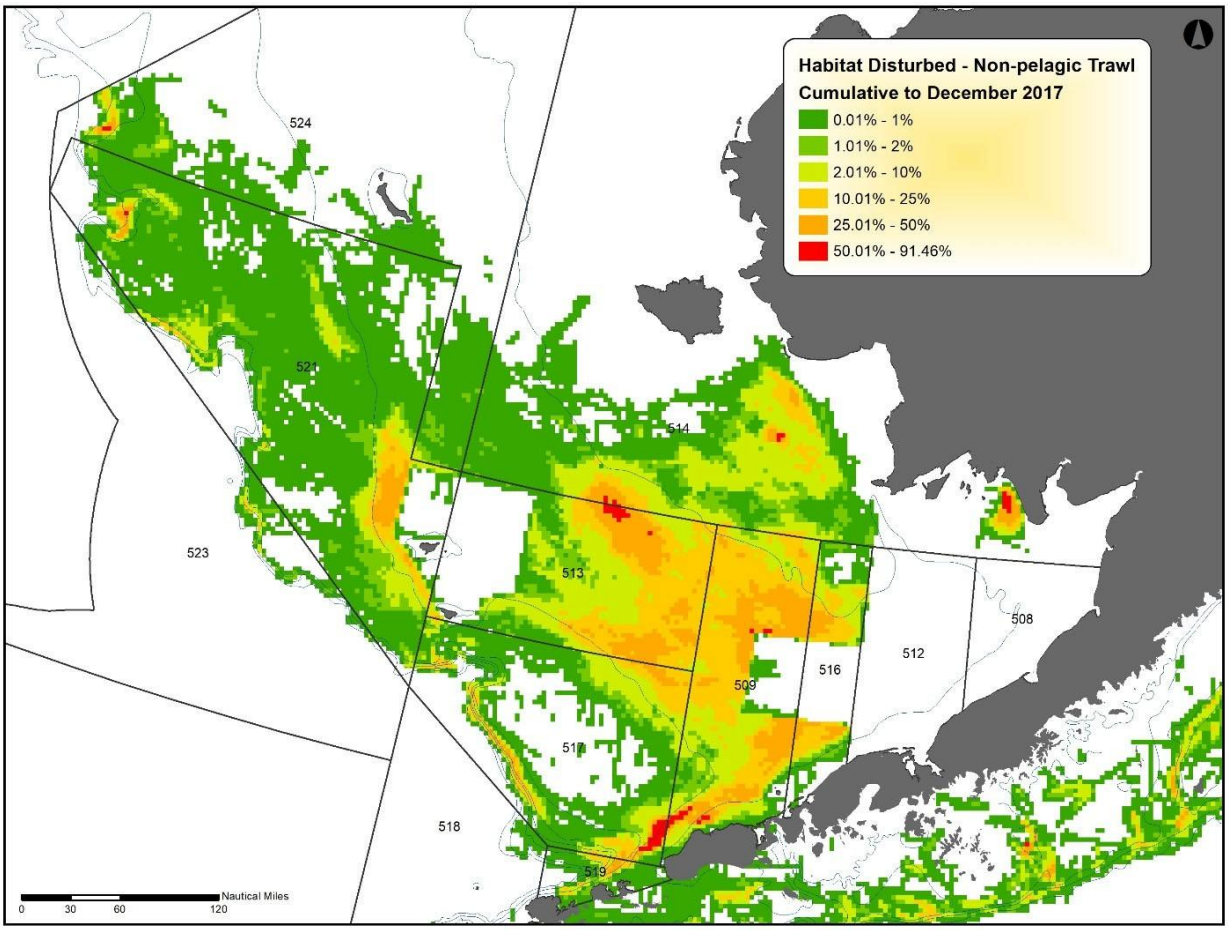


Figure 27. Percentage of area disturbed, 2003-2017, by bottom trawl gear in the BS. Effects are cumulative and consider impact on and recovery of relevant features. Source: NOAA

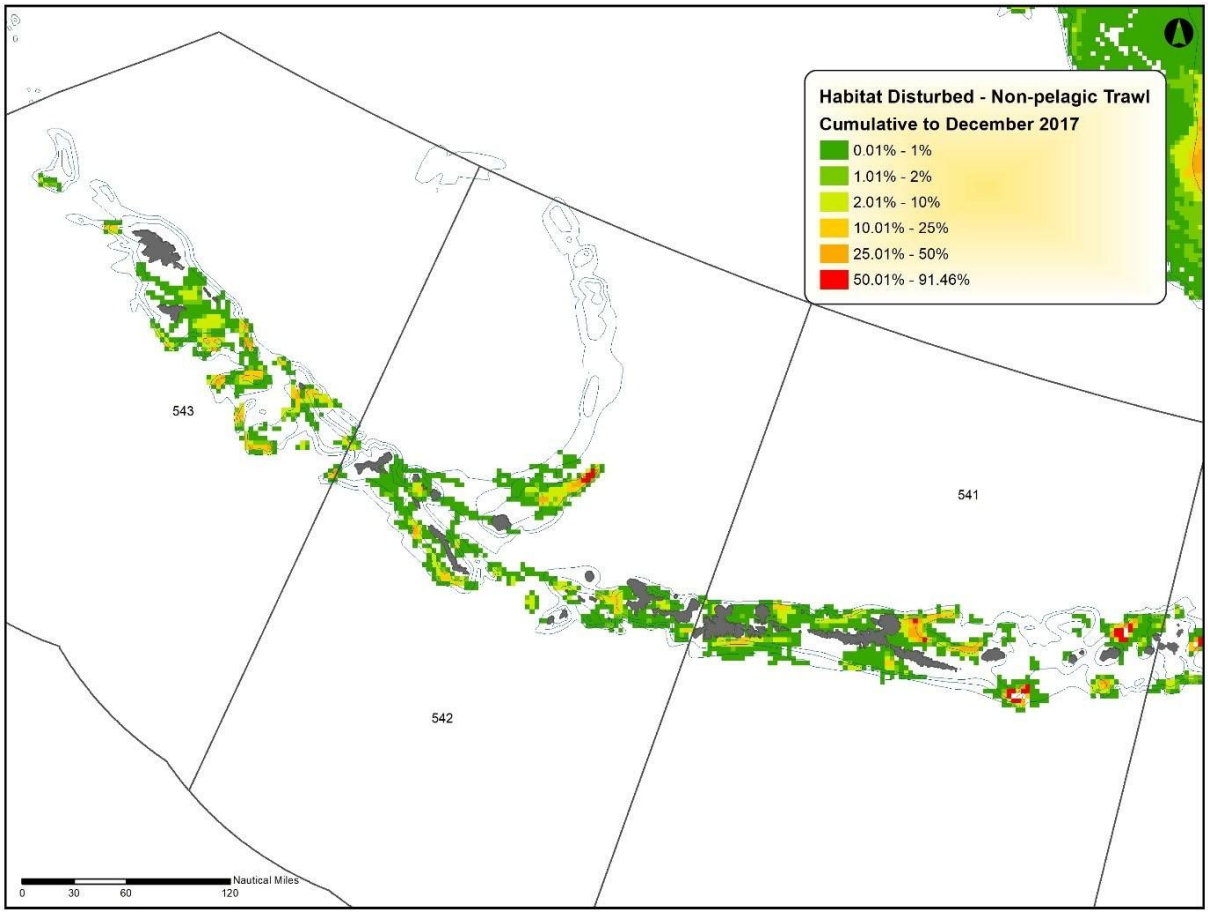


Figure 28. Percentage of area disturbed, 2003-2017, by bottom trawl gear in the AI. Effects are cumulative and consider impact on and recovery of relevant features. Source: NOAA

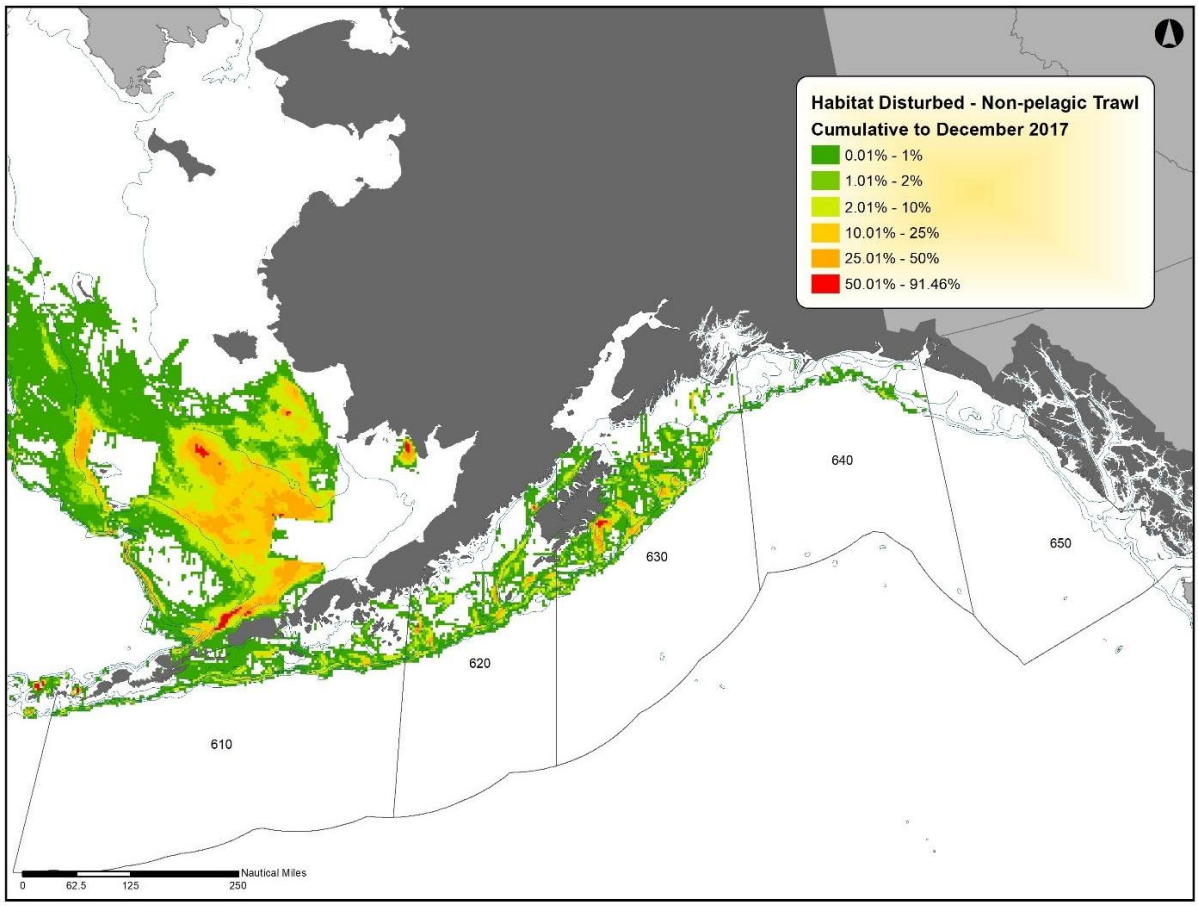


Figure 29. Percentage of area disturbed, 2003-2017, by bottom trawl gear in the GOA. Effects are cumulative and consider impact on and recovery of relevant features. Source: NOAA

During the NPFMC February 2023 meeting, The Council reviewed the summary report of a 5-year review of essential fish habitat (EFH) components of the Council's FMPs and initiated an analysis at this meeting to update the Council's BSAI Groundfish, GOA Groundfish, BSAI King and Tanner Crab, Salmon, and Arctic FMPs' descriptions and maps of Essential Fish Habitat (EFH). The Council elected not to initiate additional habitat-specific processes at this time (NPFMC 2023).

The Council adopts mitigation measures directed at the adverse impacts of fishing on groundfish EFH. The process of designating EFH and, within EFH, HAPCs, is an appropriate mechanism allowing the establishment of "outcome indicators" consistent with achieving management objectives for avoiding, minimizing or mitigating impacts on essential habitats and those highly vulnerable to damage by fishing gear. The principal management measure among these are closed areas to protect sensitive habitats (Figure 29).

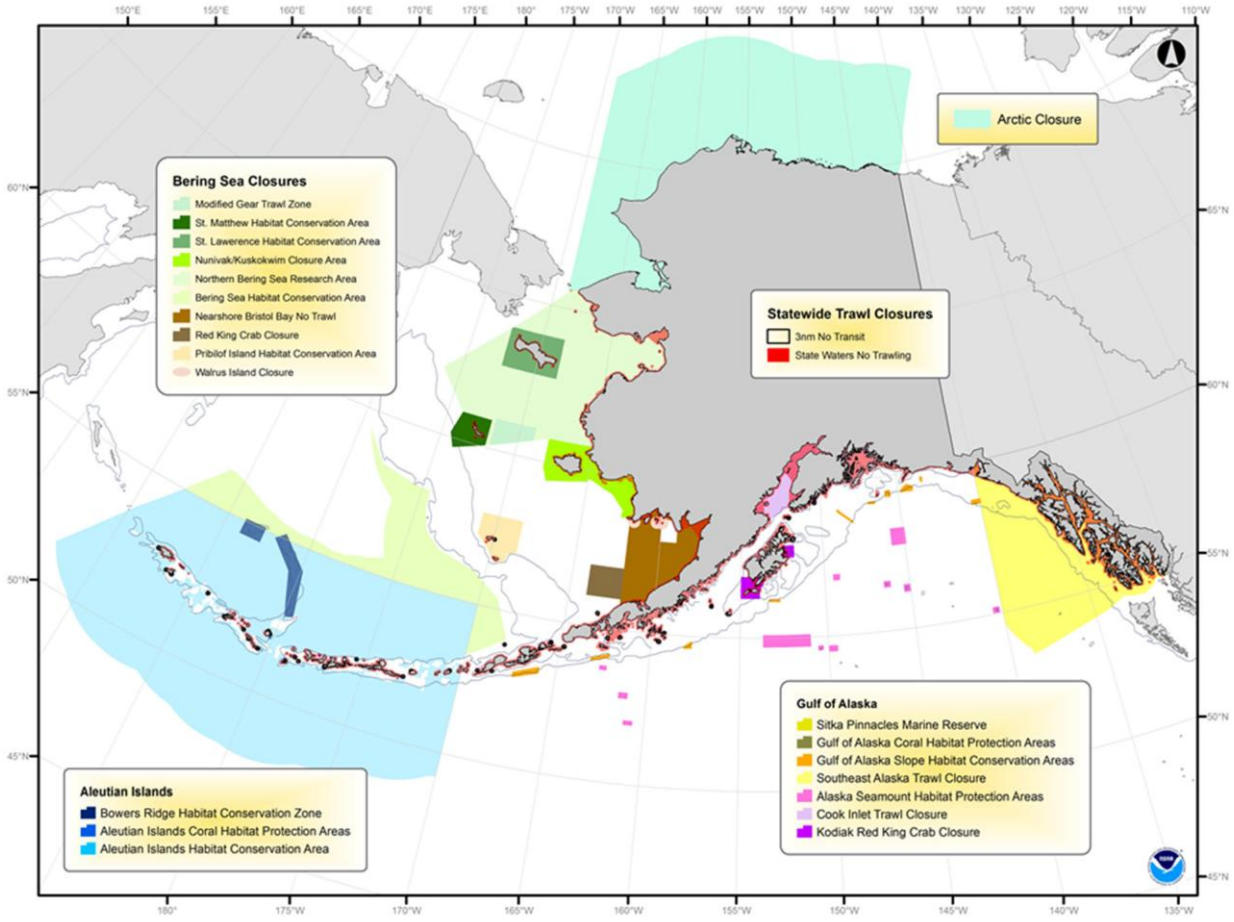


Figure 30. Area closures within the BSAI and GOA. Source: NOAA Fisheries.

The BSAI and GOA groundfish fishery management policies shared by the AK Regional Office (AKRO) and the Council have incorporated ecosystem considerations into a broad ecosystem view of the fisheries. Groundfish FMPs are based on ecosystem principles reflected in policy goals and objectives. These policy goals and objectives were unchanged from 1981 through 2004. In 2005, through the 2004 Alaska Groundfish Programmatic Supplemental Environmental Impact Statement (Alaska Groundfish PSEIS) (NMFS 2004), the management approach and objectives for BSAI and GOA groundfish fisheries were updated. This update included measures to accelerate a precautionary, adaptive management approach through community or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and as appropriate and practicable, increase habitat protection and bycatch constraints. The AKRO and the Council use the management objectives in the 2004 Alaska Groundfish PSEIS as guideposts when considering groundfish FMP amendments. Forty-five management objectives are organized in nine categories: prevent overfishing, promote sustainable fisheries and communities; preserve the food web; manage incidental catch and reduce bycatch and waste; avoid impacts to seabirds and marine mammals; reduce and avoid impacts to habitat; promote equitable and efficient use of fishery resources; increase Alaska Native consultation; and improve data quality, monitoring and enforcement. Fishery policy decisions and annual catch limits are informed by the best scientific information available and management is continually adjusted to account for emerging information.

In 2014, the AKRO and the Council underscored the commitment to EBFM by formally adopting an ecosystem approach for fisheries management in the EEZ off Alaska. This approach includes a vision statement adopted by the Council that applies to all long-term planning initiatives, fishery management actions, and science planning to support EBFM. The 2014 overarching ecosystem approach statements and strategy extend the broad EBFM principles, similar to those in the groundfish FMPs, to all fisheries in the Council's jurisdiction.

Ecosystem Status Reports are produced annually to compile and summarize information about the status of the Alaska marine ecosystems for the North Pacific Fishery Management Council, the scientific community and the public. As of 2016, there are separate reports for the Eastern Bering Sea, Aleutian Islands, the Gulf of Alaska, and Arctic (forthcoming) ecosystems. These reports include ecosystem report cards, ecosystem assessments, and ecosystem and ecosystem-based management indicators that together provide context for ecosystem-based fisheries

management in Alaska. In addition to the reports themselves, a tool has been developed to help users visualize the ecosystem status in each area, along with a “report card” on ecosystem health. Scientists at the Alaska Fisheries Science Center have begun eexploring quantitative linkages among Report Card indicators, illustrating how changes in one variable might affect another (i.e., which indicators are stronger/weaker determinants of trends in other ecosystem components). The method used is dynamic structural equation modeling (DSEM), which can also project next year values and can therefore be used as a tool alongside the Spring PEEC (Preview of Ecosystem and Economic Conditions) meeting to identify emergent trends and potential noteworthy topics to track through summer surveys and research efforts.

Understanding ecosystem structure and function usually begins by organizing indicators within a simplified conceptual model, such that ecological relationships among indicators can be expressed, visualized, and discussed. One simplified approach to visualize relationships among variables is a qualitative network model (QNM) (Levins, 1974). QNMs summarize the relationship among multiple variables (represented as boxes) that are linked by hypothesized mechanisms (represented as arrows), where mechanisms are specified as a positive or negative impact of one variable on another. QNMs have been successfully used at the Alaska Fisheries Science Center to identify likely consequences of hypothetical ecosystem changes (Reum et al., 2015, 2021) and can incorporate stakeholder input regarding relevant variables (boxes) and mechanisms (arrows).

In 2019, NOAA Fisheries published the Alaska Region Implementation Plan for Ecosystem Based Management (NOAA 2019). To implement EBFM, the Policy identifies and outlines six guiding principles:

1. Implement ecosystem-level planning
2. Advance our understanding of ecosystem processes
3. Prioritize ecosystem vulnerabilities and risks
4. Explore and address trade-offs within an ecosystem
5. Incorporate ecosystem considerations into management advice
6. Maintain resilient ecosystems.

The EBFM Roadmap calls for the development of implementation plans to guide NOAA Fisheries’ efforts in implementing EBFM over the next 5 years. The purpose of this Alaska EBFM Roadmap Implementation Plan is to identify and coordinate priority EBFM milestones among the NOAA Fisheries Alaska Regional Office (AKRO), the NOAA Fisheries Alaska Fisheries Science Center (AFSC) and partners in the Alaska Region.

The Council is considering a Programmatic EIS (PEIS) with the purpose of providing a comprehensive analysis of the cumulative impacts of Alaska’s Federal groundfish fisheries on the human environment given both management and ecosystem changes that have occurred since the last review. The Council indicated that adoption of a final alternative would include updating the Council’s current management policy objectives, noting that it may not be necessary to update every objective. The process of considering a PEIS is intended to incorporate ongoing Council efforts specifically tasked to create more climate-resilient federal fisheries, as applicable (NPFMC 2023).

4 Assessment Process

4.1 RFM assessment process

This assessment is based on the RFM Standard. The Standard is derived from several United Nations Food and Agriculture Organization (UN FAO) documents that are listed in the foreword to the Standard itself. The content of the Standard is organized around four Components of responsible management:

A. The Fisheries Management System
B. Science and Stock Assessment Activities and the Precautionary Approach
C. Management Measures, Implementation, Monitoring, and Control
D. Serious Impacts of the Fishery on the Ecosystem

The four Components encompass 13 Fundamental Clauses, which in turn encompass 125 Supporting Clauses. Each clause defines a management practice, attribute, or outcome that collectively define a responsibly managed fishery. Conformance to the Standard is assessed by scoring each Supporting Clause according to the RFM Guidance. A full list of clauses can be found in the Standard and section 6 of this report.

4.2 Scoring

4.2.1 Evaluation Parameters

Each Supporting Clause is evaluated against performance Evaluation Parameters (EPs). There are several EPs but the Guidance may not require the application of all EPs to a particular clause. EPs include:

Process Evaluation
There is a system in place to implement the aspects of management relevant to the clause, such as systems for data collection, laws and regulations, stock assessments, and enforcement. If evidence on the current process/system of a given process-based requirement is limited or non-existent, then this EP is not satisfied.

Current Status/Appropriateness/Effectiveness
Requires that the current status, appropriateness, or effectiveness of an element of fisheries management practices (whichever of these attributes is relevant to the outputs or outcomes required by the clause) is demonstrated, such as data collected, results of stock assessment including stock status, and enforcement data. If evidence on the current status, appropriateness, or effectiveness of a given output-based requirement is limited or non-existent, then this EP is not satisfied.

Evidence Basis
The availability, quality, or adequacy of the evidence is used for scoring the clause. If evidence availability (such as studies, reports, regulations and other data) is limited, low quality or non-existent, then this EP is not satisfied.

After the assessment team determines whether each EP is met for a Supporting Clause, that clause receives a score of 10, minus 3 for each EP not met, down to a minimum of 1. A confidence rating and conformance level, possibly including a non-conformance (NC), is then assigned to the clause based on the following relationships:

EPs not met	Numeric score	Confidence rating	Conformance level
0	10	High	Full conformance
1	7	Medium	Minor NC
2	4	Medium	Major NC
3+	1	Low	Critical NC

For the fishery to pass the assessment and be recommended for certification, no single Component can have more than:

- 3 minor NCs, if no major NC assigned
- 1 major NC, if no minor NC assigned
- 0 critical NCs

Guidelines for each EP as applied to each Supporting Clause are specified in the Guidance as well as section 6 of this report, and a full detailed description of the scoring system is available in the Guidance.

The assessment steps before and after scoring are specified in the RFM Procedure. Before scoring, the assessment team gathers information to be used in scoring via multiple pathways, including a fishery site visit, voluntary submission of input from stakeholders, and desktop review of available and relevant literature. After scoring, but before a certification decision is made, the client must create a corrective action plan to address any unresolved NCs. Then the draft report with the corrective action plan is peer-reviewed and opened to public comment from stakeholders to identify whether any final revisions to the assessment are needed. Full details of the stages in the assessment and certification process are specified in the Procedure.

4.3 Advance review of topics that trigger immediate assessment failure

The RFM Standard requires that the assessment team review certain fisheries management issues which trigger immediate failure before proceeding to the full assessment. The assessment is not conducted, and the fishery fails immediately if evidence for any of the following problems is found:

- Dynamiting, poisoning, and other comparable destructive fishing practices
- Significant illegal, unreported, and unregulated (IUU) fishing activities in the country jurisdiction

- Shark finning (i.e., removal and retention of shark fins while the remainder of the shark is discarded in the ocean)
- Slavery and slave labor on board fishing vessels
- Any significant lack of compliance with the requirements of an international fisheries agreement to which the U.S. is signatory. A fishery will have to be formally cited by the International Governing body that has competence with the international Treaty in question, and that the US has been notified of that citation of non-compliance.

After a review, the assessment team found no evidence that any of these problems exist with respect to the fishery under consideration.

5 Assessment Execution

5.1 Site visit

An onsite site visit was held at the offices of the Alaska Seafood Cooperative on March 14th, 2024 in conjunction with the MSC reassessment and 4th surveillance audit for BSAI&GOA Atka mackerel, Pacific Ocean Perch, and rockfish and the Responsible Fisheries Management (RFM) reassessments for BSAI&GOA AK flatfish. The following table lists the stakeholders contacted for this reassessment.

Table 17 Stakeholders contacted for the reassessment of AK Atka mackerel and rockfish

Yukon Salmon Fisheries Association
Kawerak
WWF-US
WWF-RU
Food and Water Watch
Monterey Bay Aquarium
Oceana
Ruby Advisory Committee of ADFG
Western Interior Alaska Subsistence Regional Advisory Council
Alaska Natives
IPHC
Greenpeace
Intrafish
Undercurrent News
Alaska Fisheries Development Foundation
Marine Stewardship Council
At-Sea Processors Association
North Pacific Fisheries Management Council
Alaska Fisheries Science Center

Below is a general agenda that was used to guide conversations in relation to this audit.

Client Meeting Agenda
Marine Stewardship Council's (MSC) and the Responsible Fisheries Management (RFM) assessments for BSAI & GOA flatfish, Atka mackerel, rockfish and POP
Date: March 14th, 2024
Location: 4241 21st Ave W, Suite 302, Seattle WA, 98199 (and remote)

Attendees: Beth Concepcion (Client representative); Erin Wilson (Team lead), Dr. Giuseppe Scarcella, Amanda Stern-Pirlot, Michealene Corlett
Other potential attendees:
Mary Beth Tooley, Ruth Christiansen, Annika Saltman, Frank O'Hara III, Chris Woodley, Sarah Webster

Microsoft Teams meeting
Join on your computer, mobile app or room device
Click here to join the meeting
Meeting ID: 221 646 469 659
Passcode: UHmmTY
Download Teams | Join on the web

Objectives:

MRAG Americas is conducting the following audits for the BSAI&GOA Atka mackerel, POP and rockfish and BSAI

&GOA flatfish fisheries against the Marine Stewardship Council's (MSC) Standard and/or the Responsible Fisheries Management (RFM) Standard for sustainability.

- MSC Reassessment and 4th surveillance audit for BSAI &GOA Atka mackerel, rockfish and Pacific Ocean Perch
- MSC 3rd surveillance audit for BSAI &GOA flatfish fisheries
- RFM reassessment and 4th surveillance audit for BSAI &GOA Atka mackerel and rockfish fisheries
- RFM reassessment and 4th surveillance audit for BSAI &GOA flatfish fisheries

The objectives of this audit is to meet with managers and stakeholders and gather the best available information to assess whether these fisheries continue to meet the requirements of the MSC and RFM Standard for recertification.

9:30 – 10:15 AM Introductions, review of agenda and process requirements

1. Introductions
    - Introductions of the team, their roles, and responsibilities regarding scoring the fishery
    - Client group
2. Overview of the MSC Process
    - The assessment will focus on the following three core Principles:
        - Principle 1 – Sustainable target fish stocks
        - Principle 2 – Environmental impact of fishing
        - Principle 3 – Effective Management
    - Where to find additional materials: Guide to the MSC process
3. Overview of the RFM process
    - V1.3 for the 4th surveillance and v2.01 for the reassessment; Certificate No.: 10000445828-MSC-ANSI-USA
    - Four Components:
        A. The Fisheries Management System
        B. Science and Stock Assessment Activities and the Precautionary Approach
        C. Management Measures, Implementation, Monitoring and Control
        D. Serious Impacts of the Fishery on the Ecosystem
    - General information on the scoring: The four Components encompass 13 Fundamental Clauses, which encompasses 125 Supporting Clauses. Each Supporting Clause is evaluated against performance Evaluation Parameters (EPs), which include 1) process evaluation; 2) current status/appropriateness/effectiveness; and 3)evidence basis. After the assessment team determines whether each EP is met for a Supporting Clause, that clause receives a score, a confidence rating and conformance level (e.g. Full conformance, or Minor, Major or Critical Non-conformance). Further details regarding the RFM process, information and the Standard ,etc. can be found at the following link: https://rfmcertification.org

10:15 -11:30 AM Review general topics and/or updates for fisheries for both MSC and RFM assessments

General Topics for discussion:

- General overview of the fishery, including information on the fleet, number of vessels, markets, etc.
- Any potential changes to scientific information, including stock assessments
- Any changes in management/regulation, or recent reviews (e.g. updates on EFH, protected species, bycatch mitigation)
- Changes in personnel, both within the Cooperative, the management agencies, etc.
- Updates on bycatch, any unusual events
- Enforcement update
- Meet with Captain

11:30 – 11:45 Break

11:45 – 12:30 Review traceability

- Will work through MSC template for traceability
- Topics include: evidence needs to be presented, e.g. fish tickets, invoices, etc., that has gear, area caught, species, etc.; sorting procedures; how to ensure no mixing of certified with non-certified product, other methods to ensure systems in place (dockside monitoring, observers, permits, etc.); how product is transported, any intermediary actors (e.g. auctions), and where CoC begins

12:30 – ? Questions, review timelines, wrap-up

- MSC Surveillance reports due 60 days from site visit
- Next drafts, process requirements
- Other meetings scheduled
  - John Gauvin 8AM on Friday, March 15th
  - Anne Marie Eich and Hannah Myers 2:00 PM Friday, March 15th, 2024
- Address any information still needed

Thirty days prior to the audit site visit, all stakeholders were informed of the visit and given the opportunity to provide information to the auditors in advance of, or during, the site visit. Managers, stock assessment authors and various stakeholders provided information by email, joined remotely or participated in person during the site visit. Below is a list of the attendees that participated in this site visit.

Name	Title/Role	Organization
Erin Wilson	Assessment team leader and Principle 3 Assessor	MRAG Americas
Amanda Stern-Pirlot	Principle 2 Assessor	MRAG Americas
Michealene Corlett	MRAG Americas Quality Manager (Observer for this assessment)	MRAG Americas
Dr. Giuseppe Scarcella	Principle 1 Assessor	MRAG Americas assessment team member
Beth Concepcion	AKSC Manager	AKSC (Client Representative)
Ruth Christiansen	Director Government Affairs	Ocean Peace
Mary Beth Tooley	Government Affairs	O'Hara Corp.
Frank O'Hara III	Executive Vice President	O'Hara Corp.
Sara Webster	Biologist	AKSC
Chris Woodley	Groundfish Forum Executive Director	AKSC
TJ Durnan	Captain	AKSC
Sana Watterson	Quality Assurance and Traceability Operations	O'Hara
John Gauvin	AKSC Science Projects Director	AKSC
Dr. Anne Marie Eich	Director Protected Resources Policy	NOAA/NMFS
Dr. Hannah Myers	Postdoctoral Scholar	Oregon State University
Melissa Haltuch	Manager of the Status of the Stocks and Multispecies Assessments	Alaska Fisheries Science Center

5.2 Desktop review

The assessment team also conducted a desktop review of available and relevant literature. Sources considered include, but are not limited to:

- Management authority establishment legislation, governance procedures, and reporting, surveillance, and enforcing activities
- Scientific stock assessments and advice, including any international guidance and third-party published stock assessments
- Information from non-governmental organizations

Desktop sources used in the assessment are cited in section 7.

5.3 Stakeholder input

Prior to the assessment site visit, all stakeholders were informed of the visit and given the opportunity to provide information to the assessment team in advance of, or during, the site visit. No stakeholder comments were received during the Alaska Atka mackerel and rockfish RFM reassessment.

5.4 Peer review

Peer Review was completed by Paul Knapman and Dr. Susan Hanna.

Paul Knapman is an independent consultant based in Halifax, Nova Scotia, Canada. Paul began his career in fisheries nearly 30 years ago as a fisheries officer in the UK, responsible for the enforcement of UK and EU fisheries regulations. He then worked with the UK government's nature conservation advisors (1993-2001), as their Fisheries Programme Manager, responsible for establishing and developing an extensive programme of work with fisheries managers, scientists, the fishing industry and ENGOs, researching the effects of fishing and integrating nature conservation requirements into national and European fisheries policy and legislation. Between 2001-2004 he was Head of the largest inshore fisheries management organisation in England, with responsibility for managing an extensive area of inshore fisheries on the North Sea coast. The organisations responsibilities and roles included: stock assessments; setting and ensuring compliance with allowable catches; developing and applying regional fisheries regulations; the development and implementation of fisheries management plans; acting as the lead authority for the largest marine protected area in England. In 2004, Paul moved to Canada and established his own consultancy providing analysis, advisory and developmental work on fisheries management policy in Canada and Europe. He helped draft the management plan for one of Canada's first marine protected areas, undertook an extensive review on IUU fishing in the Baltic Sea and was appointed as rapporteur to the European Commission's Baltic Sea Regional Advisory Council. In 2008, Paul joined Moody Marine as their Americas Regional Manager, with responsibility for managing and developing their regional MSC business. He became General Manager of the business in 2012. Paul has been involved as a lead assessor, team member and technical advisor/reviewer for more than 50 different fisheries in the MSC programme. He returned to fisheries consultancy in 2015. Paul has passed MSC v1.3, v2.0, v2.1 and ISO 19011 training and has no Conflict of Interest in relation to this fishery. Full CV available upon request.

Dr. Susan Hanna is professor emeritus of marine economics at Oregon State University. Her research and publications are in the area of marine economics and policy, with an emphasis on fishery management, ecosystem-based fishery management, property rights and institutional design. Dr. Hanna has served as a scientific advisor to the U.S. Commission on Ocean Policy, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Minerals Management Service, Northwest Power and Conservation Council and the Pacific Fishery Management Council. She served on the Ocean Studies Board of the National Research Council (NRC), National Academy of Sciences, and several NRC Committees, including the Committee to Review Individual Quotas in Fisheries and the Committee on Protection and Management of Pacific Northwest Anadromous Salmonids.

Full CVs can be provided on request.

The following tables include both the comments from the Peer Reviewers and MRAG America's responses.

Fishery AK Atka mackerel and rockfish

Peer Reviewer 1

Year	Question	Yes/No	Peer Reviewer justification	CB Response
	Is the scoring of the fishery consistent with the RFM standard, and clearly based on the evidence presented in the assessment report?	Yes	The report provides a detailed review of the Alaska flatfish fishery operating in the Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) and an evaluation against the Responsible Fishing Standard version 2.1. The Background sections of the report are thorough well set out and current and relevant information sources are cited. Section 7.4 of the report which contains the evidence and interpretation that forms the basis for the assessment outcomes is poorly and inconsistently laid out. Supporting Clauses under Fundamental Clauses 1-11 are presented with overarching rationales for each Supporting Clause rather than the emphasis being put on describing and providing evidence for each Evaluation Parameter (EP) for each Supporting Clause. In some instances, rationales highlight which Supporting Clause(s) are met in other instances, they are not. The lay out of Supporting Clauses under Fundamental Clause 12 is different and, while easier to follow, the supporting text that describes the evidence and/or expectation for each EP is set out in separate tables. As a result, it is difficult for the reader to easily assess whether the evidence that has been presented for each EP meets the evidence requirements that would achieve full conformance of each EP and therefore achievement of each Supporting Clause. In order for me to check if the rationales met the EP evidence requirements I had to have the Scoring Guidance open next to me so I could more easily cross-check EP requirements required with what was presented in the rationales. I briefly reviewed all of the 10 current certification reports on the	Thank you for the comment. As there is no required template for use with the RFM Standard v2.1, we tried to create a template that reduced the redundancy of the rationale within the sub clauses and the many evaluation parameters. The template is a work in progress and we will consider this feedback in future revisions.

			RFM website to see how the evaluation and outcome have been presented - this includes the MRAG US Pacific Hake /Whiting Fishery, Full Assessment Report. All of them have used very similar approaches in presenting their evaluations. Each Supporting Clause has been set out individually along with each EP and associated supporting text that describes the type of evidence and/or expectation that would achieve full conformance. The Assessment Teams have then inserted evidential text under each EP and included references that substantiate/support this evidence. I've cut and pasted the generic structure of the evaluation table for a Supporting Clause below. Using this format helps the reader understand what the requirements/expectation is for each EP for the Supporting Clause and see what evidence the Assessment team have used to make their evaluation of the EP. While I appreciate there is no standardised report template and the approach taken in this report may help to reduce repetition and streamline the writing process, it does not serve well those wishing or required to review whether the fishery meets the RFM standard and I strongly recommend that Section 7.4 is revised accordingly.	
	Are the non-conformities raised appropriately written to achieve the prescribed outcome within the specified timeframe?	NA	There are no non-conformities	

	General comments on the report (e.g. Executive summary, background, UoAs). Add extra rows if needed.		In reviewing the report I used track changes to highlight possible edits and attach this separately.	
	Additional comments			

Section A: The Fisheries Management System				
Clause	Has all available relevant info been used to score this FC?	Does the information and/or rationale used to score this FC support the given score?	Peer Reviewer comments	CB Response
1. Structured and legally mandated management system				
1.1	Yes	Yes	The role of the State (ADFG) in relation to the UoC is not cleary described. Does the fishery operate in state waters? Are there parallel flatfish fisheries?	Additional rationale has been provided for further clarification.
1.2	Yes	Yes	EP Current Status / Appropriateness / Effectiveness: There is no comment in the rational about the geographic extent of the stock or any migratory behaviors. While this might not apply to any of the species it should still be stated.	The rationale has been revised.
1.2.1	Yes	Yes	No comment	
1.3	N/A	N/A	No comment	
1.3.1	N/A	N/A	EP Process is indicated as being met but these are not transboundary stocks	This has been revised to NA.
1.4	N/A	N/A	EP Process is indicated as being met but these are not transboundary stocks	This has been revised to NA.
1.4.1	N/A	N/A	EP Process is indicated as being met but these are not transboundary stocks	This has been revised to NA.

1.5	N/A	N/A	The report indicates that this clause is met, however, it is not applicable as the Atka mackerel and rockfish stocks in the UoCs are not considered to be transboundary. Also, all EPs are indicated as being met.	This has been revised to NA.
1.6	Yes	Yes	No comment	
1.6.1	N/A	N/A	No comment	
1.7	Yes	Yes	No comment	
1.8	Yes	Yes	No comment	
1.9	N/A	N/A	No comment	
2. Coastal area management frameworks				
2.1	Yes	Yes	No comment	
2.1.1	Yes	Yes	No comment	
2.1.2	Yes	Yes	No comment	
2.2	Yes	Yes	No comment	
2.3	Yes	Yes	No comment	
2.4	Yes	Yes	No comment	
2.5	Yes	Yes	No comment	
2.6	Yes	Yes	No comment	
2.7	Yes	Yes	No comment	
3. Management objectives and plan				
3.1	Yes	Yes	No comment	
3.1.1	Yes	Yes	No comment	
3.1.2	Yes	Yes	No comment	
3.1.3	Yes	Yes	No comment	
3.2	N/A	N/A	No comment	

3.2.1	No	No	The rationale does not provide evidence to support the fulfillment of all parameters, i.e., no mention of avoidance of excess fishing capacity or economic conditions that promote responsible fisheries…Limited access privilege program? One of the goals of Amendment 80 is to limit harvesting capacity for fisheries not managed by a LAPP.	The rationale has been revised.
3.2.2	No	No	The rationale does not provide evidence to support the fulfillment of all parameters, i.e., no mention of economic conditions that promote responsible fisheries	The rationale has been revised.
3.2.3	Yes	Yes	No comment	
3.2.4	Yes	Yes	No comment	

Section B: Science & Stock Assessment Activities, and the Precautionary Approach				
Clause	Has all available relevant info been used to score this FC?	Does the information and/or rationale used to score this FC support the given score?	Peer Reviewer comments	CB Response
4. Fishery data				
4.1	Yes	Yes	No comment	
4.1.1	Yes	Yes	No comment	
4.1.2	Yes	Yes	No comment	
4.2	Yes	Yes	No comment	
4.2.1	Yes	Yes	No comment	
4.3	Yes	Yes	No comment	
4.4	Yes	Yes	No comment	
4.5	Yes	Yes	No comment	
4.6	Yes	Yes	No comment	

4.7	N/A	N/A	No comment	
4.8	N/A	N/A	No comment	
4.9	N/A	N/A	No comment	
4.1	N/A	N/A	No comment	
4.11	N/A	N/A	No comment	
5. Stock assessment				
5.1	No	No	While it is clear there is an instituitional framework for fishery management purposes, as set out in Clause 1.1, there is no mention of it here.	Thank you for the comment, the rationale is now modified to better describe the institutional framework.
5.1.1	N/A	N/A	No comment	
5.1.2	Yes	Yes	No comment	
5.2	Yes	Yes	No comment	
5.3	Yes	Yes	No comment	
5.4	N/A	N/A	No comment	
5.5	N/A	N/A	There is no mention of how or whether confidentiality is respected, if appropriate.	Thank you for the comment, the rationale is now modified to address the comment.
6. Biological reference points and harvest control rule				
6.1	Yes	Yes	No comment	
6.2	Yes	Yes	No comment	
6.3	Yes	Yes	No comment	
6.4	Yes	Yes	No comment	
6.5	Yes	Yes	No comment	
7. Precautionary approach				
7.1	Yes	Yes	No comment	
7.1.1	Yes	Yes	No comment	
7.1.2	NA	NA	No comment	
7.2	NA	NA	No comment	

Section C: Management Measures, Implementation, Monitoring, and Control

Clause	Has all available relevant info been used to score this FC?	Does the information and/or rationale used to score this FC support the given score?	Peer Reviewer comments	CB Response
8. Management measures				
8.1	Yes	Yes	No comment	
8.1.1	Yes	Yes	No comment	
8.1.2	Yes	Yes	No comment	
8.2	Yes	Yes	No comment	
8.3	Yes	Yes	No comment	
8.4	Yes	Yes	No comment	
8.4.1	No	No	There is no evidence of studies that provide an understanding of the costs, benefits, and effects of alternative management options designed to rationalize fishing, especially options relating to excess fishing capacity and excessive levels of fishing effort	The rationale has been revised, including a discussion on EFPs.
8.5	Yes	Yes	No comment	
8.5.1	Yes	Yes	No comment	
8.6	Yes	Yes	No comment	
8.7	Yes	Yes	No comment	
8.8	Yes	Yes	No comment	
8.9	Yes	Yes	No comment	
8.1	NA	NA	This clause need not apply if new gears have not been introduced in the last 3 years. There is no mention of new gears and so the team need to consider if it applies.	The clause has been revised to NA.

8.11	No	Yes	Recommend including The Technical Subcommittee (TSC) of the Canada-U.S. Groundfish Committee. https://www.psmfc.org/tsc-drafts/2024/AFSC_2024_TSC_Report.pdf	This has been added.
8.12	Yes	Yes	No comment	
8.13	NA	NA	No comment	
9. Appropriate standards of fishers' competence				
9.1	Yes	Yes	No comment	
9.2	No	No	No evidence provided to support this SC	This has been added
9.3	Yes	Yes	No comment	
10. Effective legal and administrative framework				
10.1	Yes	Yes	No comment	
10.2	Yes	Yes	No comment	
10.3	NA	NA	No comment	
10.3.1	NA	NA	No comment	
10.4	NA	NA	No comment	
10.4.1	NA	NA	No comment	
11. Framework for sanctions				
11.1	Yes	Yes	No comment	
11.2	Yes	Yes	No comment	
11.3	Yes	Yes	No comment	
11.4	NA	NA	No comment	

Section D: Serious Impacts of the Fishery on the Ecosystem				
Clause	Has all available relevant info been used to score this FC?	Does the information and/or rationale used to score this FC support the given score?	Peer Reviewer comments	CB Response
12. Impacts of the fishery on the ecosystem				

12.1	Yes	Yes	No comment	
12.2	NA	NA	No comment	
12.2.1	Yes	Yes	No comment	
12.2.2	Yes	Yes	No comment	
12.2.3	Yes	Yes	No comment	
12.2.4	Yes	Yes	No comment	
12.2.5	Yes	Yes	No comment	
12.2.6	Yes	Yes	No comment	
12.2.7	Yes	Yes	No comment	
12.2.8	Yes	Yes	No comment	
12.2.9	Yes	Yes	No comment	
12.2.10	Yes	Yes	No comment	
12.2.11	Yes	Yes	No comment	
12.3	Yes	Yes	No comment	
12.4	Yes	Yes	No comment	
12.5	Yes	Yes	No comment	
12.6	Yes	Yes	No comment	
12.7	Yes	Yes	No comment	

Fishery AK Atka mackerel and rockfish

Peer Reviewer 2

Year	Question	Yes/No	Peer Reviewer justification	CB Response
	Is the scoring of the fishery consistent with the RFM standard, and clearly based on the evidence presented in the assessment report?	Yes	Overall, scoring is justified based on the evidence. Areas where minor additions are needed for full justification are noted.	
	Are the non-conformities raised appropriately written to achieve the prescribed outcome within the specified timeframe?	NA	No non-conformances were found for this fishery.	
	General comments on the report (e.g. Executive summary, background, UoAs). Add extra rows if needed.		This is a well written and comprehensive report, well documented.	Thank you!

Section A: The Fisheries Management System				
Clause	Has all available relevant info been used to score this FC?	Does the information and/or rationale used to score this FC support the given score?		CB Response
1. Structured and legally mandated management system				
1.1	Yes	Yes	Agree with rationale and scoring	
1.2	Yes	Yes	Agree with rationale and scoring	
1.2.1	Yes	Yes	Agree with rationale and scoring	
1.3	NA		Agree with determination that 1.3 is not relevant	
1.3.1	NA		Agree with determination that 1.3.1 is not relevant	
1.4	NA		Agree with determination that 1.4 is not relevant	
1.4.1	NA		Agree with determination that 1.4.1 is not relevant	
1.5	Yes	Yes	Agree with scoring and most of the rationale, but some explicit reference to how the system is fostering cooperation between states is needed.	The rationale has been revised.
1.6	Yes	Yes	Agree with rationale and scoring	
1.6.1	NA		Agree with determination that 1.6.1 is not relevant	
1.7	Yes	Yes	Agree with rationale and scoring	
1.8	Yes	Yes	Agree with scoring and most of the rationale. References to transparency are implied but not explicit in "evidence of continuous compliance" , paragraphs 4,6 and 7. Adding the term "transparency" where appropriate in those paragraphs would strengthen the explanation.	The rationale has been revised.
1.9	NA		Agree with determination that 1.9 is not relevant	
2. Coastal area management frameworks				
2.1	Yes	Yes	Agree with rationale and scoring. Reference to NS8 could be added here.	

2.1.1	Yes	Yes	Agree with rationale and scoring. Reference to 2.1.1 should be added to para 1 (or 4,5?) in rationale	This reference has been added.
2.1.2	No, see comment	No	Para 1 of the rationale references 2.1.2 but does not address technical capacities of financial resources of fishery interests. It is implied by the existence of collaborative decision processes but not explicit. It looks like para 5 should reference 2.1.2 instead of 2.2.	This reference has been fixed.
2.2	Yes	Yes	Agree with rationale and scoring	
2.3	Yes	Yes	Agree with rationale and scoring	
2.4	Yes	Yes	Agree with rationale and scoring	
2.5	Yes	Yes	Agree with rationale and scoring	
2.6	Yes	Yes	Agree with rationale and scoring	
2.7	Yes	No	Explicit reference to 2.7 and "timely information" is needed	This has been addressed.
3. Management objectives and plan				
3.1	Yes	Yes	Agree with rationale and scoring.	
3.1.1	Yes	Yes	FMP objectives cover this; SC 3.1.1 should be cited with the list of objectives	The reference has been added.
3.1.2	Yes	Yes	FMP objectives cover this; SC 3.1.2 should be cited with the list of objectives	The reference has been added.
3.1.3	Yes	Yes	FMP objectives cover this; SC 3.1.3 should be cited with the list of objectives	The reference has been added.
3.2	NA		NA	
3.2.1	Yes	Yes	FMP objectives cover this; SC 3.2.1 should be cited with the list of objectives	The reference has been added.
3.2.2	Yes	Yes	FMP objectives cover this; SC 3.2.2 should be cited with the list of objectives	The reference has been added.
3.2.3	Yes	Yes	FMP objectives cover this; SC 3.2.3 should be cited with the list of objectives	The reference has been added.
3.2.4	Yes	Yes	FMP objectives cover this; SC 3.2.4 should be cited with the list of objectives	The reference has been added.

Section B: Science & Stock Assessment Activities, and the Precautionary Approach				
Clause	Has all available relevant info been used to score this FC?	Does the information and/or rationale used to score this FC support the given score?	Peer Reviewer comments	CB Response
4. Fishery data				
4.1	Yes	Yes	Agree with rationale and scoring; SC 4.1 should be cited in the data section. (as in the Flatfish Report)	This reference has been added.
4.1.1	Yes	Yes	Agree with rationale and scoring; SC 4.1.1 should be cited in the data section	This reference has been added.
4.1.2	NA		Agree with determination that 4.1.2 is not relevant	
4.2	Yes	Yes	Agree with rationale and scoring; SC 4.1.1 should be cited in the data section	This reference has been added.
4.2.1	Yes	Yes	Agree with rationale and scoring; SC 4.2.1 should be cited in the data section.	This reference has been added.
4.3	Yes	Yes	Agree with rationale and scoring; SC 4.3 should be cited in the data section	This reference has been added.
4.4	No	No	More information is needed as to how the research supports national policy (e.g. MSA National Standards).SC 4.4 should be cited.	Additional rationale has been provided.
4.5	No	No	Explicit reference is needed to economic, social, marketing and institutional knowledge as well as data collection and analysis generating this knowledge; SC 4.5 should be cited.	This has been revised.

4.6	No	No	Explicit reference to traditional knowledge is needed; SC 4.6 should be cited	The rationale has been revised.
4.7	NA		Agree with determination that 4.7 is not relevant	
4.8	NA		Agree with determination that 4.8 is not relevant	
4.9	NA		Agree with determination that 4.9 is not relevant	
4.1	NA		Agree with determination that 4.10 is not relevant	
4.11	NA		Agree with determination that 4.11 is not relevant	
5. Stock assessment				
5.1	Yes	Yes	Agree with rationale and scoring; It would be helpful to have SCs 5.1. 5.1.2, 5.2, 5.3, 5.5 cited in the rationale as was done in the flatfish report.	This has been revised.
5.1.1	NA		Agree with determination that 5.1.1 is not relevant	
5.1.2	Yes	Yes	Agree with rationale and scoring.	
5.2	Yes	Yes	Agree with rationale and scoring.	
5.3	Yes	Yes	Agree with rationale and scoring.	
5.4	NA		Agree with determination that 5.4 is not relevant	
5.5	Yes	Yes	Agree with rationale and scoring.	
6. Biological reference points and harvest control rule				
6.1	Yes	Yes	Agree with rationale and scoring. It would be helpful to have SCs 6.1-6.5 cited in the rationale as was done in the flatfish report.	This has been revised.
6.2	Yes	Yes	Agree with rationale and scoring	
6.3	Yes	Yes	Agree with rationale and scoring	

6.4	Yes	Yes	Agree with rationale and scoring	
6.5	Yes	Yes	Agree with rationale and scoring	
7. Precautionary approach				
7.1	Yes	Yes	Agree with rationale and scoring. It would helpful to have 7.1 cited in the rationale.	The reference has been added.
7.1.1	Yes	Yes	Agree with rationale and scoring. It would be helpful to have SC 7.1.1 cited in the rationale.	The reference has been added.
7.1.2	NA		Agree with determination that 7.1.2 is not relevant	
7.2	NA		Agree with determination that 7.2 is not relevant	

Section C: Management Measures, Implementation, Monitoring, and Control				
Clause	Has all available relevant info been used to score this FC?	Does the information and/or rationale used to score this FC support the given score?	Peer Reviewer comments	CB Response
8. Management measures				
8.1	Yes	Yes	Agree with rationale and scoring	
8.1.1	Yes	Yes	Agree with rationale and scoring. There is no reference to 8.1.1 but it could be added to the Para on AFSC ESSRP	This reference has been added.
8.1.2	Yes	Yes	Agree with rationale and scoring. There is no reference to 8.1.2 but it could be added to FMP objectives 14-21	This reference has been added.
8.2	Yes	Yes	Agree with rationale and scoring	
8.3	Yes	Yes	Agree with rationale and scoring. There is no reference to 8.3 but it could be added to FMP objectives 35-37	This reference has been added.

8.4	Yes	No	Agree with scoring and most of rationale but some explicit reference to excess capacity should be added	The rationale has been revised.
8.4.1	Yes	No	Agree with scoring and most of rationale but some explicit reference to excess capacity should be added	The rationale has been revised.
8.5	Yes	Yes	Agree with rationale and scoring	
8.5.1	Yes	Yes	Agree with rationale and scoring	
8.6	Yes	Yes	Agree with rationale and scoring	
8.7	Yes	Yes	Agree with rationale and scoring	
8.8	Yes	Yes	Agree with rationale and scoring.	
8.9	Yes	Yes	Agree with rationale and scoring. There is no reference to 8.9 but it could be added to legal gears para of rationale	This reference has been added.
8.1	Yes	Yes	Agree with rationale and scoring	
8.11	Yes	Yes	Agree with rationale and scoring	
8.12	Yes	Yes	Agree with rationale and scoring	
8.13	NA		Agree with determination that 8.13 is not relevant	
9. Appropriate standards of fishers' competence				
9.1	Yes	Yes	Agree with rationale and scoring	
9.2	Yes	No	Agree with scoring and most of the rationale but some reference to CCRF should be added to rationale with cite for SC 9.2	The rationale has been revised.
9.3	Yes	Yes	Agree with rationale and scoring	
10. Effective legal and administrative framework				
10.1	Yes	Yes	Agree with rationale and scoring	
10.2	Yes	Yes	Agree with rationale and scoring	
10.3	NA		Agree with determination that 10.3 is not relevant	
10.3.1	NA		Agree with determination that 10.3.1 is not relevant	
10.4	NA		Agree with determination that 10.4 is not relevant	
10.4.1	NA		Agree with determination that 10.4.1 is not relevant	
11. Framework for sanctions				

11.1	Yes	Yes	Agree with rationale and scoring	
11.2	Yes	Yes	Agree with rationale and scoring	
11.3	Yes	Yes	Agree with rationale and scoring	
11.4	NA		Agree with determination that 11.4 is not relevant	

Clause	Has all available relevant info been used to score this FC?	Does the information and/or rationale used to score this FC support the given score?	Peer Reviewer comments	CB Response
12. Impacts of the fishery on the ecosystem				
12.1	Yes	Yes	Agree with rationale and scoring	
12.2	NA		Agree with determination that 12.2 is not relevant	
12.2.1	Yes	Yes	Agree with rationale and scoring	
12.2.2	Yes	Yes	Agree with rationale and scoring	
12.2.3	Yes	Yes	Agree with rationale and scoring	
12.2.4	Yes	Yes	Agree with rationale and scoring	
12.2.5	Yes	Yes	Agree with rationale and scoring	
12.2.6	Yes	Yes	Agree with rationale and scoring	
12.2.7	Yes	Yes	Agree with rationale and scoring	
12.2.8	Yes	Yes	Agree with rationale and scoring	
12.2.9	Yes	Yes	Agree with rationale and scoring	
12.2.10	Yes	Yes	Agree with rationale and scoring	
12.2.11	Yes	Yes	Agree with rationale and scoring	
12.3	Yes	Yes	Agree with rationale and scoring	
12.4	NA		Agree with determination that 12.4 is not relevant	
12.5	Yes	Yes	Agree with rationale and scoring	
12.6	Yes	Yes	Agree with rationale and scoring	

12.7	Yes	No	Agree with scoring and most of the rationale. The "process" section of the rationale details the generation of information that can support the consideration of MPAs; explicitly stating this connection would strengthen the discussion. The overall score for FC 12 still needs to be filled in.	This has been revised.

6 Assessment Outcome

6.1 Summary of scores

Scores for each Supporting Clause are fully justified in section 6.4 and summarized in Table 18.

Table 18. Summary of assessment scores.

Component	Fundamental Clause	Supporting Clause	Numeric score	Confidence rating	Conformance level
A Fisheries Management System	1	1.1	10	High	Full
		1.2	10	High	Full
		1.2.1	10	High	Full
		1.3	NA	NA	NA
		1.3.1	NA	NA	NA
		1.4	NA	NA	NA
		1.4.1	NA	NA	NA
		1.5	10	High	Full
		1.6	10	High	Full
		1.6.1	NA	NA	NA
		1.7	10	High	Full
		1.8	10	High	Full
		1.9	NA	NA	NA
	2	2.1	10	High	Full
		2.1.1	10	High	Full
		2.1.2	10	High	Full
		2.2	10	High	Full
		2.3	10	High	Full
		2.4	10	High	Full
		2.5	10	High	Full
		2.6	10	High	Full
		2.7	10	High	Full
	3	3.1	10	High	Full
		3.1.1	10	High	Full
		3.1.2	10	High	Full
		3.1.3	10	High	Full
		3.2	NA	NA	NA
		3.2.1	10	High	Full
		3.2.2	10	High	Full
		3.2.3	10	High	Full
		3.2.4	10	High	Full
B Science and Stock Assessment Activities and the Precautionary Approach	4	4.1	10	High	Full
		4.1.1	10	High	Full
		4.1.2	10	High	Full
		4.2	10	High	Full
		4.2.1	10	High	Full
		4.3	10	High	Full
		4.4	10	High	Full
		4.5	10	High	Full
		4.6	10	High	Full
		4.7	NA	NA	NA
		4.8	NA	NA	NA
		4.9	NA	NA	NA
		4.10	NA	NA	NA
		4.11	NA	NA	NA
	5	5.1	10	High	Full
		5.1.1	NA	NA	NA
		5.1.2	10	High	Full
		5.2	10	High	Full
		5.3	10	High	Full
		5.4	NA	NA	NA

Component	Fundamental Clause	Supporting Clause	Numeric score	Confidence rating	Conformance level
		5.5	10	High	Full
	6	6.1	10	High	Full
		6.2	10	High	Full
		6.3	10	High	Full
		6.4	10	High	Full
		6.5	10	High	Full
	7	7.1	10	High	Full
		7.1.1	10	High	Full
		7.1.2	NA	NA	NA
		7.2	NA	NA	NA
C Management Measures, Implementation, Monitoring, and Control	8	8.1	10	High	Full
		8.1.1	10	High	Full
		8.1.2	10	High	Full
		8.2	10	High	Full
		8.3	10	High	Full
		8.4	10	High	Full
		8.4.1	10	High	Full
		8.5	10	High	Full
		8.5.1	10	High	Full
		8.6	10	High	Full
		8.7	10	High	Full
		8.8	10	High	Full
		8.9	10	High	Full
		8.10	10	High	Full
		8.11	10	High	Full
		8.12	10	High	Full
		8.13	NA	NA	NA
	9	9.1	10	High	Full
		9.2	10	High	Full
		9.3	10	High	Full
	10	10.1	10	High	Full
		10.2	10	High	Full
		10.3	NA	NA	NA
		10.3.1	NA	NA	NA
		10.4	NA	NA	NA
		10.4.1	NA	NA	NA
	11	11.1	10	High	Full
		11.2	10	High	Full
		11.3	10	High	Full
		11.4	NA	NA	NA
D Serious Impacts of the Fishery on the Ecosystem	12	12.1	10	High	Full
		12.2	NA	NA	NA
		12.2.1	10	High	Full
		12.2.2	10	High	Full
		12.2.3	10	High	Full
		12.2.4	10	High	Full
		12.2.5	10	High	Full
		12.2.6	10	High	Full
		12.2.7	10	High	Full
		12.2.8	10	High	Full
		12.2.9	10	High	Full
		12.2.10	10	High	Full
		12.2.11	10	High	Full
		12.3	10	High	Full
		12.4	NA	NA	NA
		12.5	10	High	Full
		12.6	10	High	Full
		12.7	10	High	Full
	13	All	N/A	N/A	N/A

6.2 Non-conformances and corrective actions

The assessment team identified zero non-conformances with the RFM Standard.

6.3 Recommendation

The scores in section 6.1 satisfy the requirements for certification established by the Guidance. No non-conformances were found. On this basis, MRAG Americas recommends that the AK Atka mackerel and rockfish fishery be re-certified under the RFM program.

6.4 Full scoring rationales

This section contains the evidence and interpretation that forms the basis for the assessment outcomes. Each table contains the text of a Supporting Clause and its Evaluation Parameters. Fundamental Clauses are not scored directly but are included for organization and reference.

Fundamental Clause 1

There shall be a structured and legally mandated management system based upon and respecting international, State, and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.

Supporting Clause		Met? (Yes/No/NA)
1.1	*There shall be an effective legal and administrative framework established at international, State and local levels appropriate for fishery resource conservation and management. The management system and the fishery operate in compliance with the requirements of international, State, and local laws and regulations, including the requirements of any regional and/or international fisheries management agreement.*	**Yes**
1.2	*Management measures shall consider (1) stock status (i.e., overfished, biomass) and genetic diversity (stock structure) over its entire area of distribution, and (2) other biological characteristics of the fish stock (stock) including age of maturity and reproductive potential.*	**Yes**
1.2.1	*Previously agreed management measures established and applied in the same region shall be taken into account by management.*	**Yes**
1.3	*Where transboundary, shared, straddling, highly migratory, or high seas fish stocks are exploited by two or more States (neighbouring or not), the applicant and appropriate management organizations concerned shall cooperate and take part in the formal fishery commission or arrangements appointed to ensure effective conservation and management of the stock(s) in question and their environment.*	**N/A**
1.3.1	*Conservation and management measures established for the stock under consideration within the jurisdiction of the relevant States for transboundary, shared, straddling, highly migratory, or high seas stocks, shall be compatible in a manner consistent with the rights, competence, and interests of the States concerned.*	**N/A**
1.4	*A State's fishery management organization not member or participant of a sub-regional or regional fisheries management organization shall cooperate, in accordance with relevant international agreements and law, in the conservation and management of the relevant fisheries resources by giving effect to any relevant measures adopted by such organization or arrangement.*	**N/A**
1.4.1	*A fishery management organization seeking to take any action through a non-fishery organization which may affect the conservation and management measures taken by a competent sub-regional or regional fisheries management organization or arrangement shall consult with the latter, in advance to the extent practicable, and take its views into account.*	**N/A**
1.5	*The applicant fishery's management system, when appropriate for the stock under consideration, shall actively foster cooperation between States with regard to (1) information gathering and exchange, (2) fisheries research, (3) fisheries management, and (4) fisheries development.*	**N/A**

1.6	*A fishery management organization and sub-regional or regional fisheries management organizations and arrangements, as appropriate, shall agree on the means by which the activities of such organizations and arrangements will be financed, bearing in mind, inter alia, the relative benefits derived from the fishery and the differing capacities of States to provide financial and other contributions. Where appropriate, and when possible, such organizations and arrangements shall aim to recover the costs of fisheries conservation, management, and research.*	**Yes**
1.6.1	*Without prejudice to relevant international agreements, States or fishery management organizations shall encourage banks and financial institutions not to require, as a condition of a loan or mortgage, fishing vessels or fishing support vessels to be flagged in a jurisdiction other than that of the State of beneficial ownership where such a requirement would have the effect of increasing the likelihood of non-compliance with international conservation and management measures.*	**N/A**
1.7	*Within the fishery management system, procedures shall be in place to keep the efficacy of current conservation and management measures and their possible interactions under continuous review, and to revise or abolish them in the light of new information.*	**Yes**
1.8	*The management arrangements and decision-making processes for the fishery shall be organized in a transparent manner.*	**Yes**
1.9	*Management organizations not party to the Agreement to Promote Compliance with International Conservation and Management Measures by Vessels Fishing on the High Seas shall be encouraged to accept the Agreement and to adopt laws and regulations consistent with the provisions of the Agreement.*	**N/A**

Rationale

Evidence of continuous compliance with the fundamental clause:

Considerable resources in the form of stock assessment, ecosystem monitoring and management expertise and capacity; management organizations and structures (e.g., National Marine Fisheries Service (NMFS) Alaska region, the North Pacific Fishery Management Council (NPFMC, or Council), NOAA Fisheries Office of Law Enforcement (OLE), United States Coast Guard (USCG), and the Observer Program are dedicated to fisheries, including Atka mackerel and rockfish, in Alaskan federal waters. National legislation and the regulatory process by which the Council and NMFS are directed and follow, enable the management of the resource at regional and localized levels. The adaptive and consultative management approach adopted by the Council actively promotes stakeholder participation. The NOAA Office of General Council (OGC) reviews any proposed management action to assure compliance with the MSA. International obligations (e.g., combating Illegal, Unreported and Unregulated (IUU) fishing) and the enforcement of federal regulations are upheld by the federal departments such as USCG and OLE (**Supporting Clauses (SC 1.1; 1.2.1).**

The NPFMC is the regional council responsible for managing North Pacific Ocean fisheries in the federal EEZ off the coast of Alaska. For most federal groundfish fisheries Alaska Department of Fish and Game (ADFG) issues emergency orders for state waters that duplicate NMFS management actions, however gear restrictions may vary. The AK Atka mackerel and rockfish fisheries are federally managed fisheries and decision-making for North Pacific groundfish occurs primarily within the Council process. However, NMFS; the states of Alaska, Washington, and Oregon; and numerous industry, academic, and NGO stakeholders participate in the process. The process used by the Council for decision-making is described in the guide for navigating the Council process (NPFMC, 2009). In accordance with the MSA, the Council has functions and responsibilities that are also outlined in the Statement of Organization, Practices and Procedures (SOPP). There is also a Scientific and Statistical Committee (SSC), Advisory Panel (AP), Plan Teams, and other committees that provide input to the Council, and their roles with decision making are outlined in the SOPP as well (**SC 1.1**).

The assessment models used take into account all sources of fishing mortality and are based on complete catch reporting systems including extensive observer data. Catches from fisheries occurring in state-managed waters are included in the appropriate assessments. All retained catch and discards AK mackerel and rockfish are included in the total catch amounts input into the models. The assessments consider various relevant aspects of target stocks biology and distribution. The assessments of AK mackerel and rockfish are age-structured, use a Bayesian approach, consider sources of uncertainty where possible, and evaluate stock status relative to reference points in a probabilistic way. SAFE reports give extensive histories of the models used in the assessments (see: https://www.fisheries.noaa.gov/tags/north-pacific-groundfish-stock-

assessments). Additionally, in BSAI and GOA models exploring stock status in relation to changing environmental conditions have also been developed and evaluated, in some of the models also the target stocks of the present report are considered (see: https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-eastern-bering-sea; https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-aleutian-islands; https://www.fisheries.noaa.gov/resource/data/ecosystem-status-report-2023-gulf-alaska) **(SC 1.2; 1.7).** Each model uses information on the status of the stock and potential effects of current management practices. Fisheries of the exclusive economic zone (EEZ) off Alaska; Bering Sea and Aleutian Islands; Final 2024 and 2025 Harvest Specifications for Groundfish can be found at the following link: https://www.federalregister.gov/documents/2024/03/11/2024-05093/fisheries-of-the-exclusive-economic-zone-off-alaska-bering-sea-and-aleutian-islands-final-2024. The Final 2024 and 2025 GOA Harvest Specifications can be found at the following: https://www.federalregister.gov/documents/2024/03/04/2024-04516/fisheries-of-the-exclusive-economic-zone-off-alaska-gulf-of-alaska-final-2024-and-2025-harvest.

The Council routinely reviews its management plans and actions as part of standard operating procedure. The Council's FMPs explicitly describe the Council's transparent policy to review management issues, and this is reflected in the numerous Council meetings that take place each year. Similarly, the BOF websites have dedicated pages to their public meetings and agendas and outcomes reflect a commitment to review previously agreed management measures **(SC 1.7; 1.8)**.

There is an agreed system to finance the fishery management organizations and arrangements. In general, the costs of fisheries management and conservation are funded through Congressional and state appropriations that follow the federal and state budget cycles. Cost recovery from certain fleet sectors, including BSAI and GOA groundfish stocks, is also in operation. The MSA authorizes and requires the collection of cost recovery fees for the incremental costs of limited access privilege programs. Cost recovery fees recover the actual costs directly related to the management, data collection, and enforcement of the programs. The current groundfish observer program is a further example of management being financially supported through cost recovery. Estimates of the costs for federal and state management, research, and enforcement of the groundfish stocks in the BSAI and GOA are reported in the BSAI and GOA Groundfish FMPs (**SC 1.6).**

There are procedures at multiple levels to review management measures, and the MSA is reviewed by Congress every five years and is periodically revised and reauthorized. The adaptive management approach taken in the BSAI and GOA groundfish fisheries requires regular and periodic review. Component parts of the FMPs are regularly reviewed, including outcome indicators, and various levels of Environmental Impact Statements (EIS) are undertaken when the FMPs are amended in order to review the environmental and socio-economic consequences, as well as assess the effectiveness of the changes. Stakeholders are actively encouraged to participate in Council and BOF meetings and, in so doing, opportunity to review management measures is provided. Stock status is reviewed and updated annually, producing SAFE reports for the BSAI and GOA groundfish stocks. Alaska Department of Fish and Game (ADFG) also conducts scientific research and surveys on its state-managed groundfish fisheries. These SAFE reports document stock status and significant trends or changes in the resource, marine ecosystems and fishery over time. The reports also assess the relative success of existing state and Federal fishery management programs and based on stock status indicators, provide recommendations for annual quotas and other fishery management measures (**SC 1.2; 1.2.1; 1.6; 1.7; 1.8)**.

Information is publicly available that explains how information and management decisions are made, consultations with the various agencies and inter-agency sectors, council representation, etc. The Council meets five times a year according to a pre-announced schedule. Notice of meetings is made through the Federal Register. Meeting agendas are widely distributed before each meeting and accessible on the Council website. Most Council meetings take approximately seven days, with individual advisory body meetings occurring during the course of the week. All meetings are open to the public, except for a short-closed Council session in which the Council deals with in which the Council deals with personnel, administrative, or litigation issues. A report of each meeting of the Council, except for any closed session, shall be kept and contain a record of the persons present, a complete and accurate description of matters discussed, and conclusions reached, and copies of all statements filed. The summary report, combined with the detailed newsletter, time log, and audio/visual recordings of the meeting, are intended to meet the requirements for minutes as described in Section 302(i)(2)(E) of the MSA.The Council (and NMFS) as well as the BOF (and ADFG) provide substantial amounts of information on their websites, including agenda of meetings, discussion papers, and records of decisions. The Council and the BOF actively encourage stakeholder participation, and all Council and BOF deliberations are conducted in open, public session. Anyone may submit regulatory proposals, and all such proposals are given due consideration by both the Council and the BOF (**SC 1.7; 1.8).**

The fisheries operate within the EEZ and the stocks are not transboundary. The stocks are not considered to be a transboundary, straddling, highly migratory, or high seas stock and so there is no

international component of the fishery to take into account. Clauses 1.3, 1.3.1, 1.4; 1.5, 1.6.1 and 1.9 are not applicable.

Evaluation Parameter Rationale - Process	Met? (Yes/No/NA)
1.1 Management agencies are physically and legally established at international, State and levels	**Yes**
1.2.1 There is a process or system that allows the continuity and updating of previously agreed and implemented management measures. Examples may include a specific review process or management plan where these measures can be clearly identified and continued implementation and updating can be carried out.	**Yes**
1.3 There is a mechanism in place by which the applicant organization(s) cooperates for the management of the transboundary, shared, straddling, highly migratory or high seas stock. This mechanism has the sustainable total exploitation of the stock as its main objective.	**NA**
1.3.1 Identification of common objectives for maintenance of stock biomass.	**Yes**
1.4 There is ongoing cooperation in stock assessment, data sharing, and other activities.	**Yes**
1.4.1 There is history of prior consultation.	**Yes**
1.5 The extent to which a formal process or system is available.	**Yes**
1.6 There is an agreed-upon system to finance the fishery management organizations and arrangements.	**Yes**
1.6.1 There is a system that encourages banks to require vessels to be flagged within the jurisdiction of interest.	**NA**
1.7 There is a procedure to review management measures. The procedure includes the use of outcome indicators against which the success of management measures in achieving specific management objectives is measured. The procedure covers all management measures, including those relating to the sustainable exploitation of the target stock; the mitigation of negative impacts on non-target species through bycatch, discarding, and indirect effects; and the protection of Endangered, Threatened, Protected (ETP) species and the physical environment. Please note that both the management processes of the North Pacific Fishery Management Council (NPFMC) for federal waters, and the Alaska Board of Fisheries (BOF) for state waters, allow for the continuous review of conservation and management measures. Such processes shall be clearly documented as relevant to key management measures for the fishery under assessment.	**Yes**
1.8 None	**NA**
1.9 Regulation to implement the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas has been adopted. Assessors shall consult the following document http://www.fao.org/docrep/meeting/003/x3130m/X3130E00.htm for reference to the Agreement.	**NA**
Rationale: Please see the rationale for the supporting clauses.	

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	Met? (Yes/No/NA)
1.1 The output of the management organization(s) is in line with fishery resource management needs. Examples may include rule making, scientific research, stock and	**Yes**

ecosystem assessments, implementation of rules and regulations, and enforcement activities. *The management framework is appropriate for managing the resource. For example, the larger the exploitation, vulnerability, or risks of a fish stock, the more work and precision (assessment of the resource ensuring the risks related to overfishing and equivalent negative effects) shall be focused in managing the resource. This shall be done in compliance with legislative and regulatory requirements at the local, national, and international level, including the requirements of any regional fisheries management agreement. The management system shall not be subject to continual unresolved or repeated disputes or political instability.*	
1.2 If a stock is subject to two or more jurisdictions (nations, states, etc) (either by distribution or migration), then exploitation by all jurisdictions shall be considered when defining exploitation levels and determining stock status to avoid overfishing/depletion of the resource. The scoring of this parameter shall consider that significant migration may take a species outside the jurisdiction of the managing agency (e.g., for significant feeding or ontogenetic migration). *Managers shall have an understanding of stock structure and composition as these relate to stock resilience over its entire distribution area. The underlying objective is to preserve genetic diversity between and within species, and avoid localized depletions (overall affecting the stock contributing to its resilience and stability). This assessment shall consider, when appropriate, demographic independence of populations or stocks (i.e., if a component stock of a species is demographically independent from another because it is genetically different, has significant difference in age structure, or if there is insignificant exchange among groups due to distance, environmental barriers, or other reasons).* *The stock may spend a portion of its life (migration for feeding, growth, or reproduction) in both fresh and saltwater, in international waters, or in another jurisdiction, and may suffer mortality or other pressures. These must be accounted for when assessing stock status.*	**Yes**
1.2.1 Previously agreed management measures established and applied in the same region are included and part of current management decisions. Examples may include international or other agreements not honored by the management system or a management agency. The management system is effectively continuing implementation of agreed management measures.	**NA**
1.3 There is evidence that the mechanism described in the process parameter is effective at ensuring the stock is sustainably exploited. This can take the form of evidence that the stock is not overfished or subject to overfishing across the entirety of the range of the stock.	**Yes**
1.3.1 Implementation of measures to achieve the common objectives mentioned above (i.e., similar harvest rates based on stock status, common rebuilding objectives for depleted stocks).	**NA**
1.4 Relevant measures are implemented by non-member States.	**NA**
1.4.1 The vies of the managing fishery organization are taken into account.	**NA**
1.5 Level of activity, application, and level of engagement.	**Yes**
1.6 The fishery management organizations and arrangements are currently financed using a cost recovery or other system.	**Yes**
1.6.1 There is regulation that directs for vessels to be flagged outside the State's jurisdiction. The fishery for the stock under consideration occurs outside EEZ, and there are flags of convenience operations present, or evidence of IUU fishing.	**NA**
1.7 If, as a result of the review process, it is determined that management measures are not achieving the specific management objectives they are designed to achieve, they are revised and updated as appropriate.	**Yes**
1.8 There is transparency in management arrangements. Please note that both the management processes of the NPFMC for federal waters, and the BOF for state waters, shall be clearly documented to provide evidence for the transparency of these arrangements and decision-making processes.	**Yes**
1.9 There are laws regulating high seas fishing activity. Describe how they accomplish this.	**NA**

Rationale:
As noted in the rationale above for supporting clauses, there is a legally mandated management system that is in line with the fishery resource.
Annually, the Council develops harvest specifications based on information from the SSC, AP, Groundfish plan teams, the public, and any other relevant information (NPFMC, 2023) In addition, the Guidelines for FMPs published by NMFS require that a SAFE report be prepared and reviewed annually for each FMP. Final harvest specifications are implemented by mid-February each year to replace those already in effect for the current year and based on new information contained in the latest SAFE reports (NPFMC 2023). This fishery operates only in Alaska's EEZ so sub clauses and evaluation parameters referring to transboundary stocks or fishing on the high seas are not applicable.

Evaluation Parameter Rationale – Evidence Basis	Met? (Yes/No/NA)
1.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that an effective legal and administrative framework established at the local and national level is appropriate for fishery resource conservation and management. In addition, the management system and the fishery operate in compliance with the requirements of local, national, and international laws and regulations, including the requirements of any regional fisheries management agreement. Examples may include fishery management plans or other relevant information.	**Yes**
1.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that management measures consider (1) the stock status over its entire area of distribution, (2) the area through which the stock migrates during its life cycle, and (3) other biological characteristics of the stock. Examples may include the presence of genetic studies, age structure data, stock assessments or other relevant information.	**Yes**
1.2.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that previously agreed management measures established and applied in the same region are taken into account by management.	**Yes**
1.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that where transboundary, shared, straddling, highly migratory, or high seas fish stocks are exploited by two or more States, the applicant and appropriate management organizations concerned cooperate and take part in formal fishery discussions or arrangements that have been appointed to ensure effective conservation and management of the stock(s) and fisheries in question. Examples may include evidence of formal agreements, records of meetings, and decisions.	**NA**
1.3.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that conservation and management measures established for the stock within the jurisdiction of the relevant States for shared, straddling, high seas, or highly migratory stocks, are compatible in a manner consistent with the rights, competences, and interests of the States concerned. Examples may include evidence of formal agreements, records of meetings and decisions, stock assessment, and other reports.	**NA**
1.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the State nonmember or participant of a sub-regional or regional fisheries management organization cooperates, in accordance with relevant international agreements and law, in the conservation and management of the relevant fisheries resources by giving effect to any relevant measures adopted by such organization or arrangement. Examples may include reports detailing results of common surveys or acceptable harvest rates.	**NA**
1.4.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that a fishery management organization seeking to take any action through a non-fishery organization which may affect the conservation and management measures taken by a competent sub-regional or regional fisheries management organization or arrangement consults with the latter, in advance to the extent practicable, and take its views into account. Examples may include reports detailing action taken by the State(s) in question.	**NA**
1.5 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the applicant's fishery management system, when appropriate for the stock under consideration, fosters active international cooperation on fishery matters with regard to information gathering and exchange, fisheries research, fisheries management, and	**Yes**

fisheries development. Example of evidence sources may include outputs from activity (e.g., reports, minutes, common or collective themes).	
1.6 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there is agreement on the means by which the activities of such organizations and arrangements are financed. Where appropriate, and when possible, such organizations and arrangements aim to recover the costs of fisheries conservation, management, and research. Examples may include data showing the expenditure and cost recovery derived from fisheries management.	**Yes**
1.6.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the State or fishery management organizations encourages banks and financial institutions not to require, as a condition of a loan or mortgage, fishing vessels or fishing support vessels to be flagged in a jurisdiction other than that of the State of beneficial ownership where such a requirement would have the effect of increasing the likelihood of non-compliance with international conservation and management measures. Examples may include data showing fishery operation by vessels flying a flag different from that of the State where fishing geographically occurs.	**NA**
1.7 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that within the fishery management system, procedures are in place to keep the efficacy of current conservation and management measures and their possible interactions under continuous review, and to revise or abolish them in the light of new information. Examples may include data showing recent regulation or management plan revisions.	**Yes**
1.8 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the management arrangements and decision-making processes for the fishery are organized in a transparent manner. Examples may include records of the management arrangements and decision-making processes.	**Yes**
1.9 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization is party to the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, or has adopted laws and regulations consistent with the provisions of the Agreement. Examples may include reports on the management of high seas fishing activities.	**Yes**
Rationale: As noted above, the process used by the Council for decision-making is described in the SOPP, and mandated by the MSA. Evidence of the review process and transparent management system can be seen in the BSAI and GOA FMPs, meeting minutes, and in the SAFE reports. The Council also developed a groundfish work plan that integrates the management objectives with recent, current, ongoing, and pending Council actions and statements. The status of this work plan is updated at every meeting and is reviewed under the "Staff Tasking" agenda item. The work plan includes cumulative actions taken by the Council under the policy since 2004. The addition of actions over the course of each year contributes to that list and facilitates the mandatory annual review of the policy (NPFMC, 2023).	

	Starting score	**- (Number of EPs NOT met x 3) =**	**Overall score**
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: **(10 = High; 4 or 7 = Medium; 1 = Low)**			**High**
Corresponding Conformance Level: **(10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)**			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 2

Management organizations shall participate in coastal area management, decision-making processes and activities related to the fishery and its users, supporting sustainable and integrated resource use, and conflict avoidance.

Supporting Clause		Met? (Yes/No/NA)
2.1	*Within the fisheries management organization's jurisdiction, an appropriate policy, legal, and institutional framework shall be adopted in order to achieve sustainable and integrated use of living marine resources, (1) taking into account the fragility of coastal ecosystems and finite nature of their natural resources, (2) allowing for determination of the possible uses of coastal resources and governing access to them, and (3) recognizing the rights and needs of coastal communities and their customary practices to the extent compatible with sustainable development. In setting policies for the management of coastal areas, States shall take due account of the risks and uncertainties involved.*	**Yes**
2.1.1	*States shall establish mechanisms for cooperation and coordination in planning, development, conservation, and management of coastal areas.*	**Yes**
2.1.2	*The fisheries management organization shall ensure that the authority or authorities representing the fisheries sector and fishing communities in the coastal management process have the appropriate technical capacities and financial resources.*	**Yes**
2.2	*Representatives of the fisheries sector and fishing communities shall be consulted in the decision-making processes involving activities related to coastal area management planning and development. The public, as well as others affected, shall also be kept aware of the need for protection and management of coastal resources, and shall participate in the management process.*	**Yes**
2.3	*Fisheries practices that avoid conflict among fishers and other users of the coastal area (e.g., fisheries enhancement facilities, tourism, energy) shall be adopted, and fishing shall be regulated in such a way as to avoid risk of conflict among fishers using different vessels, gear, and fishing methods. Procedures and mechanisms shall be established at the appropriate administrative level to settle conflicts that arise within the fisheries sector and between fisheries resource users and other coastal users.*	**Yes**
2.4	*States' fisheries management organizations and sub-regional or regional fisheries management organizations and arrangements shall give due publicity to conservation and management measures and ensure that laws, regulations, and other legal rules governing their implementation are effectively disseminated. The bases and purposes of such measures shall be explained to users of the resource in order to facilitate their application and thus gain increased support in the implementation of such measures.*	**Yes**
2.5	*The economic, social, and cultural value of coastal resources shall be assessed by the appropriate fisheries management organization in order to assist decision making on their allocation and use.*	**Yes**
2.6	*States shall cooperate to support and improve coastal area management, and in accordance with capacities, measures shall be taken to establish or promote (1) systems for research and monitoring of the coastal environment, and (2) multidisciplinary research of the coastal area using physical, chemical, biological, economic, social, legal, and institutional capabilities.*	**Yes**
2.7	*In the case of activities that may have an adverse environmental effect on coastal areas of other States, States shall provide timely information and if*	**Yes**

	possible, prior notification to potentially affected States, and consult with those States as early as possible.	

Rationale

In managing the Alaska mackerel and rockfish fisheries, NMFS, in conjunction with the Council and Alaska Department of Fish & Game (ADFG), participate in coastal area management-related issues through processes established by the National Environmental Policy Act (NEPA), which requires that all federal agencies' funding or permitting decisions be made with full consideration of the impact to the natural and human environment. An environmental review process is required that includes a risk evaluation and evaluation of alternatives including a "no action" alternative. The Council and the BOF system were designed so that fisheries management decisions were made at the regional level to allow input from affected stakeholders. Council meetings are open, and public testimony is taken on issues prior to deliberations and final decisions. In doing so, the management organizations within Alaska and their management processes take into account the rights of coastal fishing communities and their customary practices to the extent compatible with sustainable development (**SC 2.1; 2.1.1; 2.1.2**).

The Council and BOF websites actively encourage and demonstrate participation by stakeholders at their respective public meetings and cover a wide range of topics regarding the use, development and management of coastal resources. Potential conflict between fishermen and other coastal users at the federal level are usually discussed and resolved through the NEPA process and, at the state level, through the BOF public meeting process or regional committee established as part of the state's land use and access planning processes (**SC 2.2; 2.3; 2.4).**

As part of the management approach of the Council, identification of legal gear types and seasons to distribute harvest are implemented to avoid gear conflicts, reduce bycatch and marine mammal interactions **(SC 2.3)**. There are also community protections, where harvest quotas are set aside for communities. The Groundfish Management Objectives in the FMPs are reviewed annually by the Council in order to modify, eliminate, or consider new issues to best carry out the goals and objectives of its management policy. These objectives include: prevent overfishing, promote sustainable fisheries and communities, preserve the food web, manage incidental catch and reduce bycatch and waste, avoid impacts to seabirds and marine mammals, reduce and avoid impacts to habitat, promote equitable and efficient use of fishery resources, increase Alaska Native consultation, and improve data quality, monitoring and enforcement[9] **(SC 2.1; 2.4; 2.5; 2.6).**

Canada abuts the U.S. border to the south and shares certain fisheries resources, however the GOA stocks are not considered to be transboundary. The United States and Canada have a very strong working relationship at both the national and regional levels. In cases involving boundary disputes and treaties governing fishery access, the USCG, NOAA, and Canadian Department of Fisheries and Oceans (DFO) along with Canadian Coast Guard counterparts have effectively coordinated living marine resource enforcement efforts despite occasional related political and economic tensions. There are established agreements and shared management and working practice (e.g., International Pacific Halibut Commission (IPHC), Pacific Salmon Treaty, an agreement between the U.S. and Canada on enforcement**) (SC 2.1.1; 2.3).**

The technical capacities of the federal and state agencies involved in the management of Alaska Atka mackerel and rockfish are significant, and include internationally recognized scientists, experienced fishery managers and policy makers and highly professional and trained enforcement officers. Appropriate technical and financial resources are in place. A joint protocol is in place between the Council and ADFG which provides the intent to provide long term cooperative, compatible management systems that maintain the sustainability of the fisheries resources in federal and state waters (**SC 2.1.1).**

The MSA requires the Council and other groups (BOF, ADGF, etc.) to hold public meetings within their respective regions to discuss the development and amendment of FMPs. These meetings are publicized by the Council and stakeholders actively encouraged to participate changes and allow input from stakeholders. The BOF website publishes information on forth-coming BOF meetings including the "Proposal Book" which details proposed ADFG or stakeholder-requested changes that might lead to regulatory change. Stakeholders are actively encouraged to participate at the meetings and submit proposal prior to the meetings. The OLE and AWT put an emphasis on educating and informing stakeholders of new regulatory changes and other important fishery related matters. (**SC 2.4)**

The Community Development Quota (CDQ) program was created by the Council in 1992 to provide western Alaska communities an opportunity to participate in the BSAI fisheries that had been foreclosed to them because of the high capital investment needed to enter the fishery. The program involves eligible communities who have formed six regional organizations, referred to as CDQ groups. There are 65 communities within a 50-mile radius of the BS coastline who participate in the program. The CDQ program allocates a percentage of the BSAI quotas to CDQ groups. The program is reviewed every 10 years, with the last review occurring in 2012. Analysis by the State of Alaska in 2013 determined that each CDQ entity had maintained or improved

[9] https://www.npfmc.org/how-we-work/management-policies/

performance against its objectives. The CDQ program provides an example of how the management system takes account of the allocation and use of coastal resources with respect to their economic, social and cultural value **(SC 2.4; 2.5).**

A considerable amount of monitoring of the coastal environment in Alaska is conducted and supported by multiple federal and state agencies (e.g., NMFS, AFSC, ADFG, universities such as the University of Alaska Fairbanks' Institute of Marine Science, and organizations that support and facilitate marine research such as the North Pacific Research Board [NPRB]). The NPRB have helped fund two major projects in the Alaska region: The Bering Sea Project and the Gulf of Alaska Ecosystem Study. AFSC has established the Ecosystem Monitoring and Assessment Program with an overall goal to improve and reduce uncertainty in stock assessment models of commercially important fish species through the collection of observations of fish and oceanography (**SC 2.5; 2.6).**

The Ecosystem-based fisheries management approach taken by the Council recognizes the interactions within an ecosystem rather than considering a single species or issue in isolation. The primary purpose of EBFM as viewed by the Alaska Region's partners and stakeholders is to manage and conserve fish stocks in the context of the ecosystem as a whole. Recent EBFM considerations in the Alaska Region have included a focus on the role of humans in the ecosystem and the importance of maintaining healthy fishing communities. Within the BS Fisheries Ecosystem Plan (FEP) and the AI FEP, the Council has progressed on EBFM, that provides a clear record for the Council's ecosystem-based policy decision making, while applying policies that are suited to Alaskan circumstances.[10] (**SC 2.5; 2.6)**

The State of Alaska is represented in the Oil Spill Task Force by the Department of Environmental Conservation. Its Division of Spill Prevention and Response prevents spills of oil and hazardous substances, prepares for when a spill occurs and responds rapidly to protect human health and the environment. The Oil Spill Recovery Institute located in PWS conducts research into oil spills and their effects on the Alaskan environment, particularly the natural resources in PWS **(SC 2.7).**

Evaluation Parameter Rationale - Process	**Met? (Yes/No/NA)**
2.1 A mechanism exists by which the integrated management of multiple coastal area uses is conducted, the possible uses of coastal resources are assessed, and access to them is governed. Accordingly, policies for the management of the coastal area are set. Assessment teams shall document how existing authorities and/or processes cooperate and interact together to manage coastal resources (living and non-living) in a transparent, organized, and sustainable way that minimizes environmental issues while taking into account the socio-economic aspects, needs, and interests of the various stakeholders of the coastal zone.	**Yes**
2.1.1 There is a mechanism to allow cooperation between neighboring States to improve coastal resource management.	**Yes**
2.1.2 There are appropriate technical capacities and financial resources.	**Yes**
2.2 Describe how fishery-related information is disseminated and how a process is in place to consult with the fishery sector and fishing communities.	**Yes**
2.3 These practices have been adopted, and there is a process to regulate fishing gear, methods, and vessels so as to avoid risk of conflict. If conflicts arise, there is a process in place to settle conflicts between fishery users and other users.	**Yes**
2.4 There is a process that allows for fishery-related information to be disseminated.	**Yes**
2.5 There is a system that allows for socio-economic value assessments and cultural value assessments to be carried out.	**Yes**
2.6 There is a system that allows research and monitoring of the coastal environment, and multidisciplinary research in support of coastal area management is promoted.	**Yes**
2.7 There is a system to allow early information sharing (i.e., within appropriate timeframes to avoid negative consequences) between States in case of adverse environmental effects from one State.	**Yes**
Rationale: As noted in the rationale above, the Council management approach carries out its objectives by considering reasonable adaptive, management measures as described in the MSA and in conformance with the National Standards, the Endangered Species Act, the NEPA, and other applicable law. The Council has a public, transparent process that describes the meeting process, including how to participate, how to get involved in the process and the steps involved to implement regulation from ideas brought to the Council by public testimony or the many advisory bodies. Evidence can be found in FMP amendments, meeting minutes, SAFE documents and in the harvest allocations.	

[10] https://www.npfmc.org/fisheries-issues/issues/ebfm/

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	Met? (Yes/No/NA)
2.1 The coastal management framework includes explicit consideration of the fragility of coastal ecosystems, the finite nature of coastal resources, and the needs of coastal communities, and accounts for the rights and customary practices of coastal communities. These policies take due account of risks and uncertainties.	**Yes**
2.1.1 There are records of cooperation. Examples may include fishery, fishery enhancement, or other agreements or records from international forums.	**Yes**
2.1.2 It can be determined with confidence that there are appropriate technical capacities and financial resources.	**Yes**
2.2 There are records of consultations with the fisheries sector and fishing communities. Attempts have been made to create public awareness on the need for protection and management of coastal resources, and those affected by the management process have been made aware of its provision.	**Yes**
2.3 Describe these practices and their effectiveness within the fishery sector, and between fishers and other coastal users.	**Yes**
2.4 There is a record of the disseminated information, and is it disseminated effectively, and the basis and purposes of such regulation explained to users.	**Yes**
2.5 There are socio-economic value assessments and cultural value assessments, both of which are effectively assisting decision making on resource allocation and use.	**Yes**
2.6 Systems of monitoring and research have taken into account physical, chemical, biological, economic, social, legal, and institutional capabilities to support coastal area management.	**Yes**
2.7 There are current agreements for or past records of such occurrences. Examples may include oil spills, and aquaculture farm escapes among others.	**Yes**
Rationale: As noted in the rationale above, there several records and implemented programs that consider the fisheries in the context of the ecosystem as a whole. This can be seen in the FMPs, Ecosystem Plans, meeting minutes from the Council and BOF and SAFE Reports. The Alaska Division of Spill Prevention and Response lists summaries and situation reports that have the potential to significantly impact human health. Active and historic summaries dating back to 2003 are available through links at the following website: https://dec.alaska.gov/spar/ppr/spill-information/response/. Other adverse environmental occurrences include evaluating the impact of climate change in Alaska and records of these events can be found at the U.S. Fish and Wildlife Service, national Wildlife Refuge, Alaska Region; the US Environmental Protection Agency (EPA) and in the United States National Climate Assessment – Alaska.	

Evaluation Parameter Rationale – Evidence Basis	Met? (Yes/No)
2.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that within the fisheries management organization's jurisdiction, an appropriate policy within the legal and institutional framework has been adopted in order to achieve sustainable and integrated use of living marine resources. Examples may include coastal management plans or other policy documents, and frameworks for resource/coastal management.	**Yes**
2.1.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that within the fisheries management organization's jurisdiction, an appropriate policy within the legal and institutional framework has been adopted in order to achieve sustainable and integrated use of living marine resources. Examples may include reports or data on the or data on the international cooperation/information exchange in these events.	**Yes**
2.1.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fisheries management organization ensures that the authority or authorities representing the fisheries sector and fishing communities in the coastal management process have the appropriate technical capacities and financial resources. Examples may include reports or data, overall operating staff, and financial resources/budgets available.	**Yes**
2.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that representatives of the fisheries sector and fishing communities are consulted in the decision-making processes and involved in other activities related to coastal area management planning and development. The public, and others affected,	**Yes**

are also kept aware of the need for the protection and management of coastal resources, and are participants in the management process. Examples may include public records of consultation activities and other available documentation published on the internet or distributed at public meetings.	
2.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fisheries practices that avoid conflict among fishers and other users of the coastal area (e.g., fisheries enhancement facilities, tourism, energy) are adopted and fishing is regulated in such a way as to avoid risk of conflict among fishers using different vessels, gear, and fishing methods. Procedures and mechanisms are established at the appropriate administrative level to settle conflicts that arise within the fisheries sector, and between fisheries resource users and other coastal users. Examples may include laws and regulations or other documents.	**Yes**
2.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States' fisheries management organizations and sub-regional or regional fisheries management organizations and arrangements give due publicity to conservation and management measures and ensure that laws, regulations and other legal rules governing their implementation are effectively disseminated. The bases and purposes of such measures are explained to users of the resource in order to facilitate their application and thus gain increased support in the implementation of such measures. Examples may include records of such management measures published in the internet or distributed at public meetings.	**Yes**
2.5 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the economic, social, and cultural value of coastal resources is assessed in order to assist decision decision-making on their allocation and use. Examples may include reports on social, cultural, and economic value of the resource.	**Yes**
2.6 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there is cooperation to support and improve coastal area management, and in accordance with capacities, measures are taken to establish or promote (1) systems for research and monitoring of the coastal environment, and (2) multidisciplinary research of the coastal area using physical, chemical, biological, economic, social, legal, and institutional capabilities. Examples may include reports on the status of the coastal area using the various aspects listed above.	**Yes**
2.7 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the case of a States' activities that may have an adverse environmental effect on coastal areas of other States, the State provides timely information and if possible, prior notification to potentially affected States. Examples may include reports or data on the international cooperation in these events.	**Yes**
Rationale: See rationale above.	

	Starting score	**- (Number of EPs NOT met x 3) =**	**Overall score**
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: **(10 = High; 4 or 7 = Medium; 1 = Low)**			**High**
Corresponding Conformance Level: **(10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)**			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 3

Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.

Supporting Clause	**Score**

3.1	*Long-term management objectives shall be translated into a plan or other management document (taking into account uncertainty and imprecision) and be subscribed to by all interested parties.*	**Yes**
3.1.1	*There shall be management objectives seeking to ensure that **ETP species** are protected from adverse impacts resulting from interactions with the unit of certification and any fisheries enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.*	**Yes**
3.1.2	*There shall be management objectives seeking to avoid, minimize, or mitigate impacts of the unit of certification on the stock under consideration's essential habitats, and on habitats that are highly vulnerable to damage by the unit of certification's fishing gear.*	**Yes**
3.1.3	*There shall be management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhancement) on the structure, and function of the ecosystems that are likely to be irreversible or very slowly reversible.*	**Yes**
3.2	*Management measures shall provide, inter alia, that:*	**-**
3.2.1	*Excess fishing capacity shall be avoided and exploitation of the stocks shall remain economically viable.*	**Yes**
3.2.2	*The economic conditions under which fishing industries operate shall promote responsible fisheries.*	**Yes**
3.2.3	*The interests of fishers, including those engaged in subsistence, small-scale, and artisanal fisheries shall be taken into account.*	**Yes**
3.2.4	*Biodiversity of aquatic ecosystems shall be conserved and ETP species shall be protected. Where relevant, there shall be pertinent objectives, and as necessary, management measures.*	**Yes**

Rationale

The MSA, National Standards and other legislation include explicit, well-defined short- and long-term objectives for sustainable fishing and conservation. NMFS incorporated precautionary concepts to ensure compliance with the Sustainable Fisheries Act 1996, which includes 10 National Standards for conservation and management of fisheries in the U.S. The National Standards for fishery management and the National Standard Guidelines require that: "The fishing mortality rate does not jeopardize the capacity of a stock or stock complex to produce MSY." The National Standards are further interpreted through the National Standard Guidelines, required by the MSA and developed and published by NMFS. The National Standard Guidelines for National Standard 1 require that: "when specifying limits and accountability measures intended to avoid overfishing and achieve sustainable fisheries, Councils must take an approach that considers uncertainty in scientific information and management control of the fishery. These guidelines describe how to address uncertainty such that there is a low risk that limits are exceeded." Since 2007, the MSA has required that all FMPs include catch limits and accountability measures that are intended to ensure that overfishing cannot reduce a stock below the level that will produce MSY on a continuing basis (NOAA, 2018; MSA, 2007). The management approach of the Council carries out objectives by considering reasonable, adaptive management measures, as described in the MSA and in conformance with the National Standards, the ESA, the NEPA, and other applicable law (NPFMC, 2020; 2020b). **(SC 3.1; 3.2.1; 3.2.2).**

The U.S measures for regulating the BSAI and GOA fisheries are found in 50 CFR 600 and 50 CFR 679. Gear types authorized by the FMP are trawls, hook-and-line, pots, jigs, and other gear as defined in regulations. The fishery is primarily managed by required licenses and/or permits, fishing seasons, annual TACs, closed areas, catch restrictions. Annually, the Council develops harvest specifications based on information from the Groundfish Plan Teams, SSC, AP, the public, and any other relevant information. Harvest specifications include overfishing limit, acceptable biological catch (ABC), total allowable catch (TAC), ABC surplus and ABC reserve. Final harvest specifications are implemented by mid-February each year to replace those in effect for that year

and based on new information contained in the latest groundfish SAFE reports. Current harvest specifications can be found at the following link: https://www.npfmc.org/fisheries-issues/issues/harvest-specs/.

The fishery management goal, according to the BSAI and GOA FMPs (NPFMC 2020; NPFMC 2020b) is to provide sound conservation of the living marine resources; provide socially and economically viable fisheries for the well-being of fishing communities; minimize human-caused threats to protected species; maintain a healthy marine resource habitat; and incorporate ecosystem-based considerations into management decisions. This management approach recognizes the need to balance many competing uses of marine resources and different social and economic goals for sustainable fishery management, including protection of the long-term health of the resource and the optimization of yield. This policy will use and improve upon the Council's existing open and transparent process of public involvement in decision-making.
The following procedure is used to specify TACs for every groundfish stock and stock complex managed by the FMP:
1. Determine the ABC for each managed stock or stock complex. ABCs are recommended by the SSC based on information presented by the Plan Team.
2. Determine a TAC based on biological and socioeconomic information. The TAC must be lower than or equal to the ABC. The TAC may be lower than the ABC if warranted on the basis of bycatch considerations, management uncertainty, or socioeconomic considerations; or if required in order to cause the sum of the TACs to fall within the OY range.
3. Sum TACs for "target species" to assure that the sum is within the optimum yield range specified for the groundfish complex in the FMP. If the sum falls outside this range, the TACs must be adjusted.
When TACs for the groundfish complex are determined by the Council, 15 percent of the sum of the TACs is set aside as a reserve. This reserve is used for: a) correction of operational problems in the fishing fleets, to promote full and efficient use of groundfish resources; b) adjustments of species TACs according to the condition of stocks during the fishing year; and c) apportionments. **(SC 3.2.1; 3.22)**

Within both the BSAI and GOA Groundfish FMPs, there are clear short and long-term objectives that are consistent with achieving the outcomes of conservation of the target stocks, non-target species and the surrounding habitat. The following objectives are directly from the BSAI and GOA Groundfish FMP (NPFMC, 2020; 2020b).
Prevent Overfishing:
1. *Adopt conservative harvest levels for multi-species and single species fisheries and specify optimum yield.*
2. Continue to use the 2 million mt optimum yield cap for the BSAI groundfish fisheries. [Continue to use the existing optimum yield cap for the GOA groundfish fisheries.]
3. Provide for adaptive management by continuing to specify optimum yield as a range.
4. Provide for periodic reviews of the adequacy of F40 and adopt improvements, as appropriate.
5. Continue to improve the management of species through species categories.
Promote Sustainable Fisheries and Communities:
6. *Promote conservation while providing for optimum yield in terms of the greatest overall benefit to the nation with particular reference to food production, and sustainable opportunities for recreational, subsistence, and commercial fishing participants and fishing communities.*
7. Promote management measures that, while meeting conservation objectives, are also designed to avoid significant disruption of existing social and economic structures.
8. Promote fair and equitable allocation of identified available resources in a manner such that no particular sector, group or entity acquires an excessive share of the privileges.
9. Promote increased safety at sea.
Preserve Food Web:
10. *Develop indices of ecosystem health as targets for management.*
11. Improve the procedure to adjust acceptable biological catch levels as necessary to account for uncertainty and ecosystem factors.
12. Continue to protect the integrity of the food web through limits on harvest of forage species.
13. Incorporate ecosystem-based considerations into fishery management decisions, as appropriate.
Manage Incidental Catch and Reduce Bycatch and Waste:
14. Continue and improve current incidental catch and bycatch management program.
15. Develop incentive programs for bycatch reduction including the development of mechanisms to facilitate the formation of bycatch pools, vessel bycatch allowances, or other bycatch incentive systems.
16. Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits, as information becomes available.
17. Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce bycatch which includes economic discards.
18. Continue to manage incidental catch and bycatch through seasonal distribution of total allowable catch and geographical gear restrictions.

19. Continue to account for bycatch mortality in total allowable catch accounting and improve the accuracy of mortality assessments for target, prohibited species catch, and non-commercial species.
20. Control the bycatch of prohibited species through prohibited species catch limits or other appropriate measures.
21. Reduce waste to biologically and socially acceptable levels.
Avoid Impacts to Seabirds and Marine Mammals:
22. *Continue to cooperate with U.S. Fish and Wildlife Service (USFWS) to protect ESA-listed species, and if appropriate and practicable, other seabird species.*
23. Maintain or adjust current protection measures as appropriate to avoid jeopardy of extinction or adverse modification to critical habitat for ESA-listed Steller sea lions.
24. *Encourage programs to review status of endangered or threatened marine mammal stocks and fishing interactions and develop fishery management measures as appropriate.*
25. Continue to cooperate with NMFS and USFWS to protect ESA-listed marine mammal species, and if appropriate and practicable, other marine mammal species.
Reduce and Avoid Impacts to Habitat:
26. Review and evaluate efficacy of existing habitat protection measures for managed species.
27. Identify and designate essential fish habitat and habitat areas of particular concern pursuant to Magnuson-Stevens Act rules, and mitigate fishery impacts as necessary and practicable to continue the sustainability of managed species.
28. Develop a Marine Protected Area policy in coordination with national and state policies.
29. Encourage development of a research program to identify regional baseline habitat information and mapping, subject to funding and staff availability.
30. Develop goals, objectives and criteria to evaluate the efficacy and suitable design of marine protected areas and no-take marine reserves as tools to maintain abundance, diversity, and productivity. Implement marine protected areas if and where appropriate.
Promote Equitable and Efficient Use of Fishery Resources:
31. Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources.
32. Maintain the license limitation program, modified as necessary, and further decrease excess fishing capacity and overcapitalization by eliminating latent licences and extending programs such as community or rights-based management to some or all groundfish fisheries.
33. Provide for adaptive management by periodically evaluating the effectiveness of rationalization programs and the allocation of access rights based on performance.
34. Develop management measures that, when practicable, consider the efficient use of fishery resources taking into account the interest of harvesters, processors, and communities.
Increase Alaska Native Consultation:
35. Continue to incorporate local and traditional knowledge in fishery management.
36. Consider ways to enhance collection of local and traditional knowledge from communities, and incorporate such knowledge in fishery management where appropriate.
37. Increase Alaska Native participation and consultation in fishery management.
Improve Data Quality, Monitoring and Enforcement:
38. Increase the utility of groundfish fishery observer data for the conservation and management of living marine resources.
39. Develop funding mechanisms that achieve equitable costs to the industry for implementation of the North Pacific Groundfish Observer Program.
40. Improve community and regional economic impact costs and benefits through increased data reporting requirements.
41. Increase the quality of monitoring and enforcement data through improved technology.
42. Encourage a coordinated, long-term ecosystem monitoring program to collect baseline information and compile existing information from a variety of ongoing research initiatives, subject to funding and staff availability.
43. Cooperate with research institutions such as the North Pacific Research Board in identifying research needs to address pressing fishery issues.
44. Promote enhanced enforceability.
45. Continue to cooperate and coordinate management and enforcement programs with the Alaska Board of Fish, Alaska Department of Fish and Game, and Alaska Fish and Wildlife Protection, the U.S. Coast Guard, NMFS Enforcement, International Pacific Halibut Commission, Federal agencies, and other organizations to meet conservation requirements; promote economically healthy and sustainable fisheries and fishing communities; and maximize efficiencies in management and enforcement programs through continued consultation, coordination, and cooperation. **(SC 3.1, 3.1.1, 3.1.2, 3.1.3, 3.2.1, 3.2.2, 3.2.3, 3.2.4)**

As noted above, the National Standards require an approach that considers uncertainty such that there is low risk that limits are exceeded. The precautionary approach is further highlighted in the management approach for

BSAI & GOA groundfish fisheries, stating that "*the Council intends to consider and adopt, as appropriate, measures that accelerate the Council's precautionary, adaptive management approach through community-based or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and where appropriate and practicable, increase habitat protection and bycatch constraints. All management measures will be based on the best scientific information available. Given this intent, the fishery management goal is to provide sound conservation of the living marine resources; provide socially and economically viable fisheries for the well-being of fishing communities; minimize human-caused threats to protected species; maintain a healthy marine resource habitat; and incorporate ecosystem-based considerations into management decisions."* **(SC 3.1, 3.1.1, 3.1.2, 3.1.3, 3.2.1, 3.2.2, 3.2.3, 3.2.4).**

Evaluation Parameter Rationale - Process	**Met? (Yes/No/NA)**
3.1 Management objectives based on the best scientific evidence available (which can include traditional/local knowledge, if verifiable) have been translated into a fishery management plan, are in regulation, or are in another document.	**Yes**
3.1.1 There is a process that allows for setting specific management objectives in fishery management plans or other relevant regulation (or other appropriate frameworks) for the protection of ETP species.	**Yes**
3.1.2 There is a mechanism in place by which the essential habitat of the stock under consideration and the potential impacts of the fishery (i.e., employing bottom contact gear) upon them are identified. This or a similar mechanism shall also be in place to identify habitats which are highly vulnerable to fishery activities by the unit of certification. The information provided by these mechanisms shall be used to produce specific management objectives seeking to avoid significant negative impacts on habitats. When identifying highly vulnerable habitats, their value to ETP species shall be also considered, with habitats essential to ETP species being categorized accordingly. Note that this clause shall consider Alaska-specific designation of important and essential fish habitats categorized as such at the state and federal level. Such objectives may be outlines in overarching fisheries legislation, regulations, or management plans.	**Yes**
3.1.3 There is a process in place by which adverse impacts of the fishery (including any fishery enhancement) on the structure, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible are identified. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored. This process results in setting relative management objectives. Management priority shall be focused primarily towards minimizing and avoiding identified impacts.	**Yes**
3.2 None – this is a summary clause and is not scored.	**N/A**
3.2.1 There are management measures in place to limit and/or reduce the total fishing capacity of the unit of certification. These measures shall include specific fishing capacity objective(s), which themselves are based on the best scientific evidence available to understand the level of fishing pressure appropriate to ensure the long-term sustainability of the fishery. Please note that assessors should ensure that catches are within limits, and that data from enforcement show an adequate level of compliance with fisheries laws and regulation.	**Yes**
3.2.2 Where best scientific evidence available determines that it is necessary, there are management measures in place to ensure the economic conditions under which the fishery operates promote responsible fisheries.	**Yes**
3.2.3 There is a system or process in place that identifies the interests of small-scale fishers, either through stakeholder engagement or social research, in a way, which permits the utilization of the information during the management measure development process.	**Yes**
3.2.4 There are management measures in place specifically designed to ensure that the biodiversity of aquatic ecosystems are conserved and ETP species are protected. This shall reflect the existence of specific management objectives and measures, which are based on the best scientific evidence available.	**Yes**

Rationale:

The MSA requires that conservation and fisheries' management measures prevent overfishing while achieving optimal yield (OY) on a continuing basis. NMFS and the Council follow a multi-faceted precautionary approach, including overfishing Limits (OFL), acceptable biological catch (ABC), TAC, and OY to manage the federal Alaska mackerel and rockfish fisheries, based on targets, limits, and pre-defined harvest control rules (HCRs), as well as overall ecosystem considerations (e.g., the OY limits). The fisheries management system is supported by high

level science, and management measures have been generally effective in avoiding overfishing and promoting responsible fishing. Objectives for the BSAI and GOA are set out in the FMPs and include the need to take into account socio-economic considerations. Estimates of ex-vessel value by area, gear, type of vessel, and species, are included in the annual Economic Status SAFE report see: https://www.fisheries.noaa.gov/tags/north-pacific-groundfish-stock-assessments), and each stock assessment SAFE also contains extensive economic data.

The GOA and BSAI FMPs describe management measures designed to consider the interests of subsistence, small-scale, and artisanal fisheries. Specific FMP management objectives include: the promotion of sustainable fisheries and communities, the promotion of equitable and efficient use of fishery resources and increase Alaska native consultation. Actions have been taken to minimize the bycatch of halibut and salmon, given its importance for subsistence and artisanal fisheries. The fishery dependence of coastal and western Alaska communities was addressed through the creation of the CDQ programs for the BSAI in the early to mid-1990s and the expansion of those programs into the multispecies CDQ program by 1999.

There are mechanisms developed to identify significant effects on essential fish habitat (EFH) and for identifying habitat areas of particular concern and are considered consistent with achieving management objectives for avoidance, minimization or mitigation of impacts on essential habitats for the “stock under consideration” and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification. This is further supported by habitat ecosystem indicators considered as part of the SAFE process. There are processes in place – primarily through FMPs, endangered species management plans and Biological Opinions and EISs of the various plans - that allow for direct and indirect impacts that are likely to have significant consequences to be addressed.

There are several processes in place which address actual or potential impacts identified through the monitoring of the groundfish fishery and the ecosystem supporting the fishery. The primary mechanism is the annual SAFE report. There are specific processes through NMFS and U.S. Fish and Wildlife Service (USFWS) to review potential impacts (generally indirect effects through changes in prey availability) on endangered species (through the Endangered Species Act, ESA) and marine mammals (Marine Mammal Protection Act, MMPA).

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	**Met? (Yes/No/NA)**
3.1 The objectives described by the management plan are consistent with the sustainable use of the resource, and are subscribed to by all relevant fishery stakeholders.	**Yes**
3.1.1 There are clear objectives in management plans or other relevant regulations (or other appropriate frameworks) seeking to ensure that ETP species are protected from adverse impacts resulting from interactions with the unit of certification and fishery enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible. Such objectives may be outlined in overarching fisheries legislation, regulations, or management plans.	**Yes**
3.1.2 There is evidence that the objectives described above are in place, and that effective management measures relative to those have been implemented.	**Yes**
3.2 None – this is a summary clause and is not scored.	**NA**
3.2.1 The fishing capacity of the unit of certification is at or below the level of the specific fishing capacity objective(s).	**Yes**
3.2.2 There is evidence for the general economic value of the resource and its benefit to fishermen. There is enforcement data that supports the occurrence of responsible fishing practices.	**Yes**
3.2.3 There is evidence that the interests of small-scale fishers are effectively taken into account during the development of management measures, and there is no evidence that small-scale fisheries are adversely impacted by any management measures currently in place.	**Yes**
3.2.4 The management measures currently in place have been successful in meeting the management objectives. Such objectives may be outlines in overarching fisheries legislation, regulations, or management plans. There is no evidence that the fishery is currently having a significant adverse impact on aquatic ecosystems, and it is not putting any ETP species at risk of extinction.	**Yes**
Rationale: As noted above, there are clear objectives in the MSA and FMPs. Evidence of these management measures and their overall effectiveness can be seen in SAFE reports, stock assessments, changes to amendments, etc. The 6 stocks considered in the present assessment report are above MSY level both in BSAI and in GOA (See below in the evidence basis EP).	

Evaluation Parameter Rationale – Evidence Basis	Met? (Yes/No)
3.1 *The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that scientifically based long-term management objectives consistent with the sustainable use of the resource are translated into a plan or other management document which is subscribed to by all interested parties. Examples may include fishery management plan/framework or legal rules.*	**Yes**
3.1.1 *The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are management objectives seeking to ensure that endangered species are protected from adverse impacts resulting from interactions with the unit of certification and any associated culture or enhancement activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible. Examples may include fishery management plans/framework or legal rules.*	**Yes**
3.1.2 *The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are management objectives seeking to avoid, minimize, or mitigate impacts of the unit of certification on the stock under consideration's essential habitats and on habitats that are highly vulnerable to damage by the unit of certification's fishing gear. Examples may include various regulations, fishery management plans, data, and reports.*	**Yes**
3.1.3 *The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are management objectives seeking to minimize adverse impacts of the fishery (including any enhancement activities) on the structure, processes, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible. Examples may include fishery management plans, other regulatory documents, or laws.*	**Yes**
3.2 *None*	**NA**
3.2.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that excess fishing capacity is avoided and exploitation of the stocks remains economically viable. Examples may include fishery reports on harvest recommendation or fleet reports.	**Yes**
3.2.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the economic conditions under which fishing industries operate promote responsible fisheries. Examples may include economic reports or enforcement data.	**Yes**
3.2.3 *The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the interests of fishers, including those engaged in subsistence, small-scale, and artisanal fisheries are taken into account. Examples may include dedicated quotas, public meeting records, laws, and regulations.*	**Yes**
3.2.4 *The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that biodiversity of aquatic ecosystems is conserved and ETP species are protected. Where relevant, there are management objectives, and as necessary, management measures. Examples may include laws and regulations, fisheries management plans, and species status reports.*	**Yes**

Rationale:

FMPs, protected species management plans, and biological opinion reviews are all supported by well-designed data-gathering programs and analyses, widely available through NMFS and Council websites. These are, in relation to the complexity of factors which may affect species dynamics, comprehensive and rigorous in their analysis.

The 6 stocks considered in the present reassessment report are above MSY level both in BSAI and in GOA (Figure 31 and Figure 32).

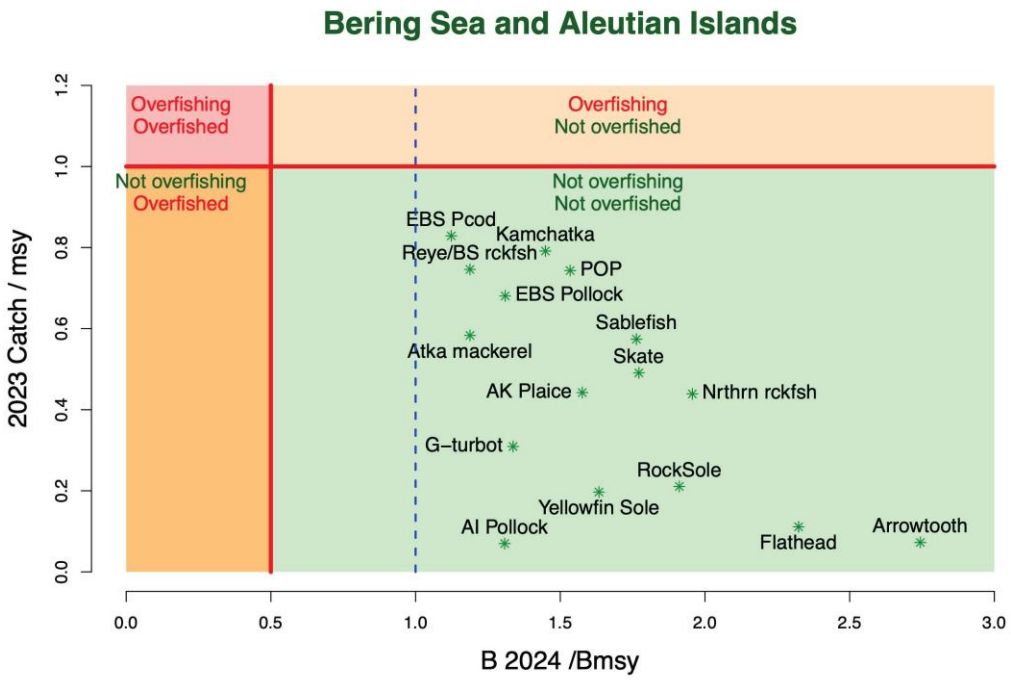


Figure 31 Summary of Bering Sea stock status next year (spawning biomass relative to BMSY; horizontal axis) and current year catch relative to fishing at FMSY (vertical axis) where FOFL is taken to equal FMSY. Source: Aydin et al., 2023.

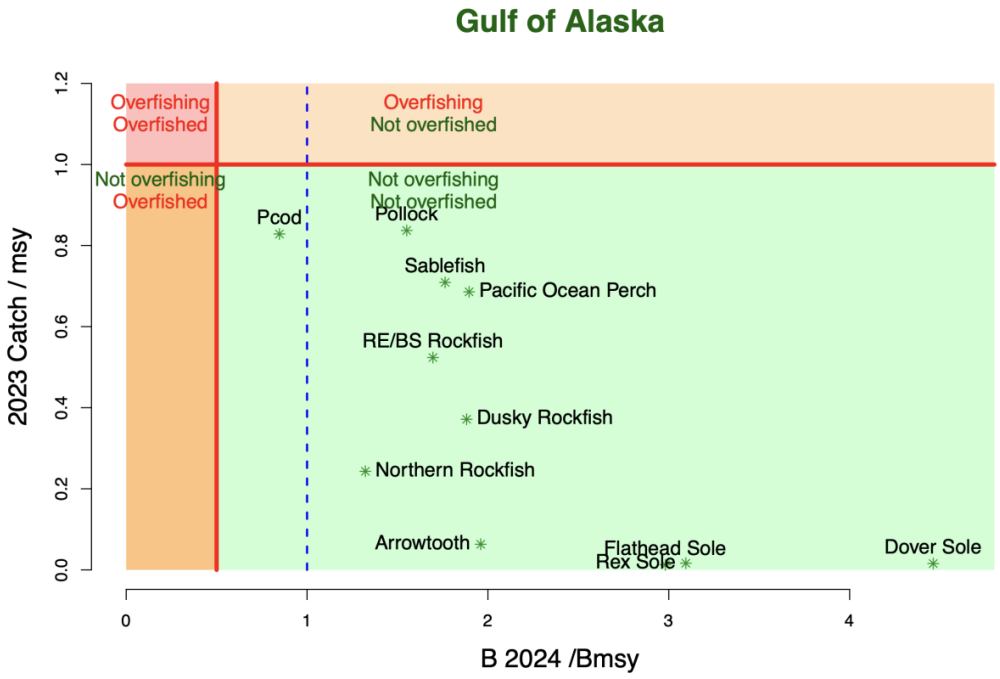


Figure 32 Summary of Gulf of Alaska stock status next year (spawning biomass relative to BMSY; horizontal axis) and current year catch relative to fishing at FMSY (vertical axis). Note that sablefish is for Alaska-wide values including the BSAI catches. Source: Adams et al., 2023

NOAA Fisheries issued the final rule to implement Amendment 123 to the BSAI FMP. This final rule amends the regulations governing limits on Pacific halibut (*Hippolgossus stenolepis*) prohibited species catch (PSC) to link the halibut PSC limit for the Amendment 80 commercial groundfish trawl fleet in the BSAI groundfish fisheries to halibut abundance. This is necessary to comply with the Magnuson Stevens Act (MSA) that FMPs minimize bycatch to the extent practicable. Effective date of the final rule was January 1, 2024.[11]

The North Pacific Fishery Management Council (NPFMC) reviewed the Fishery Management Plans (FMP) omnibus amendment analysis and proposed FMP amendment text based on the 2023 EFH 5 year Review. The Council took final action and selected Alternative 2, which is summarized as follows:
Alternative 2, the preferred alternative, will update the EFH information in the BSAI&GOA groundfish, BSAI crab and Arctic FMPs. These updates include updated EFH maps, text descriptions, results of the fishing effects (FE) on habitat, prey species tables, non-fishing effects report and research and information needs (NPFMC, 2023).

	Starting score	- (Number of EPs NOT met x 3) =	Overall score
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			**High**
Corresponding Conformance Level: (10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 4

There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.

4.1	*All significant fishery removals and mortality of the target species (shall be considered by management. Specifically, reliable and accurate data required for assessing the status of fishery(ies) and ecosystems—including data on retained catch, bycatch, discards, and waste— shall be collected. Data can include relevant traditional, fisher, or community knowledge, provided their validity can be objectively verified. These data shall be collected, at an appropriate time and level of aggregation, by relevant management organizations connected with the fishery, and provided to relevant States regional, and international fisheries organizations.*	**Yes**
4.1.1	*Timely, complete, and reliable statistics shall be compiled on catch and fishing effort and maintained in accordance with applicable international standards and practices, and in sufficient detail to allow sound statistical analysis for stock assessment. Such data shall be updated regularly and verified through an appropriate system. The use of research results as a basis for setting management objectives, reference points, and performance criteria, as well as for ensuring adequate linkage between applied research and fisheries management (e.g., adoption of scientific advice) shall be promoted. Results of analysis shall be distributed accordingly as a contribution to fisheries conservation, management, and development.*	**Yes**
4.1.2	*In the absence of specific information on the stock under consideration, generic evidence based on similar stocks can be used. However, the greater the risk of overfishing, the more specific evidence is necessary to ascertain the sustainability of intensive fisheries.*	**NA**
4.2	*An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures shall be established.*	**Yes**
4.2.1	*Where necessary, fisheries management organizations and regional fisheries management organizations and other such arrangements should strive to achieve a*	**Yes**

[11] https://www.federalregister.gov/documents/2023/11/24/2023-25513/fisheries-of-the-exclusive-economic-zone-off-alaska-bering-sea-and-aleutian-islands-halibut

	level and scope of observer programs sufficient to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.	
4.3	*A fisheries management organization, regional fisheries management organizations or arrangements shall compile data and make them available, in a manner consistent with any applicable confidentiality requirements, in a timely manner and in an agreed format to all members of these organizations and other interested parties in accordance with agreed procedures.*	**Yes**
4.4	*States shall stimulate the research required to support national policies related to fish as food.*	**Yes**
4.5	*There shall be sufficient knowledge of the economic, social, marketing, and institutional aspects of fisheries collected through data gathering, analysis, and research, as well as comparable data generated for ongoing monitoring, analysis, and policy formulation.*	**Yes**
4.6	*The fisheries management organization shall investigate and document traditional fisheries knowledge and technologies—in particular those applied to small-scale fisheries—in order to assess their application to sustainable fisheries conservation, management, and development.*	**Yes**
4.7	*If a fisheries management organization is conducting scientific research activities in waters of another State, it shall ensure that their vessels comply with the laws and regulations of that State and international law.*	**NA**
4.8	*Adoption of uniform guidelines governing fisheries research conducted on the high seas shall be promoted and, where appropriate, support the establishment of policies that include, inter alia, facilitating research at the international and sharing the research results with affected States.*	**NA**
4.9	*If appropriate, the fisheries management organization and relevant international organizations shall promote and enhance the research capacities of developing countries, inter alia, in the areas of data collection and analysis, information, science and technology, human resource development, and provision of research facilities, in order for them to participate effectively in the conservation, management, and sustainable use of living aquatic resources.*	**NA**
4.10	*Competent national organizations shall, where appropriate, render technical and financial support to States upon request and when engaged in research investigations aimed at evaluating stocks which have been previously unfished or very lightly fished.*	**NA**
4.11	*Relevant technical and financial international organizations shall, upon request, support States in their research efforts, devoting special attention to developing countries—in particular the least developed among them and small developing island countries.*	**NA**

Rationale

Alaska's fisheries, specifically in the Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI) regions, have a well-established history of implementing effective fishery-dependent and fishery-independent data collection and analysis systems. These systems are integral to the management of targeted species such as Atka mackerel, Pacific ocean perch, northern rockfish and dusky rockfish. The following points outline the rationale for the effectiveness of these systems in stock management:

Fishery-Dependent Data Collection **(SC 4.1; 4.1.1; 4.2**)

- Fishery-dependent data is gathered directly from the fishing industry, providing valuable real-time data on catches, fishing effort, and bycatch rates. These programs are essential for monitoring the impact of fishing on stock levels.
- Catch Reporting Systems: Mandatory reporting requirements for vessels operating in the GOA and BSAI ensure comprehensive data on catch composition, location, and effort. Electronic monitoring (EM) and vessel monitoring systems (VMS) are widely used to track fishing activities accurately. Catch data is integrated into stock assessments to estimate removal rates from the population.
- Observer Program: The North Pacific Groundfish Observer Program (NPGOP) deploys observers on vessels to collect biological data (e.g., species composition, size, and age) and monitor bycatch and compliance with regulations. Observers provide critical data for real-time decision-making and long-term stock assessments.

Fishery-Independent Data Collection (**SC 4.1; 4.1.1; 4.2**)

Fishery-independent surveys provide unbiased data on fish populations, which are essential for understanding stock abundance, distribution, and dynamics independent of fishing activities.

- Trawl Surveys: The National Marine Fisheries Service (NMFS) conducts regular bottom trawl surveys in both the GOA and BSAI regions, providing estimates of fish abundance and biomass for species such as Atka mackerel, Pacific ocean perch, northern rockfish, and dusky rockfish. These surveys are spatially comprehensive and cover a broad range of depths and areas, ensuring accurate assessments of the stocks.
- Acoustic Surveys: Acoustic technologies are increasingly used to assess fish biomass and distribution, particularly for schooling species like Atka mackerel. These surveys provide high-resolution data on species' abundance and behaviour.

Comprehensive Stock Assessments (**SC 4.3; 4.4; 4.5; 4.6**)

The integration of fishery-dependent and fishery-independent data is crucial for comprehensive stock assessments that inform management decisions.

- Assessment Models: Stock assessment models, such as age-structured models, are used to analyze data from both fishery-dependent and independent sources. These models consider fishing mortality, natural mortality, recruitment, and environmental factors. The assessment outputs are used to estimate the current stock status and project future stock trajectories under different management scenarios.
- Harvest Control Rules (HCRs): The fishery management plans (FMPs) for the GOA and BSAI regions incorporate HCRs based on stock assessments. These rules establish target reference points such as maximum sustainable yield (MSY) and biological reference points to ensure that fishing does not compromise stock health. These science-based rules guide managers in setting annual catch limits (ACLs) and total allowable catch (TAC) to prevent overfishing and promote sustainable fishing practices.

Adaptive Management and Monitoring (**SC 4.3; 4.4; 4.5; 4.6**)

Alaska’s fisheries management system is designed to be adaptive, allowing for rapid adjustments to management measures based on new data or changes in stock status.

- Annual Stock Reviews: Stock assessments are reviewed and updated annually by the North Pacific Fishery Management Council (NPFMC). This ensures that management decisions are based on the most up-to-date scientific information. Regular adjustments to TACs and bycatch limits are made to reflect changes in stock abundance and ecosystem conditions.
- Ecosystem-Based Fisheries Management (EBFM): Alaska’s fisheries management approach incorporates ecosystem considerations, recognizing the importance of maintaining biodiversity, ecosystem function, and the role of target species in the broader ecosystem. This approach is supported by data on environmental conditions, predator-prey dynamics, and habitat use.

Stakeholder Involvement and Transparency (**SC 4.3; 4.4; 4.5; 4.6**)

The management process in Alaska's fisheries is transparent, involving a range of stakeholders, including scientists, industry representatives, and conservation groups.

- Council Process: The NPFMC operates under an open, transparent decision-making process where stakeholders can provide input into stock assessments, management measures, and other aspects of fisheries management. This inclusive approach ensures that management decisions are well-informed and broadly supported by a range of stakeholders (Krupa et al., 2018).

Alaska’s fisheries management in the GOA and BSAI regions relies on robust data collection systems, comprehensive stock assessments, adaptive management practices, and transparent stakeholder involvement. These elements together ensure the sustainable management of flatfish species, safeguarding their populations for future generations.

- There is also specific traditional knowledge that is used both at the state level of fishery management in Alaska and at the Federal level. The North Pacific Fishery Management Council (NPFMC) has made efforts to incorporate traditional knowledge (TK) into its decision-making process for Alaska fisheries, including: Creating seats for Alaska Native Tribes on advisory bodies and committees
- Adopting a protocol for identifying, analyzing, and incorporating TK

The Council adopted the Local Knowledge (LK), Traditional Knowledge (TK), and Subsistence Protocol (LKTKS Protocol) in October 2023. The LKTKS Protocol provides foundational information and context for identifying, analyzing, and incorporating LK, TK, and subsistence information into the Council’s decision-making process.

At the core of this work is the recognition of diversity among the people that engage in, depend on, and are impacted by the federal fisheries managed by the Council. Effective fisheries management that supports sustainable fisheries and ecosystems requires robust science and an inclusive decision-making process that fosters relationships and trust[12](NPFMC, 2024). **(SC 4.6)**

Since these fisheries are exclusively managed by the U.S., there is no need for cross-jurisdictional stock research, making certain regulatory clauses inapplicable to the management of flatfish in the GOA and BSAI and 4.7 to 4.11 clauses are not applicable. In addition, considering the comprehensive data available for the key flatfish stocks also clause 4.1.2 is considered not applicable.

Evaluation Parameter Rationale - Process	Met? (Yes/No)
4.1 There is a process or system that allows for effective data collection (including data on retained catch, bycatch, discards and waste) on the status of fisheries and ecosystems for management purposes. In the case of stocks fished by more than one State, this includes a system or agreement with other States to ensure mortality and removals data are available for the entirety of the biological stock. Some fisheries and/or fish stock are hard to monitor for various reasons, including remoteness of operation/distribution and complexity of fishing operations—posing particular challenges with the collection and maintenance of adequate, reliable, and current data and/or other information. Assessors shall acknowledge and explain these challenges, data collection, and maintenance to cover all stages of fishery development in accordance with applicable international standards and practices. For salmon, the assessors shall describe and present the enumeration methods (i.e., peak aerial survey, feet survey, weir count, tower, mark–recapture, sonar, etc.) utilized for all the major stocks managed by formal escapement goal in Alaska. Such summary data can be found in the annually released ADF&G document Summary of Pacific salmon escapement goals in Alaska with a review of escapements from [year] to [year]. The document generally reviews the latest 9–10 years of salmon escapements, enumeration, goal development methods, and the relative escapement goal performance.	**Yes**
4.1.1 There is a process or system that allows for the production, maintenance, update, and verification of statistical data to international standards. Such standards include the FAO Coordinating Working Party on Fishery Statistics Handbook of Fishery Statistical Standards. Also, there is a process for the use and distribution of research results as a basis for setting management objectives, reference points, and performance criteria, as well as for ensuring adequate linkage between applied research and fisheries management (e.g., adoption of scientific advice). Please note that stock assessment for salmon is intended as the processes that leads to enumeration, escapement goal development, and fishery management activities to meet escapement goals.	**Yes**
4.1.2 There is a process that allows for the use of generic evidence based on similar stocks for fisheries with low risk. The greater the risk, the more specific evidence is necessary to assess sustainability. In principle, "generic evidence based on similar stocks" should not suffice, but it may be adequate where there is low risk to the stock under consideration. In general, "low risk to that stock under consideration" would suggest that there is very little chance of the stock becoming overfished (e.g., where the exploitation rate is very low and the resilience of the stock is high). However, the evidence for low risk and the justification for using surrogate data shall come from the stock assessment itself.	**NA**
4.2 An observer program is present. There may be cases where collection of accurate data for research and support compliance could be established without the use of observers or a formal observer scheme (i.e., inspection scheme, enforcement, port sampling, at shore inspection, voluntary or compulsory logbooks, e-logbooks or other harvester collected data, electronic monitoring [video], or bycatch surveys). The reliability and accurateness of that system(s) would need to be verified accordingly. Note also that some fisheries observer programs are designed to collect biological data and others serve mainly as a compliance or enforcement tool. This shall be considered accordingly in the overall evaluation of this clause. Assessors shall question primarily whether the required data for fisheries management are collected or if there are important data gaps (e.g., because of the absence of an observer program).	**Yes**

[12] https://www.npfmc.org/how-we-work/management-policies/

4.2.1 There is a clear system that allows the observer program, or any other appropriate data gathering system as appropriate, to provide sufficient quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.	**Yes**
4.3 There is a system within the regional body structure that allows for data distribution in line with confidentiality requirements.	**Yes**
4.4 There is research to support policies related to fish as food.	**Yes**
4.5 There is a system in place for collecting economic, social, marketing, and institutional knowledge of the fisheries.	**Yes**
4.6 Traditional fisher knowledge has been investigated. Note that for highly developed fisheries that knowledge may already have been integrated into fisheries management.	**Yes**
4.7 There is a system in place to manage the conduct of research vessels operating in waters of other States.	**NA**
4.8 There is a mechanism in place to allow the development and review of guidelines governing fisheries research conducted on the high seas.	**NA**
4.9 There is a mechanism in place by which the research capacities of developing countries can be developed and enhanced. This could include, but is not limited to, the provision of personnel, equipment, funding, or cooperation on data collection and stock assessment.	**NA**
4.10 There is a mechanism to allow a national organization to render technical and financial support to the State.	**NA**
4.11 The international management component of the fishery is engaged in processes that support the fishery based in developing countries.	**NA**

Rationale:
The fisheries management for BSAI Atka mackerel, Pacific ocean perch (POP), northern rockfish, and dusky rockfish in the Gulf of Alaska (GOA) and Bering Sea Aleutian Islands (BSAI) involves effective processes for tracking removals and mortality. Annual, reliable data is collected on retained catch, bycatch, and state-managed fisheries, with systems like the Catch Accounting System (CAS) ensuring timely data integration from multiple sources, including observer programs.

The North Pacific Observer Program, which deploys nearly 500 observers annually, plays a crucial role by collecting high-quality data used for stock assessments and ecosystem research. In 2013, NOAA Fisheries improved observer deployment, increasing data reliability and expanding coverage to previously unobserved fisheries. Vessels and processors are classified into full or partial observer coverage groups based on their size and gear, with specific data collection requirements for each group.

Amendments to management plans in 2013 established the North Pacific Groundfish and Halibut Observer Program, which collects data on total catch and protected species interactions to support quota management and bycatch reduction. This program operates under regulations at 50 CFR part 679 (https://www.govregs.com/regulations/expand/title50_chapterVI_part679_subpartE_section679.51).

Stock assessments and management decisions are documented in SAFE reports, which confirm that these species are managed similarly to other groundfish stocks in Alaska and are restricted to the Alaska EEZ. Management also incorporates socio-economic data collection as required by laws like the Magnuson-Stevens Act and NEPA. Economic aspects are detailed in the Economic SAFE report (Abelman et al., 2023), which includes price projections and performance indices. Alaska Native consultation is also a stated objective in fisheries management (https://www.npfmc.org/wp-content/PDFdocuments/meetings/community_stakeholder.pdf).

These fisheries are fully managed by one state, eliminating the need for shared stock research between jurisdictions. Therefore, clauses 4.7 to 4.11 are not applicable.

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	Met? (Yes/No)
4.1 *There are appropriate and reliable data collection and estimation methods. Reliable and accurate data are collected on retained catch, bycatch, discards, and waste (for targeted and non-targeted fisheries), and the direct and indirect impacts of the fishery on the ecosystem. Such information is disseminated to all relevant fishery management authorities. Overall, the data collection system is considered effective for the purposes of this clause if fishery scientists believe there is a high probability that the total estimated mortality is an accurate reflection of the actual total mortality across the entire biological stock. Fishery data are collected with a frequency and level of aggregation, which allows the effective and informed management of the stock,. The appropriate level of aggregation will often be the stock level, but could also reflect specific habitats, gear types, sub-populations, etc. The requirements for data collection are focused on the need to assess the effects of the unit of certification on non-target stocks. Non-target catches and discards refer to species/stocks that are taken by the unit of certification other than the stock for which certification is being sought. The adequacy of data relates primarily to the quantity and type of data collected (including sampling coverage) and depends crucially on the nature of the systems being monitored and purposes to which the data are being put. Some analysis of the precision resulting from sampling coverage would normally be part of an assessment of adequacy and reliability. The currency of data is important, inter alia, because its capacity for supporting reliable assessment of current status and trends declines as it gets older.*	**Yes**
4.1.1 There is evidence for the production, maintenance, updating, and review of statistical data on catch and fishing effort in the fishery under assessment. There is evidence that the best scientific evidence available is used to inform the fisheries management process. Where there is a legal requirement for the advice of scientific authorities to be adopted, this shall be viewed as conformance with this evaluation parameter.	**Yes**
4.1.2 *Information has been utilized from generic evidence based on similar fishery situations. Based on the risk of overfishing, the information utilized is of higher precision to account for higher risks (i.e., intensive fisheries).*	**No**
4.2 *The data collected by the observer program is considered accurate and useful.*	**Yes**
4.2.1 *The data collected by the observer program is considered accurate and useful, especially for providing quantitative estimates of total catch, discards, and incidental takes of living aquatic resources.*	**Yes**
4.3 *There is evidence proving that confidentiality requirements are satisfied when data is distributed to the various parties.*	**Yes**
4.4 *There is evidence of this research.*	**Yes**
4.5 *These data are used for ongoing monitoring, analysis, and policy formulation.*	**Yes**
4.6 *There are records of the documentation of small-scale fisher practices.*	**Yes**
4.7 *If a fisheries management organization is conducting scientific research activities in waters of another State, there is record of such shared research activities and they comply with required regulations.*	**No**
4.8 *There is a record of uniform high seas research guidelines or a mechanism to create them.*	**No**
4.9 *There are recognizable examples of instances in the history of the fishery under assessment where actions by the managers of the unit of certification have promoted or enhanced the research capacity of one or more developing nations in the ways described above.*	**No**
4.10/4.11 *There is a record of the provided technical and financial support.*	**No**

Rationale:

The data collection and catch estimation methods for BSAI Atka mackerel, BSAI/GOA Pacific Ocean perch (POP), BSAI/GOA northern rockfish, and GOA dusky rockfish are reliable and well-documented. Accurate data on retained catch, bycatch, discards, non-target species, and ecosystem impacts are collected and available to relevant management authorities such as NMFS and ADFG. This data allows for annual or biannual stock assessments, ensuring informed management of these stocks. The total mortality estimates accurately reflect the biological stock mortality based on these assessments. The SAFE reports confirm no special management needs for these stocks, as they are fully contained within the Alaska EEZ.

The Catch Accounting System (CAS) integrates observer and industry data, including eLandings, to estimate total catch, which includes bycatch recorded by observers and presented in annual stock assessments. Subsistence and sport fishing removals are estimated by ADFG. Long-term catch and effort data are maintained and used in stock assessments, with scientific reviews involving NMFS, ADFG, and universities ensuring the

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	Met? (Yes/No)
best scientific information guides fisheries management. The NPGHOP observer program, which covers around 80% of the fisheries, collects biological data on commercial catch, bycatch, and species interactions, contributing to both stock assessments and in-season management decisions, such as fishery closures. NMFS and ADFG maintain extensive databases on these fisheries, with data publicly available through websites, publications, and meetings. Confidentiality is maintained for sensitive commercial fishing data. Alaska also supports seafood research and distribution efforts through the Alaska Seafood Marketing Institute and the Kodiak Seafood and Marine Science Center. Economic analyses (Abelman et al., 2023) cover catch estimates, discard rates, prohibited species catch (PSC), and vessel and processor employment, with annual reports detailing changes in value, price, and market factors for the North Pacific fisheries. Most of the 6 stocks catches in Alaskan waters are taken in large-scale operations such as catcher /processors or large catcher vessels. Smaller fisheries such as some of the state-managed ones in are effectively regulated and take into account any issues related to smaller scale localized fisheries. NPFMC FMPs specifically consider an objective to increase Alaska Native consultation by a) continuing to incorporate local and traditional knowledge in fishery management; b) considering ways to enhance collection of local and traditional knowledge from communities; and c) incorporating such knowledge in fishery management where appropriate. These fisheries are fully managed by one state, eliminating the need for shared stock research between jurisdictions. Therefore, clauses 4.7 to 4.11 are not applicable.	

Evaluation Parameter Rationale – Evidence Basis	Met? (Yes/No)
4.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that all significant fishery removals and mortality of the target species are considered by the fishery management organizations. Specifically, reliable and accurate data required for assessing the status of fishery/ies and ecosystems—including data on retained catch, bycatch, discards, and waste—are collected. Data can include relevant traditional, fisher, or community knowledge, provided their validity can objectively be verified (i.e., the knowledge has been collected and analyzed though a systematic, objective, and well-designed process, and is not just hearsay). Examples may include stock assessment reports, catch data, and observer data.	**Yes**
4.1.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that timely, complete, and reliable statistics are compiled on catch and fishing effort and maintained in accordance with applicable international standards and practices, and in sufficient detail to allow sound statistical analysis for stock assessment. Such data are updated regularly and verified through an appropriate system. The use of research results as a basis for setting management objectives, reference points, and performance criteria, as well as for ensuring adequate linkage between applied research and fisheries management (e.g., adoption of scientific advice) is promoted. Analysis results are distributed accordingly as a contribution to fisheries conservation, management, and development. Examples may include stock assessment reports and other data.	**Yes**
4.1.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the absence of specific information on the stock under consideration, generic evidence based on similar stocks can be used for fisheries with low risk to that stock under consideration. However, the greater the risk of overfishing, the more specific evidence is necessary to ascertain the sustainability of intensive fisheries. Examples may include stock assessment reports and other data.	**NA**
4.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that an observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures is established. Examples may include stock assessment, survey, observer, or other reports.	**Yes**
4.2.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the observer program is established and able to provide quantitative estimates of total catch, discards, and incidental takes of living aquatic resources. Examples may include stock assessment, observer, survey, or other reports.	**Yes**
4.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that a fisheries management organization, regional fisheries management organizations or arrangements compile data and make them available, in a manner consistent with any applicable confidentiality requirements, in a timely manner and in an agreed format to all members of these organizations and other interested parties in accordance with agreed	**Yes**

procedures. Examples may include reports where confidentiality requirements have been effected.	
4.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the State stimulates the research required to support policies related to fish as food.	**Yes**
4.5 *The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there is sufficient knowledge of the economic, social, marketing, and institutional aspects of fisheries, that they are adequately researched, and that comparable data are generated for ongoing monitoring, analysis, and policy formulation. Examples may include reports on social/cultural/economic value of the resource.*	**Yes**
4.6 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fisheries management organization investigates and documents traditional fisheries knowledge and technologies—in particular those applied to small-scale fisheries—in order to assess their application to sustainable fisheries conservation, management, and development. Examples may include various fisheries reports.	**Yes**
4.7 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that if a fisheries management organization is conducting scientific research activities in waters of another State, it ensures that their vessels comply with the laws and regulations of that State and international law. Examples may include survey reports.	**NA**
4.8 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that adoption of uniform guidelines governing fisheries research conducted on the high seas is promoted and, where appropriate, supports the establishment of mechanisms, including, inter alia, adopting uniform guidelines to facilitate research at the international level, and encouraging such research results be shared with affected States. Examples may include survey reports, or high seas guidelines.	**NA**
4.9 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that if appropriate, the fisheries management organization and relevant international organizations promote and enhance the research capacities of developing States, inter alia, in the areas of data collection and analysis, information, science and technology, human resource development, and provision of research facilities, in order for them to participate effectively in the conservation, management, and sustainable use of living aquatic resources. Examples may include various data or reports.	**NA**
4.10 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that competent national organizations, where appropriate, render technical and financial support to States upon request and when engaged in research investigations aimed at evaluating stocks which have been previously unfished or very lightly fished. Examples may include various data or reports.	**NA**
4.11 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that relevant technical and financial international organizations are, upon request, supporting States in their research efforts, and are devoting special attention of developing countries—in particular the least developed among them and small island developing countries. Examples may include various data or reports.	**NA**

Rationale:

The data collection and catch estimation processes for BSAI Atka mackerel, BSAI/GOA Pacific Ocean perch (POP), BSAI/GOA northern rockfish, and GOA dusky rockfish are robust and well-documented. Key references include Cahalan et al. (2014) for catch estimation, and the most recent SAFE reports for stock assessments, which include detailed commercial catch data (NMFS, 2023). The Alaska Fisheries Information Network (AKFIN) maintains a comprehensive database of commercial fisheries data, which is used by scientists and managers (AKFIN, 2023).

The North Pacific Observer Program deploys nearly 500 observers annually, providing over 30,000 days of data collection, which feed directly into stock assessments and scientific studies (AFSC, 2023). Observer data is essential for estimating bycatch, discards, and Discard Mortality Rates (DMRs). More details on DMR calculations can be found in NPFMC reports (NPFMC, 2023). NMFS and NPFMC have also developed an Electronic Monitoring (EM) Strategic Plan to enhance data collection with video technology (NMFS, 2023).

Confidential fish ticket records are managed by the Commercial Fisheries Entry Commission (CFEC) for 45 years, and their access is regulated by state laws (CFEC, 2023). Economic data, such as the economic impact of Alaska's seafood industry, are analyzed in annual SAFE reports and studies by the McDowell Group (2015) and Abelman et al. (2023). ASMI and the Kodiak Seafood and Marine Science Center conduct research and outreach to improve seafood industry practices (ASMI, 2023; UAF, 2023).

The NPFMC has established a Community Engagement Committee to improve outreach to rural communities and Alaska Native entities, ensuring their participation in fishery management processes (NPFMC, 2023).

These fisheries are fully managed by one state, eliminating the need for shared stock research between jurisdictions. Therefore, clauses 4.7 to 4.11 are not applicable.

	Starting score	- (Number of EPs NOT met x 3)	= Overall score
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			**High**
Corresponding Conformance Level: (10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 5

There shall be regular stock assessment activities appropriate for the fishery, its range, the species biology, and the ecosystem, undertaken in accordance with acknowledged scientific standards to support its optimum utilization.

Supporting Clause		Score
5.1	*An appropriate institutional framework shall be established to determine the applied research required and its proper use (i.e., assess/evaluate stock assessment model/practices) for fishery management purposes.*	**Yes**
5.1.1	*Less elaborate stock assessment methods are frequently used for small-scale or low-value capture fisheries resulting in greater uncertainty about the status of the stock under consideration., A more precautionary approach to managing fisheries on such resources shall be required, including, where appropriate, a lower level of resource utilization. A record of good management performance may be considered as supporting evidence of the adequacy of the management system.*	**NA**
5.1.2	*The fisheries management organization shall ensure that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, and fishery enhancement. Analysis results shall be distributed in a timely and readily understandable fashion in order that the best scientific evidence available contributes to fisheries conservation, management, and development. The fisheries management organization shall also ensure the availability of research facilities and provide appropriate training, staffing, and institution building to conduct the research.*	**Yes**
5.2	*There shall be established research capacity necessary to assess and monitor (1) the effects of climate or environment change on stocks and aquatic ecosystems, (2) the state of the stock under State jurisdiction, and (3) the impacts of ecosystem changes resulting from fishing activity, pollution, or habitat alteration.*	**Yes**
5.3	*Management organizations shall cooperate with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources.*	**Yes**
5.4	*The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programs to improve understanding of the biology, environment, and status of transboundary shared, straddling, highly migratory and high seas stocks.*	**NA**

5.5	*Data generated by research shall be analysed and the results of such analyses published in a way that ensures confidentiality is respected, where appropriate.*	**Yes**

Rationale

Alaska's fisheries in the GOA and BSAI, targeting Atka mackerel, Pacific ocean perch, Northern rockfish, and Dusky rockfish, are managed through comprehensive and regular stock assessments. These assessments are designed to align with the biological characteristics of the species, their geographic range, and ecosystem roles. The rationale for the existence of appropriate stock assessment activities is supported by the following key points:

Institutional framework and data generated by research (5.1 and 5.5)

The institutional framework guiding applied research for fishery management in the Alaska fisheries in the GOA and BSAI, targeting Atka mackerel, Pacific ocean perch, Northern rockfish, and Dusky rockfish ensures science-based decision-making, sustainability, and compliance with federal regulations. Key organizations, such as the North Pacific Fishery Management Council (NPFMC), the National Marine Fisheries Service (NMFS), and the Alaska Fisheries Science Center (AFSC), collaborate to assess fish stocks and evaluate management strategies.

The AFSC conducts stock assessments by collecting biological, ecological, and fishery data, which are reviewed by NMFS scientists and regional experts. These assessments inform the NPFMC, which establishes annual catch limits (ACLs) to prevent overfishing and maintain sustainable harvests. The framework also relies on regular peer reviews through the Stock Assessment Review (STAR) panels and the Scientific and Statistical Committee (SSC), ensuring that best practices and models are used.

Through this framework, adaptive management practices are implemented. When new research identifies changes in stock conditions or ecosystem impacts, the stock assessment models are updated accordingly. This collaborative and transparent structure ensures that applied research addresses emerging challenges, providing fisheries managers with the data needed to make effective and sustainable decisions.

Data generated through research in the framework of Alaska's fisheries in the GOA and BSAI, targeting Atka mackerel, Pacific ocean perch, Northern rockfish, and Dusky rockfish, are analyzed and disseminated following strict protocols to ensure confidentiality, particularly when proprietary or sensitive information is involved. Research data, including stock assessments, harvest data, and biological sampling, are collected by the AFSC and the NMFS. These institutions follow federal guidelines, such as the Magnuson-Stevens Fishery Conservation and Management Act and NOAA's Confidentiality of Fisheries Statistics Policy, which protect individual and proprietary business information. When research results are published, only aggregated data are reported to prevent the disclosure of private operational details, such as individual vessel catches or fishing locations. The publications, often in the form of stock assessment reports, scientific papers, and council documents, balance transparency with confidentiality. The NPFMC and its Scientific and Statistical Committee (SSC) review the analyses, ensuring that the results support management decisions while safeguarding sensitive data. This approach maintains stakeholder trust, promotes scientific rigor, and ensures compliance with legal confidentiality requirements.

Scientific Standards for Stock Assessments (**SC 5.1, 5.1.2, 5.2, 5.3, 5.5**)

Stock assessments in the GOA and BSAI regions are conducted according to internationally acknowledged scientific standards, particularly those outlined by the Food and Agriculture Organization (FAO) and other leading fisheries management bodies. The stock assessment process follows best practices, including data collection, model-based analysis, and peer review to ensure reliable scientific outputs. Therefore, Supporting Clause 5.1.1 is not applicable.

- Use of Age-Structured Models: Stock assessments for Atka mackerel, Pacific ocean perch, Northern rockfish, and Dusky rockfish are typically conducted using age-structured models that incorporate fishery-independent and fishery-dependent data. These models account for key biological parameters, such as growth rates, natural mortality, recruitment, and spawning biomass, ensuring that assessments reflect the life history traits of these species.
- Annual or Biennial Assessments: Stock assessments are conducted annually or biennially, depending on the species and fishery. For example, Atka mackerel and Pacific ocean perch are assessed annually, while Northern and Dusky rockfish are assessed biennially. This frequency is consistent with the species' biology, their response to fishing pressure, and the need for timely management actions.

Ecosystem Considerations in Stock Assessments (**SC 5.1, 5.1.2, 5.2, 5.3, 5.5**)

Alaska's fisheries management is grounded in an ecosystem-based approach, which recognizes the interconnectedness of species, habitats, and environmental conditions.

- Ecosystem-Based Fisheries Management (EBFM): The stock assessment process for Atka mackerel, Pacific ocean perch, Northern rockfish, and Dusky rockfish incorporates ecosystem considerations, including predator-prey dynamics, environmental factors (e.g., ocean temperatures), and habitat use. This approach ensures that the assessments not only focus on the targeted species but also consider their roles in the broader ecosystem.
- Multispecies Models and Ecological Indicators: In addition to single-species stock assessments, multispecies models and ecological indicators are used to assess how species interact within the ecosystem. This helps in understanding the cumulative impacts of fishing on biodiversity and ecosystem function.

Geographic Range and Stock Boundaries (**SC 5.1, 5.1.2, 5.2, 5.3, 5.5**)

The geographic range of the target species is well-defined, and stock assessments are tailored to their distribution within Alaska's Exclusive Economic Zone (EEZ).

- Spatial Resolution in Surveys: Trawl surveys and data collection systems are designed to capture the full geographic range of Atka mackerel, Pacific ocean perch, Northern rockfish, and Dusky rockfish in the GOA and BSAI. This ensures that assessments reflect the spatial structure of the stocks, accounting for localized population trends and regional environmental differences.
- Jurisdiction and Management Boundaries: The stock boundaries for these species are contained within the Alaska EEZ, simplifying the assessment and management process by eliminating the need for cross-jurisdictional coordination. Stock assessments are therefore able to focus on managing the stocks within a defined area, optimizing their utilization and sustainability.

Transparency and Peer Review (**SC 5.1, 5.1.2, 5.2, 5.3, 5.5**)

Alaska's stock assessment process is transparent and subject to rigorous peer review by both national and international scientists, ensuring the highest standards of scientific integrity. The SAFE reports (https://www.noaa.gov/organization/information-technology/information-quality-peer-review-id417), published annually by NPFMC, provide detailed information on stock assessments, management measures, and scientific reviews. These reports are peer-reviewed by scientists from NMFS, ADFG, and academic institutions, ensuring that they reflect the best available science and adhere to recognized standards (NPFMC, 2023).

Integration into Fisheries Management (**SC 5.1, 5.1.2, 5.2, 5.3, 5.5**)

The stock assessment process is integrated into the broader fishery management decision-making framework. The NPFMC conducts regular reviews of stock assessments in open public forums, allowing for stakeholder engagement, transparency, and the integration of new scientific findings into management strategies.

The stock assessment process for these fisheries complies with internationally recognized frameworks such as the FAO Code of Conduct for Responsible Fisheries.

The Alaska fisheries targeting Atka mackerel and rockfish are supported by regular, scientifically rigorous stock assessment activities. These assessments are tailored to the biology of the species, the geographic range of the stocks, and the broader ecosystem context, ensuring sustainable management and optimal utilization of the fisheries. The combination of reliable data collection, peer-reviewed assessments, and an ecosystem-based management approach provides robust support for the long-term health and productivity of these important fisheries. Therefore, clause 5.1.1 is not applicable. In addition the stocks are not considered shared and 5.4 is not applicable.

Evaluation Parameter Rationale - Process	**Met? (Yes/No/NA)**
5.1 There is an established institutional framework for fishery management purposes that determines applied research needs and use.	**Yes**

5.1.1 There is a process that allows more precautionary approaches to managing fisheries (e.g., lower exploitation rates) on resources assessed through stock assessment methods that result in greater uncertainty about the state of the stock under consideration.	**NA**
5.1.2 There are organizations and processes in place to permit research into the aspects of fisheries listed in the clause.	**Yes**
5.2 There is a system that establishes the required research capacity needed to assess and monitor (1) the effects of climate or other environmental change on stocks and aquatic ecosystems; (2) the status of the stock under State jurisdiction; and (3) the impacts of ecosystem changes resulting from fishing activity, pollution, or habitat alteration. Please note that climate science is complex and evolving, and the system shall recognize the ability to assess and monitor these parameters over time.	**Yes**
5.3 There is cooperation or interaction between international organizations to ensure optimum utilization of resources.	**Yes**
5.4 The collaborative technical and research programs to improve understanding of the biology, environment, and status of transboundary aquatic stocks have been developed.	**NA**
5.5 There is a process that allows analysis of research data, ensuring, where appropriate, their confidentiality.	**Yes**

Rationale:
The NMFS, guided by the MSA standards and legal requirements, operates a robust research framework through the Alaska Fisheries Science Center (AFSC) in Seattle. This includes several divisions and laboratories, such as Auke Bay Laboratories, which focus on fish stocks, habitats, and marine chemistry. The Fisheries Monitoring and Analysis Division (FMA) monitors groundfish fishing, analyzing commercial catches and bycatch, while the Resource Assessment and Engineering Division (RACE) conducts surveys on 40 key fish and crab stocks. The Resource Ecology and Fisheries Management Division (REFM) manages data for species like BSAI Atka mackerel, POP, Northern rockfish, and Dusky rockfish, producing an annual Economic Status Report. The Alaska Department of Fish and Game (ADFG) also plays a critical role in state-level research and stock assessments.

Research on BSAI Atka mackerel, Pacific Ocean perch (POP), Northern rockfish, and Dusky rockfish is conducted by NMFS, ADFG, universities, and other agencies, often in collaboration with the fishing industry. Priorities are outlined annually in the SAFE report, covering biology, ecology, stock assessments, and environmental sciences. Broader ecosystem-wide projects provide data on these stocks, while NMFS and ADFG conduct economic and social science analyses.

Long-term monitoring programs by NMFS, ADFG, and the University of Alaska focus on stock health, fishing impacts, pollution, habitat alteration, and climate change. The U.S. also collaborates internationally with organizations such as PISCES, ICES, NAFO, SPRFMO, and others to ensure sustainable resource use. Despite the fishery being confined to U.S. waters, cooperation with neighboring countries like Canada exists.

The public process, coordinated by NPFMC, NMFS, and ADFG, ensures comprehensive analysis of research and fishery data, with confidentiality protected as needed.

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	**Met? (Yes/No/NA)**
5.1 There is evidence to substantiate that essential research for fishery management purposes is determined and carried out. This research generally includes routine stock(s) and ecosystem assessment reports. Assessors shall evaluate the specific stock assessment model/practices for each of the species under assessment and verify the technical appropriateness for use. For salmon, the assessors shall present and evaluate the methods for escapement goal development utilized to develop the annual escapement goals in Alaska (about 300). Statewide summary data for Alaska can be found in the annually released ADF&G document Summary of Pacific salmon escapement goals in Alaska with a review of escapements from [year] to [year]. The document generally presents the latest 9–10 years of salmon escapement performance in review.	**Yes**
5.1.1 There is evidence that precautionary approaches are applied to managing fisheries (e.g., lower exploitation rates) on resources assessed through stock assessment methods that result in greater uncertainty about the state of the stock under consideration.	**NA**
5.1.2 Research is conducted into the following aspects of the fisheries: biology, ecology, technology, environmental science, economics, and aquaculture. The described types of research carried out shall result in the fishery being deemed compliant with this evaluation parameter.	**Yes**

5.2 There is evidence to demonstrate that there is sufficient research capacity in place to assess and monitor (1) the effects of climate or other environmental change on stocks and aquatic ecosystems, (2) the status of the stock under consideration, and (2) the impacts of fishing activity, pollution, or habitat alteration.	**Yes**
5.3 There is evidence available to substantiate that such cooperation or interaction has taken place. There is data available that substantiates cooperation activities.	**Yes**
5.4 There is evidence available to substantiate that such cooperation or interaction has taken place. There are data on collaborative programs to improve understanding of transboundary, shared, straddling, highly migratory or high seas stocks.	**NA**
5.5 There is evidence data was properly analyzed. Data was published respecting, where appropriate, confidentiality agreements. The rules of confidentiality are effectively respected.	**Yes**

Rationale:
Stock assessments are conducted annually or biennially and form the scientific basis for setting catch quotas. These assessments evaluate stock status relative to reference points, account for uncertainties, and include information on historical catch trends, maximum sustainable yield, stock conditions, ecosystem impacts, and alternative harvest strategies. They are peer-reviewed and compiled in the SAFE reports, which are publicly available and provide comprehensive data to the NPFMC for harvest decisions.

Biological research, surveys, and socio-economic data collection conducted by NMFS, ADFG, and other agencies feed into the stock assessments. Annual economic status reports are also produced to assess the socio-economic impacts of these fisheries. Data gaps and research priorities are outlined in SAFE documents, ensuring ongoing improvement in stock assessments.

NPFMC receives detailed reports on Alaska's marine ecosystems, covering environmental and ecosystem variables, which help identify essential fish habitats. Scientific research, including that conducted by the Oil Spill Recovery Institute (OSRI) and the North Pacific Marine Science Organization (PICES), contributes to understanding environmental impacts on the ecosystem, including oil spill recovery and climate change effects on the North Pacific.

Collaborative efforts, such as the Canada-U.S. Groundfish Committee, focus on sharing data and addressing gaps for groundfish stocks. Extensive data is disseminated through peer-reviewed meetings and scientific publications, ensuring transparency and timely contributions to the conservation and management of the targeted stocks. Confidentiality is maintained where required by law.

Evaluation Parameter Rationale – Evidence Basis	**Met? (Yes/No)**
5.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that an appropriate institutional framework is established to determine the applied research required and its proper use (i.e., assess and evaluate stock assessment models or practices) for fishery management purposes. Examples may include description of the overall process of research assessment and peer review, as well as stock and ecosystem assessment reports.	**Yes**
5.1.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that with less elaborate stock assessment methods frequently used for small-scale or low-value capture fisheries, more precautionary approaches to managing fisheries on such resources are required, including where appropriate, lower level of resource utilization. Examples may include stock assessment reports and other data.	**NA**
5.1.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States are conducting appropriate research into the following aspects of the fisheries: biology, ecology, technology, environmental science, economics, and aquaculture. The research is disseminated accordingly. States also ensure the availability of research facilities and provide appropriate training, staffing, and institution building to conduct the research. Examples may include stock assessment, economic value, fleet reports, and other reports.	**Yes**
5.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there is established research capacity necessary to assess and monitor (1) the effects of climate or other environmental change on stocks and aquatic ecosystems, (2) the status of the stock under State jurisdiction, and (3) the impacts of ecosystem changes resulting from fishing activity, pollution, or habitat alteration. Examples may include stock, ecosystem, and habitat assessment reports.	**Yes**
5.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that management organizations cooperate with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources. Examples may include outputs resulting from meetings or other research.	**Yes**

5.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organizations directly, or in conjunction with other States, have developed collaborative technical and research programs to improve understanding of the biology, environment, and status, of transboundary, shared, straddling, highly migratory or high seas stocks. Examples may include outputs resulting from meetings or other research.	**NA**
5.5 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that data generated by research is analyzed and the results of such analyses published in a way that ensures confidentiality is respected, where appropriate. Examples may include various data or reports.	**Yes**

Rationale:
The AFSC provides detailed information on stock assessments and research for Alaskan Atka mackerel and rockfish. The SAFE reports, compiled annually by NMFS, ADFG, and universities under the oversight of the Council, offer comprehensive reviews of these stocks. These reports, which include assessments on stock status, ecosystem considerations, and economic analysis, are peer-reviewed and considered the best available science for fishery management under the MSA (NMFS, 2023).

Research is extensive and includes annual or biennial surveys in the BSAI and GOA. These surveys provide critical indices of abundance, contributing to ecosystem-based management. For example, the Bering Sea Project and the Gulf of Alaska Integrated Ecosystem Research Program, funded by the North Pacific Research Board (NPRB), investigate ecosystem dynamics and recruitment processes for groundfish species (NPRB, 2023).

Economic and social data are also integrated into stock assessments, with comprehensive reports provided by the AFSC's Economic and Social Sciences Research Program (ESSRP) (Abelman et al., 2023). These reports track catch values, discard rates, and market changes, providing insights into the socio-economic performance of the fisheries.

Ecosystem reports, such as Zador et al. (2018), are presented annually to NPFMC, offering data on ecosystem health, predator-prey interactions, and environmental trends, which influence fisheries management decisions. Essential Fish Habitat (EFH) is also identified and managed as part of NPFMC's ecosystem-based approach (NPFMC, 2023).

International collaborations with organizations like PICES and NAFO, as well as national programs such as the NOAA's Essential Fish Habitat and confidentiality policies, ensure secure data management and comprehensive global engagement in research (PICES, 2023; NAFO, 2023). The University of Alaska also contributes to fisheries research and education, providing degrees and conducting research on fisheries science and marine biology (UAF, 2023).

	Starting score	**- (Number of EPs NOT met x 3) =**	**Overall score**
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: **(10 = High; 4 or 7 = Medium; 1 = Low)**			**High**
Corresponding Conformance Level: **(10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)**			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 6

The current state of the stock shall be defined in relation to reference points, relevant proxies, or verifiable substitutes that allow effective management objectives and targets to be set. Remedial actions shall be available and taken where reference points or other suitable proxies are approached or exceeded.

Supporting Clause	**Score**

6.1	*The fishery management organization shall establish safe target reference point(s) for management. Management targets are consistent with achieving maximum sustainable yield (MSY), a suitable proxy, or a lesser fishing mortality—if that is optimal in the circumstances of the fishery (e.g., multispecies fisheries) or is needed to avoid severe adverse impacts on dependent predators.*	**Yes**
6.2	*The fishery management organization shall establish appropriate limit reference point(s) for exploitation (i.e., consistent with avoiding recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible; Appendix 1, Part 1). When a limit reference point is approached, measures shall be taken to ensure that it will not be exceeded. For instance, if fishing mortality (or its proxy) is above the associated limit reference point, actions should be taken to decrease the fishing mortality (or its proxy) below that limit reference point.*	**Yes**
6.3	*Data and assessment procedures that measure the position of the fishery in relation to the reference points shall be established. Accordingly, the stock under consideration shall not be overfished (i.e., above limit reference point or proxy) and the level of fishing permitted shall be commensurate with the current state of the fishery resources, maintaining its future availability, and taking into account that long-term changes in productivity can occur due to natural variability and/or impacts other than fishing (Appendix 1, Part 1).*	**Yes**
6.4	*Management actions shall be agreed to in the eventuality that data sources and analyses indicate that these reference points have been exceeded. Accordingly, contingency plans shall be agreed in advance to allow an appropriate management response to serious threats to the resource as a result of overfishing, adverse environmental changes, or other phenomena that may have adverse impacts on the fishery resource* (Appendix 1, Part 2)*. Such measures may be temporary and shall be based on best scientific evidence available.*	**Yes**
6.5	*Measures shall be introduced to identify and protect depleted stocks and those stocks threatened with depletion, and to facilitate the sustained recovery/restoration of such stocks. Also, efforts shall be made to ensure that resources and habitats critical to the well-being of such stocks, which have received adverse impacts by fishing or other human activities, are restored.*	**Yes**

Rationale

Current state of the stock and remedial actions (**SC 6.1, 6.2, 6.3, 6.4, 6.5**)

The status of US fish stocks is determined by 2 metrics. The first is the relationship between the actual exploitation level and the overfishing level (OFL). If the exploitation level (or fishing mortality) exceeds the FOFL, the stock is considered to be subject to overfishing. The second is the relationship between the stock size and the minimum stock size threshold (MSST). If the stock size is below the MSST it is considered to be overfished. A stock is considered to be approaching an overfished condition when it is projected that there is more than a 50% chance that the biomass of the stock or stock complex will decline below the MSST within 2 years. Harvest specifications for each of the stocks are made annually by NPFMC, and include the OFL, acceptable biological catch (ABC), and total allowable catch (TAC). The NPFMC management plans classify each stock based on a tier system (Tiers 1-6). The Tier system specifies the maximum permissible ABC and the OFL for each stock in the complex (usually individual species but sometimes species groups). The BSAI and GOA groundfish fishery management plans have pre-defined harvest control rules (HCR) that define a series reference points for groundfish covered by these plans. The overall objectives of the management plans are to prevent overfishing and to optimize the yield from the fishery through the promotion of conservative harvest levels while considering differing levels of uncertainty. BSAI Atka mackerel, BSAI/GOA POP, BSAI/GOA Northern rockfish, GOA dusky rockfish are in Tiers 3a. In Tiers 3, sufficient information is available to determine a target biomass level, which would be obtained at equilibrium when fishing according to the control rule with recruitment at the average historical level. Most of the larger and commercially important stocks under NPFMC management are in Tier 3, which has sufficient information to determine surrogates for MSY-based reference points. The term “FX%” refers to the fishing mortality rate (F) associated with an

equilibrium level of spawning per recruit equal to X% of the equilibrium level of spawning per recruit in the absence of any fishing. For tier 3, the term B40% refers to the long-term average biomass that would be expected under average recruitment and F=F40%. These 2 metrics can thus be considered as targets. For Tier 3 stocks, the spawner-recruit relationship is uncertain, so although MSY cannot be estimated with confidence, the MSY proxy level is defined as B35% and the MSST level is one-half of B35%. Note that Tier 3 is split into 3 components, based on biomass level, and that the harvest control rule specifies a decline in fishing mortality when the stock biomass drops below the target level of B40% rather than at B35%. The state BSAI Atka mackerel, BSAI/GOA POP, BSAI/GOA Northern rockfish, GOA dusky rockfish fisheries are managed by ADFG and BOF using an annual Guideline Harvest Level (GHL).

Tier 1 Information available: reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY}.
- 1a) Stock status: $B/B_{MSY} > 1$
  $F_{OFL} = mA$, the arithmetic mean of the pdf
- 1b) Stock status: $\alpha < B/B_{MSY} \leq 1$
  $F_{OFL} = mA \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
- 1c) Stock status: $B/B_{MSY} \leq \alpha$
  $F_{OFL} = 0$

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

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

Tier 4 Information available: reliable point estimates of B, $F_{35\%}$, and $F_{40\%}$.
$F_{OFL} = F_{35\%}$

Tier 5 Information available: reliable point estimates of B and natural mortality rate M.
$F_{OFL} = M$

Tier 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

The above text table, taken from the NPFMC FMP for BSAI Groundfish, shows the tier system and harvest control rules used to determine FOFL. A similar table exists for FABC calculation in the FMP, and the portion relevant to Tier 3 stocks is as follows:

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

Evaluation Parameter Rationale - Process	Met? (Yes/No)
6.1 A target reference point(s) or proxy has been officially established. Managers shall be able to apply technical measures to reduce fishing pressure in the event that reference points are approached or exceeded.	**Yes**
6.2 A scientifically based limit reference point or proxy has been officially established, and together with the measure to be taken, ensures the reference point(s) will not be exceeded.	**Yes**
6.3 Data and assessment procedures (i.e., stock assessment process) are in place to measure the position of the fishery in relation to the target and limit reference points.	**Yes**
6.4 There is an agreed process, system, or contingency plan in the eventuality that the data sources and analyses indicate that these reference points have been exceeded—detailing the appropriate management response to serious threats to the resource because of overfishing, adverse environmental changes, or other phenomena that may have	**Yes**

adverse impacts on the fishery resource. Accordingly, the contingency plan/harvest control rule shall be agreed in advance to allow an appropriate management response to serious threats to the resource because of overfishing, adverse environmental changes, or other phenomena that may have adverse impacts on the fishery resource.	
6.5 There is a process that identifies depleted stocks, resources, and habitats. A depleted stock is usually a stock, which has been overfished, the stock status is below limit reference point, and the ability of the stock to recover has been impaired.	**Yes**

Rationale:

National Standard 1 of the MSA requires conservation and fisheries management measures that prevent overfishing while achieving optimal yield. Target reference points for biomass and fishing mortality have been established for stocks like Atka mackerel and rockfish, using a precautionary approach based on scientific analyses. Additionally, optimal yield reference points have been set for the combined yields in the GOA and BSAI regions.

If fishing mortality (F) exceeds the FOFL (Overfishing Limit) or if stock size falls below the MSST, the stock is considered overfished, triggering the need for a rebuilding plan. The NMFS and NPFMC use a comprehensive, peer-reviewed stock assessment program to monitor these stocks against target and limit reference points. HCRs guide specific management actions when these reference points are exceeded, ensuring sustainable fisheries management. Extensive oceanographic monitoring and ecosystem modeling support stock productivity analysis and future predictions.

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	Met? (Yes/No)
6.1 The official target reference point or proxy is consistent with achieving maximum sustainable yield (MSY), a suitable proxy, or a lesser fishing mortality—if that is optimal in the circumstances of the fishery (e.g., multispecies fisheries) or is needed to avoid severe adverse impacts on dependent predators (e.g. recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible). Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored. Furthermore, there is evidence that the target reference point/management target has been used as an objective by the management process. If there are historical instances of the reference point being approached or exceeded, managers have taken remedial action as appropriate. In the context of reference points, when data are insufficient to estimate reference points directly, other measures of productive capacity can serve as reasonable substitutes or proxies. Suitable proxies may include, for example, standardized Catch per Unit of Effort (CPUE) as a proxy for biomass; or specific levels of fishing mortality and biomass, which have proven useful in other fisheries, can be used with a reasonable degree of confidence in the absence of better defined levels. It is important to note that the use of a proxy may involve additional uncertainty, and if so, should trigger extra precaution in setting biological reference points. For salmon, escapement goals are the equivalent of a target reference point proxy.	**Yes**
6.2 The stock under assessment shall not currently be overfished (see glossary) according to the best scientific evidence available. The stock is currently estimated to be on the sustainable side of this reference point (e.g., spawning stock biomass is above the limit reference point, F is below Flim, etc.). Flim shall not exceed Fmsy. The limit reference point or proxy is consistent with avoiding recruitment overfishing and other severe negative impacts on the stock. There are mechanisms in place (e.g., harvest control rule or mechanism) to ensure that the level of fishing pressure is reduced if the limit reference point is approached or reached, and these mechanisms are consistent with ensuring to a high degree of certainty that the limit reference point will not be exceeded, and that actions are taken to decrease the fishing mortality (or its proxy) below that limit reference point. The level of Blim should be set on the basis of historical information, applying an appropriate level of precaution according to the reliability of that information. In addition, an upper limit should be set on fishing mortality, Flim, which is the fishing mortality rate that, if sustained, would drive biomass down to the Blim level. It is important to clarify that for salmon, spawning escapement goals are a suitable proxy for the intent of this clause. Escapement goal performance over a 4- to 5-year period shall be considered a suitable minimum reference point for salmon management. Specific to this point, underperforming salmon stocks that do not meet their escapement goals for a sustained period (over 4–5 years) shall be appropriately managed within the stock of concern framework by the State of Alaska to ensure stocks are managed with the objective of returning them to safe biological targets.	**Yes**
6.3 The current stock status in relation to reference points is used to determine the level of fishing permitted. The latter is commensurate with the current state of the fishery resources (i.e., close to or above target reference point and most importantly, not overfished or at or below its limit reference point or proxy), and takes into account that long-term changes in productivity can occur due to natural variability and/or impacts other than fishing. The stock is positioned at or above the target reference point. As a minimum, the stock is located above the midway point between the target and the limit reference point. It is important to clarify that, for salmon, spawning escapement goals are a suitable proxy for the intent of this clause. Escapement goal performance over a 4- to 5-year period shall be considered as a suitable minimum reference point for salmon management. Underperforming salmon stocks that do not meet their escapement goals for a sustained period (over 4– 5 years) shall be appropriately managed within the stock of concern framework by the State of Alaska to return them to safe biological targets. Assessors shall present evidence and evaluate escapement goals and escapement goal performance (i.e., met, not met) for all the wild salmon stock with a formal escapement goal in force in Alaska (about 300 annually). Overall, statewide summary data for Alaska can be found in the annually released ADF&G document Summary of Pacific salmon escapement goals in Alaska with a review of escapements from [year] to [year]. The document generally presents the latest 9–10 years of salmon escapement performance in review.	**Yes**
6.4 In the eventuality that the current level of the stock has exceeded target or limit reference points, the agreed and corresponding management action (as directed by the harvest control rule or framework) shall be immediately implemented and fishing reduced or	**Yes**

halted as necessary. The harvest control rule is effective at keeping or bringing back the stock to acceptable and safe biological levels (i.e., to avoid overfishing/ed status). Underperforming salmon stocks that do not meet their escapement goals shall be appropriately managed within the stock of concern framework by the State of Alaska.	
6.5 There is evidence that where depleted or adversely impacted stocks, resources, and habitats have been identified, efforts have been made to ensure they are restored or allowed to recover (i.e., ideally within a two generations timescale). Underperforming salmon stocks that do not meet their escapement goals shall be appropriately managed within the stock of concern framework by the State of Alaska.	**Yes**

Rationale:
In the NPFMC tier system, AK Atka mackerel and rockfish stocks are managed under Tier 3. Stocks in Tier 3 are categorized into (a), (b), or (c) based on their biomass in relation to B40% and a lower limit. This categorization determines the calculation of ABC and OFL. The HCR is biomass-based, where fishing mortality is constant above B40% and declines linearly as biomass decreases below this target. Below Tier 3c limits, the fishing mortality rate (FOFL) is set to zero. The same rule applies to ABC. If a stock falls below the Minimum Stock Size Threshold (MSST, defined as 1/2 B35%), a rebuilding plan is required. An additional limit at B20% prohibits directed fishing for key prey species of Steller sea lions, such as Atka mackerel, if their spawning biomass falls below this level.

The SAFE reports for these stocks describe the current stock status, including fishing mortality and biomass relative to reference points. The stocks in GOA and BSAI are all well above the B35% (MSY proxy) and B40% reference points, indicating they are not overfished or experiencing overfishing (Figure 33 for BSAI stocks, Figure 34 for GOA stocks). Extensive oceanographic monitoring and analyses of the Pacific Decadal Oscillation (PDO) are conducted to assess impacts on stock productivity. Annual ecosystem reports for the BSAI and GOA are presented to NPFMC.

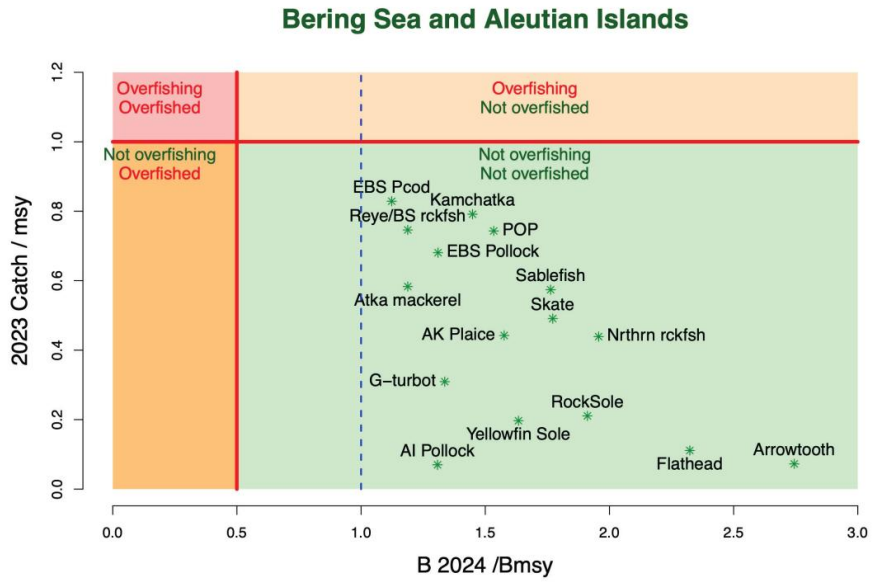


Figure 33 Summary of BSAI stock status next year (spawning biomass relative to Bmsy; horizontal axis) and current year catch relative to fishing at Fmsy (vertical axis) where FOFL is taken to equal Fmsy. Source: https://www.npfmc.org/wp-content/PDFdocuments/SAFE/2023/BSAIintro.pdf

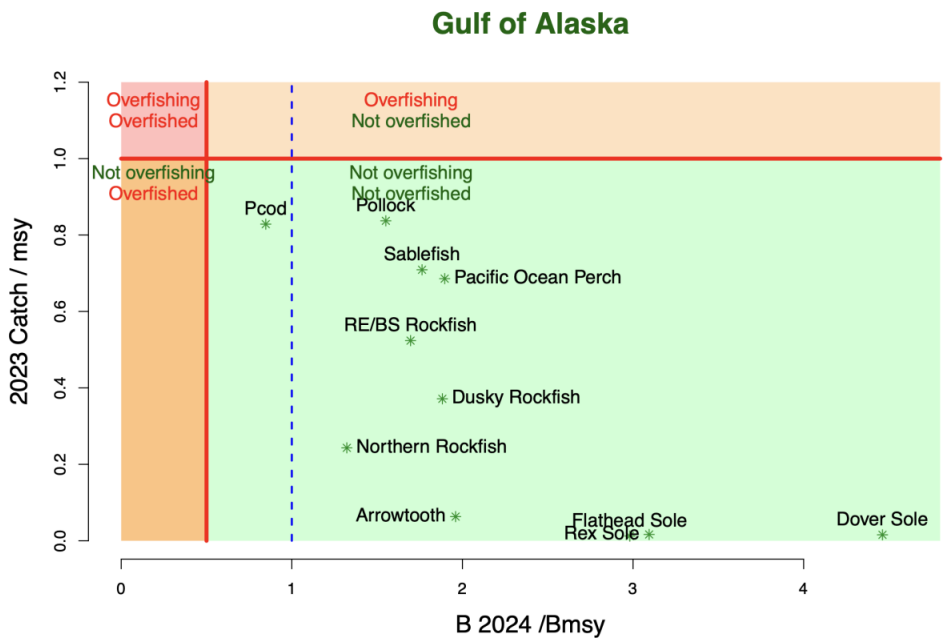


Figure 34 Summary of Gulf of Alaska stock status next year (spawning biomass relative to BMSY; horizontal axis) and current year catch relative to fishing at FMSY (vertical axis). Note that sablefish is for Alaska-wide values including the BSAI catches. Source: https://www.npfmc.org/wp-content/PDFdocuments/SAFE/2023/GOAintro.pdf

The HCR ensures that catch limits are adjusted when stock biomass falls below B40% or to zero if it drops below Tier 3c limits. If a stock is below MSST, a rebuilding plan is implemented to restore biomass to BMSY. These measures have effectively prevented overfishing in these stocks.

Evaluation Parameter Rationale – Evidence Basis	Met? (Yes/No)
6.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that target reference points have been established and are consistent with achieving MSY, a suitable proxy, or a lesser fishing mortality—if that is optimal in the circumstances of the fishery (e.g., multispecies fisheries) or is needed to avoid severe adverse impacts on dependent predators. Examples may include stock assessment reports or fishery management plans.	**Yes**
6.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are established safe limit reference point(s) for exploitation (i.e., consistent with avoiding recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible). When a limit reference point is approached, measures are taken to ensure that it will not be exceeded. For instance, if fishing mortality (or its proxy) is above the associated limit reference point, actions are taken to decrease the fishing mortality (or its proxy) below that limit reference point. Examples may include stock assessment reports or fishery management plans.	**Yes**
6.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that data and assessment procedures are installed measuring the position of the fishery in relation to the reference points. Accordingly, the stock under consideration is not overfished (i.e., it is above limit reference point or proxy) and the level of fishing permitted is commensurate with the current state of the fishery resources—maintaining its future availability and taking into account that long-term changes in productivity can occur due to natural variability and/or impacts other than fishing. Examples may include stock assessment reports or fishery management plans.	**Yes**
6.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that management actions are agreed should data sources and analyses indicate that these reference points have been exceeded. Accordingly, contingency plans are agreed in advance for the appropriate management response to serious threats to the resource as a result of overfishing, adverse environmental changes, or other phenomena that may have adverse impacts on the fishery resource. Such measures may be temporary and are based	**Yes**

on best scientific evidence available. Examples may include stock assessment reports or fishery management plans.	
6.5 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that measures are introduced to identify and protect depleted stocks and those stocks threatened with depletion, and to facilitate the sustained recovery/restoration of such stocks. Also, efforts are made to ensure that resources and essential habitats critical to the wellbeing of the stocks, which have been adversely impacted by fishing or other human activities, are restored. Examples may include laws and regulations, fishery management plans, and stock assessment reports.	**Yes**

Rationale:
The BSAI and GOA Groundfish FMPs outline a precautionary approach to stock management, including a tier system, HCRs, and reference points such as the MSY target. Stock assessments indicate that these stocks are above critical biomass reference points (B40%) and are not experiencing overfishing or overfished conditions as of recent projections. SAFE reports confirm that for Tier 3 stocks, none are below the MSST, and fishing mortality (F) is below overfishing levels (FOFL).
These assessments are backed by comprehensive projections and analyses under different harvest scenarios to ensure that stocks are not overfished or approaching that condition. If a stock were to become overfished, the FMP mandates rebuilding plans that set appropriate fishing mortality rates (FOFL and FMSY) to restore stock health within MSA requirements.

SAFE documents also include ecosystem sections that assess the impact of both ecosystem conditions on stock dynamics and the effects of fishing on the ecosystem. Ecosystem reports are presented annually to the Council, providing a broader ecological context for stock management. Additionally, a risk classification framework is being developed for setting ABC levels below the maximum permissible, incorporating considerations such as assessment reliability, population dynamics, and ecosystem/environmental factors (Dorn and Zador, 2018) .
The precautionary approach in the FMPs ensures that stocks are managed sustainably, with extensive analyses guiding catch levels. The ABCs for GOA and BSAI stocks are currently based on the stocks being above B40% or BMSY, indicating healthy population levels. If a stock becomes overfished, regulations will be updated to facilitate rebuilding to MSY levels.

	Starting score	**- (Number of EPs NOT met x 3) =**	**Overall score**
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			**High**
Corresponding Conformance Level: (10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 7

Management actions and measures for the conservation of stock and the ecosystem shall be based on the precautionary approach. Where information is deficient a suitable method using risk management shall be adopted to consider uncertainty.

Supporting Clause		**Score**
7.1	*The precautionary approach shall be applied widely to conservation, management, and exploitation of ecosystems to protect them and preserve the ecosystem. This should take due account of fishery enhancement procedures, where appropriate. Absence of scientific information shall not be used as a reason for postponing or failing to take conservation and management measures. Relevant uncertainties*	**Yes**

	shall be taken into account through a suitable method of risk management, including those associated with the use of introduced or translocated species.	
7.1.1	*In implementing the PA, the fishery management organization shall take into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality, the impact of fishing activities (including discards) on non-target and associated or dependent predators, and environmental and socioeconomic conditions.*	**Yes**
7.1.2	*In the absence of adequate scientific information, appropriate research shall be initiated in a timely fashion.*	**NA**
7.2	*In the case of new or exploratory fisheries, the fishery management organization shall adopt, as soon as possible, cautious conservation and management measures, including, inter alia, catch limits and effort limits. Such measures should remain in force until there are sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks, whereupon conservation and management measures based on that assessment should be implemented. Management measures should, if appropriate, allow for the gradual development of the fisheries.*	**NA**

Rationale

Alaska's fisheries management, specifically in the GOA and BSAI regions targeting AK Atka mackerel and GOA rockfish, adopts a precautionary approach as outlined in the FMPs developed by the NPFMC. This management strategy emphasizes conservation of both target stocks and the broader marine ecosystem, especially in situations of uncertainty or limited data (NPFMC, 2023).

Precautionary Management Framework in Alaska's Flatfish Fisheries (**SC 7.1, 7.1.1**)

The NPFMC implements a precautionary management framework through a tiered system used to assess and manage groundfish stocks, including flatfish, in Alaska. This tier system, detailed in the GOA and BSAI Groundfish FMPs, categorizes stocks based on data availability and employs a range of reference points to guide sustainable harvest levels (Hollowed et al., 2018).

- Tier System and Harvest Control Rules (HCRs): The precautionary approach is embedded in the tier system, where stocks are classified based on the amount and quality of biological data available. For example, Tier 3 stocks such as Atka mackerel and rockfish, which have reliable estimates of spawning biomass and fishing mortality, are managed based on well-established biomass reference points like B40% (biomass at 40% of the unfished level). When stock biomass falls below B40%, harvest rates are reduced to prevent overfishing and maintain stock sustainability (Aydin et al., 2023).

- Reference Points and Target Biomass Levels: Spawning biomass levels are projected relative to MSY - based target reference points. These reference points are used to set limits that prevent the stocks from becoming overfished, and current stock assessments consistently show that these stocks are above B40%, meaning they are not overfished or subject to overfishing (NPFMC, 2023).
- OFL and ABC: The precautionary approach is reflected in how catch limits are set. The ABC is deliberately set below the OFL to provide a buffer that accounts for uncertainty in stock assessments. This buffer is a core element of precautionary management, ensuring that overfishing does not occur even if there are variations in stock assessments or unexpected ecosystem changes (Dorn and Zador, 2018).

Risk Management in Data-Limited Situations (**SC 7.1, 7.1.1**)

When data is limited or uncertainty is high, the NPFMC incorporates a risk management approach that ensures conservation is prioritized. This approach is central to the precautionary framework and ensures that appropriate measures are in place when information is deficient with the following approaches:

- Risk Classification Framework: The NPFMC's risk classification system systematically reduces the ABC from its maximum permissible level by considering uncertainties related to stock assessments, population dynamics, and ecosystem factors (Dorn & Zador, 2018). This approach ensures that fishing pressure decreases as the overall risk to stocks or ecosystems increases.

- Fixed Percentage Buffers and Variable Reductions: The risk framework allows for fixed percentage buffers that increase or decrease depending on the level of uncertainty. This ensures that in the absence of robust data, a precautionary reduction in allowable catch is implemented to safeguard the stock and the broader ecosystem.
- Ecosystem-Based Management Considerations: Ecosystem principles are integrated into management plans, addressing impacts on non-target species, habitats, and ecosystem dynamics. Bycatch limits and prohibited species catch (PSC) controls reduce unintended ecosystem impacts, thereby mitigating risks of imbalance (Zador et al., 2017).

Adaptive Management Practices (**SC 7.1, 7.1.1**)

Adaptive management is a critical aspect of the precautionary approach, allowing for flexibility in response to new data or changes in stock status.

- Annual Stock Assessments: Alaska's fisheries management conducts annual stock assessments for flatfish species, using fishery-dependent and independent data to inform management decisions based on the best available science (Zador et al., 2017).
- Ecosystem Reports: Annual ecosystem reports for the GOA and BSAI regions provide essential information on ecosystem changes affecting stock health. This data integration helps implement precautionary measures when ecosystem changes pose risks to target stocks.

Regulatory Framework and Conservation Measures (**SC 7.1, 7.1.1**)

The precautionary approach is codified in federal regulations under the MSA, which requires the NPFMC to adopt management measures that prevent overfishing, rebuild overfished stocks, and protect essential fish habitats. Under this framework:

- Rebuilding Plans: If a stock were to become overfished, the NPFMC is mandated to develop and implement rebuilding plans that would restore the stock to MSY levels within a specified timeframe. These plans are precautionary in nature, ensuring that fishing mortality is reduced to levels that facilitate stock recovery (NPFMC, 2023).
- Monitoring and Enforcement: The North Pacific Groundfish Observer Program (NPGOP) provides extensive monitoring of fishing activities, ensuring compliance with catch limits and bycatch reduction measures. The data collected by observers and electronic monitoring systems supports timely and responsive management actions when necessary.

The management of AK Atka mackerel and groundfish is deeply rooted in a precautionary approach prioritizing conservation and ecosystem health. Through robust regulatory frameworks, annual assessments, risk management protocols, and adaptive ecosystem-based management, Alaska's fisheries management ensures that even in the face of uncertainty, appropriate measures are taken to prevent overfishing and promote long-term sustainability.

Finally, taking into account the availability of adequate scientific information on the stock status (SAFE reports) and the present fishery is not a new or exploratory fisheries, Supporting clauses 7.1.2 and 7.2 are not applicable.

Evaluation Parameter Rationale - Process	**Met? (Yes/No)**
7.1 There are management measures, regulations, and laws that command or direct the use of the precautionary approach (PA) for conservation, management, and exploitation of the aquatic resources under assessment. This could either take the form of an explicit commitment to the application of the PA, or be evidenced by an overarching approach applied throughout the management literature.	**Yes**
7.1.1 There is a system in place under which the potential uncertainties listed above can be examined and taken into account during the decision-making process.	**Yes**
7.1.2 There is a process that identifies weaknesses in the scientific information available to fishery management organizations, and initiates additional research as necessary. The primary focus of this requirement is the status of the stocks under consideration.	**NA**
7.2 For new or exploratory fisheries, there is a process that allows immediate application of the PA, including catch and effort limits, and the possible adverse impact of such fisheries on the long-term sustainability of the stocks.	**NA**
Rationale: Scientific information and stock assessments available are at a consistently high level, and clearly provide the necessary basis for conservation and management decisions. Uncertainties are taken into account in the stock assessment process, in the establishment of reference points, and risk assessment is used in providing harvest	

options. Potential uncertainties in the stock size, reference points, productivity, etc. are taken into account in the assessment process. Uncertainties in the management process re reference points, classification of stocks into precautionary approach tiers, setting of catch levels, etc. are explicit in the NPFMC FMPs.

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	Met? (Yes/No)
7.1 There is evidence for the practical application of the PA to resource management and conservation. Note that the PA may be integrated in stock assessment practices, in specific management measures enacted for everyday fisheries operations, or other measures. Application of the PA takes in due account of stock enhancement procedures, where appropriate, and relevant uncertainties are taken into account using a suitable method of risk assessment, including those associated with the use of introduced or translocated species.	**Yes**
7.1.1 There is evidence to demonstrate that in the fishery under assessment, uncertainties considered include those associated with the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities (including discards) on non-target and associated or dependent predators, as well as environmental and socio-economic conditions.	**Yes**
7.1.2 There is evidence that such a process has been applied in the case of the fishery under assessment, including examples of initiated research. Depending on the situation, appropriate research or further analysis of the identified risk is initiated in a timely fashion.	**Yes**
7.2 There is evidence that catch and effort limits have been implemented, and other management measures, including the assessment of possible adverse impacts, have been performed for these fisheries.	**NA**

Rationale:

Precautionary approach-based reference points are used in the management are described extensively in Clause 6. The scientific information and stock assessments available (as described in Clauses 4 and 5) are at a consistently high level, and provide the necessary basis for conservation and management decisions. Scientific advice for management of the stocks is presented for different harvest levels which explains the risk of biomass levels being below the adopted reference points.

Scientists evaluate how fish stocks and user groups might be affected by fishery management actions. The assessments take into account uncertainty in such parameters as survey index data, mean weights at age, and stock-recruit relationship. Analyses evaluate stock status relative to reference points in a probabilistic way, and risks of exceeding reference points at current and projected stock sizes are explicitly presented in the catch option tables in each SAFE report. Extensive research on impacts of fishing, environmental factors, and socioeconomics is presented annually.

The overall objectives of the NPFMC management plans are to prevent overfishing and to optimize the yield from the fishery through the promotion of conservative harvest levels while considering differing levels of uncertainty. The management plan classifies each stock based on a tier system (Tiers 1-6) with Tier 1 having the greatest level of information on stock status and fishing mortality relative to MSY considerations. The harvest control rules associated with these tiers consider the uncertainty associated with each level of information. ABC is a level of a stock or stock complex's annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty, and the ABC is set below the OFL. TAC is the annual catch target for a stock or stock complex, derived from the ABC by considering social and economic factors and management uncertainty. In the NPFMC approach, TAC <= ABC < OFL.

Evaluation Parameter Rationale – Evidence Basis	Met? (Yes/No/NA)
7.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the PA is applied to conservation, management, and exploitation of an ecosystem to protect them and preserve the ecosystem. Examples may include stock assessment reports, fishery management plans and other documents.	**Yes**
7.1.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in implementing the PA, the fishery management organization takes into account, inter alia, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities (including discards) on non-target and associated or	**Yes**

dependent species, as well as environmental and socio-economic conditions. Examples may include stock assessment reports, fishery management plans and other documents.	
7.1.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the absence of adequate scientific information, appropriate research is initiated in a timely fashion. Examples may include various data or scientific reports.	**NA**
7.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the case of new or exploratory fisheries, the fishery management organization adopts, as soon as possible, cautious conservation and management measures, including, inter alia, catch and effort limits. Such measures remain in force until there are sufficient data to allow assessment of the impact of the fisheries on the long-term sustainability of the stocks, whereupon conservation and management measures based on that assessment are implemented. Management measures should, if appropriate, allow for the gradual development of the fisheries. Examples may include various data or scientific reports.	**NA**

Rationale:

The reference points are established by the NPFMC tier system precautionary approach documented in their FMPs, and stock status is evaluated against these calculated reference points in the annual stock assessment SAFE reports. Where possible, projections are carried out as part of the stock assessments to determine future trajectories of biomass, and related risks of overfishing. There are no stock enhancement, introduced or translocated species concerns for the six stocks considered.

There are numerous references and examples of how uncertainty is dealt with in the stock assessments in the annual SAFE reports, taking into consideration that the methodologies used are Statistical Catch at Age models (in some cases implemented in SS3) which consider input parameters non-error free. In addition, the NPFMCs fishery management plans (FMPs) for groundfish in GOA and BSAI regions are explicit in how different levels of uncertainty are accounted for in the management process. Environmental data and socioeconomic data are also well documented through annual SAFE reports, as outlined in previous clauses**.**

	Starting score	**- (Number of EPs NOT met x 3) =**	**Overall score**
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			**High**
Corresponding Conformance Level: (10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			**Full conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 8

Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery, and based upon verifiable evidence and advice from available objective scientific and traditional sources.

Supporting Clause		**Met? (Yes/No/NA)**
8.1	*Conservation and management measures shall be designed to ensure the long-term sustainability of fishery resources at levels which promote optimum utilization, and are based on verifiable and objective scientific and/or traditional, fisher, or community sources.*	**Yes**
8.1.1	*When evaluating alternative conservation and management measures, the fishery management organization shall consider their cost-effectiveness and social impact.*	**Yes**
8.1.2	*Responsible fisheries management organizations shall adopt and implement measures necessary to ensure the management of bycatch and reduction of*	**Yes**

	discards as part of fisheries management (1) in accordance with the PA, as reflected in Article 6 of the UN Fish Stocks Agreement, and as set out in Article 6.5 and 7.5 of the Code; (2) in accordance with the responsible use of fish as set out in the Code; and (3) based on the best scientific evidence available, taking into account fishers' knowledge.	
8.2	*The fishery management organization shall prohibit dynamiting, poisoning, and other similar destructive fishing practices.*	**Yes**
8.3	*The fishery management organization shall seek to identify domestic parties having a legitimate interest in the use and management of the fishery. When deciding on use, conservation, and management of the resource, due recognition shall be given, where relevant, in accordance with national laws and regulations, to the traditional practices, needs, and interests of indigenous people and local fishing communities which are highly dependent on these resources for their livelihood. Arrangements shall be made to consult all the interested parties and gain their collaboration in achieving responsible fisheries.*	**Yes**
8.4	*Where excess capacity exists, mechanisms shall be established to reduce capacity to levels commensurate with sustainable use of the resource. Fleet capacity operating in the fishery shall be measured and monitored. The fishery management organization shall maintain, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations and a record of all authorizations to fish allowed by them.*	**Yes**
8.4.1	*Studies shall be promoted that provide an understanding of the costs, benefits, and effects of alternative management options designed to rationalize fishing, especially options relating to excess fishing capacity and excessive levels of fishing effort.*	**Yes**
8.5	*Technical measures regarding the stock under consideration shall be taken into account, where appropriate, in relation to fish size, mesh size, gear, closed seasons or areas, areas reserved for particular (e.g., artisanal fisheries), and protection of juveniles or spawners.*	**Yes**
8.5.1	*Appropriate measures shall be applied to minimize catch, waste, and discards of non-target species (both fish and non-fish species), and impacts on associated, dependent, or endangered species.*	**Yes**
8.6	*Fishing gear shall be marked in accordance with the State's legislation in order that the owner of the gear can be identified. Gear marking requirements shall take into account uniform and internationally recognizable gear marking systems.*	**Yes**
8.7	*The fishery management organization and relevant groups from the fishing industry shall measure performance and encourage the development, implementation, and use of selective, environmentally safe, and cost-effective gear, technologies, and techniques that are sufficiently selective as to minimize catch, waste, discards of non-target species (both fish and non-fish species), and impacts on associated or dependent predators. The use of fishing gear and practices that lead to discarding the catch shall be discouraged, and the use of fishing gear and practices that increase survival rates of escaping fish shall be promoted. Inconsistent methods, practices, and gears shall be phased out accordingly.*	**Yes**
8.8	*Technologies, materials, and operational methods or measures—including, to the extent practicable, the development and use of selective, environmentally safe, and cost effective fishing gear and techniques—shall be applied to minimize the loss of fishing gear, the ghost fishing effects of lost or abandoned fishing gear, pollution, and waste.*	**Yes**

8.9	*The intent of fishing selectivity and fishing impacts-related regulations shall not be circumvented by technical devices. Information on new developments and requirements shall be made available to all fishers.*	**Yes**
8.10	*Assessment and scientific evaluation shall be carried out on the impacts of habitat disturbance on the fisheries and ecosystems prior to the commercial-scale introduction of new fishing gear, methods, and operations. Accordingly, the impacts of such introductions shall be monitored.*	**N/A**
8.11	*International cooperation shall be encouraged for research programs involving fishing gear selectivity, fishing methods and strategies, dissemination of the results of such research programs, and the transfer of technology.*	**Yes**
8.12	*The fishery management organization and relevant institutions involved in the fishery shall collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies, and on the behavior of target and non-target species regarding such fishing gear—as an aid for management decisions and with a view to minimizing non-utilized catches.*	**Yes**
8.13	*Where appropriate, policies shall be developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures. The fishery management organization shall ensure that, when selecting the materials to be used in the creation of artificial reefs, as well as when selecting the geographical location of such artificial reefs, the provisions of relevant international conventions concerning the environment and the safety of navigation are observed.*	**N/A**

Rationale:

The MSA requires that conservation and fisheries management measures prevent overfishing while achieving optimum yield on a continuing basis and sets out the standards (e.g., optimal use and avoiding overfishing) which are followed in managing the AK Atka mackerel and rockfish. The Council uses a multi-tier PA, which includes OY and MSY reference points. NMFS and the Council follow a multi-faceted PA (OFL, ABC, TAC, OY) to manage the federal target stocks fisheries, based on targets, limits, and pre-defined HCRs, as well as overall ecosystem considerations. All vessels participating in the BSAI groundfish fisheries, other than fixed gear sablefish, require a Federal groundfish license. Licenses are endorsed with area, gear, and vessel type and length designations. Fishing permits may be authorized, for limited experimental purposes, for the target or incidental harvest of groundfish that would otherwise be prohibited. Gear types authorized by the FMP are trawls, longline (including hook-and-line, jig, troll, and handline), pots (including longline pots and pot-and-line), and other gear as defined in regulations. Nonpelagic trawl gear modified to reduce the potential impact on bottom habitat is required when directed fishing for flatfish species in the Bering Sea subarea with nonpelagic trawl gear. For vessels using nonpelagic trawl gear, elevating devices on the sweeps are required when directed fishing for flatfish species in the Central GOA Regulatory Area. The use of nonpelagic trawl is prohibited in Cook Inlet. Three types of king crab protection areas are designated around Kodiak Island. Type I areas prohibit nonpelagic trawling year-round; and Type II areas prohibit nonpelagic trawling from February 15 to June 15; and adjacent areas designated as Type III may be reclassified by the Regional Administrator as Type I or Type II following a recruitment event. The Gulf of Alaska Slope Habitat Conservation Area is closed to nonpelagic trawling year–round. Trawling in the Marmot Bay Tanner Crab Protection Area is prohibited year-round, except for pelagic trawl gear used to directed fish for pollock. (**SC 8.1; 8.4; 8.5; 8.5.1;)**.

NMFS incorporated precautionary concepts to ensure compliance with the Sustainable Fisheries Act 1996, which includes 10 National Standards for conservation and management of fisheries in the U.S. The National Standards for fishery management and the National Standard Guidelines require that: “The fishing mortality rate does not jeopardize the capacity of a stock or stock complex to produce MSY.” The National Standards are further interpreted through the National Standard Guidelines, required by the MSA and developed and published by NMFS. The National Standard Guidelines for National Standard 1 require that: “when specifying limits and accountability measures intended to avoid overfishing and achieve sustainable fisheries, Councils must take an approach that considers uncertainty in scientific information and management control of the fishery. These guidelines describe how to address uncertainty such that there is a low risk that limits are exceeded.” Since 2007, the MSA has required that all FMPs include catch limits and accountability measures that are intended to ensure that overfishing cannot reduce a stock below the level that will produce MSY on a continuing basis (NOAA, 2018; MSA, 2007). The management approach of the Council carries out objectives by considering reasonable, adaptive management measures, as described in the MSA and in conformance with the National Standards, the ESA, the NEPA, and other applicable law (NPFMC, 2020; 2020b) **(SC 8.1)**

The following objectives are directly taken from the BSAI and GOA Groundfish FMPs:
***Prevent Overfishing (SC 8.5;* 8.5.1; 8.7; 8.8)**
1. *Adopt conservative harvest levels for multi-species and single species fisheries and specify optimum yield.*
2. Continue to use the 2 million mt optimum yield cap for the BSAI groundfish fisheries. [Continue to use the existing optimum yield cap for the GOA groundfish fisheries.]
3. Provide for adaptive management by continuing to specify optimum yield as a range.
4. Provide for periodic reviews of the adequacy of F40 and adopt improvements, as appropriate.
5. Continue to improve the management of species through species categories.
Promote Sustainable Fisheries and Communities:
6. *Promote conservation while providing for optimum yield in terms of the greatest overall benefit to the nation with particular reference to food production, and sustainable opportunities for recreational, subsistence, and commercial fishing participants and fishing communities.*
7. Promote management measures that, while meeting conservation objectives, are also designed to avoid significant disruption of existing social and economic structures.
8. Promote fair and equitable allocation of identified available resources in a manner such that no particular sector, group or entity acquires an excessive share of the privileges.
9. Promote increased safety at sea.
Preserve Food Web:
10. *Develop indices of ecosystem health as targets for management.*
11. Improve the procedure to adjust acceptable biological catch levels as necessary to account for uncertainty and ecosystem factors.
12. Continue to protect the integrity of the food web through limits on harvest of forage species.
13. Incorporate ecosystem-based considerations into fishery management decisions, as appropriate.
Manage Incidental Catch and Reduce Bycatch and Waste (SC 8.1.2):
14. Continue and improve current incidental catch and bycatch management program.
15. Develop incentive programs for bycatch reduction including the development of mechanisms to facilitate the formation of bycatch pools, vessel bycatch allowances, or other bycatch incentive systems.
16. Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits, as information becomes available.
17. Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce bycatch which includes economic discards.
18. Continue to manage incidental catch and bycatch through seasonal distribution of total allowable catch and geographical gear restrictions.
19. Continue to account for bycatch mortality in total allowable catch accounting and improve the accuracy of mortality assessments for target, prohibited species catch, and non-commercial species.
20. Control the bycatch of prohibited species through prohibited species catch limits or other appropriate measures.
21. Reduce waste to biologically and socially acceptable levels.
Avoid Impacts to Seabirds and Marine Mammals:
22. *Continue to cooperate with U.S. Fish and Wildlife Service (USFWS) to protect ESA-listed species, and if appropriate and practicable, other seabird species.*
23. Maintain or adjust current protection measures as appropriate to avoid jeopardy of extinction or adverse modification to critical habitat for ESA-listed Steller sea lions.
24. *Encourage programs to review status of endangered or threatened marine mammal stocks and fishing interactions and develop fishery management measures as appropriate.*
25. Continue to cooperate with NMFS and USFWS to protect ESA-listed marine mammal species, and if appropriate and practicable, other marine mammal species.
Reduce and Avoid Impacts to Habitat:
26. Review and evaluate efficacy of existing habitat protection measures for managed species.
27. Identify and designate essential fish habitat and habitat areas of particular concern pursuant to Magnuson-Stevens Act rules, and mitigate fishery impacts as necessary and practicable to continue the sustainability of managed species.
28. Develop a Marine Protected Area policy in coordination with national and state policies.
29. Encourage development of a research program to identify regional baseline habitat information and mapping, subject to funding and staff availability.
30. Develop goals, objectives and criteria to evaluate the efficacy and suitable design of marine protected areas and no-take marine reserves as tools to maintain abundance, diversity, and productivity. Implement marine protected areas if and where appropriate.
Promote Equitable and Efficient Use of Fishery Resources:
31. Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources.

32. Maintain the license limitation program, modified as necessary, and further decrease excess fishing capacity and overcapitalization by eliminating latent licences and extending programs such as community or rights-based management to some or all groundfish fisheries.
33. Provide for adaptive management by periodically evaluating the effectiveness of rationalization programs and the allocation of access rights based on performance.
34. Develop management measures that, when practicable, consider the efficient use of fishery resources taking into account the interest of harvesters, processors, and communities.
Increase Alaska Native Consultation (SC 8.3):
35. Continue to incorporate local and traditional knowledge in fishery management.
36. Consider ways to enhance collection of local and traditional knowledge from communities, and incorporate such knowledge in fishery management where appropriate.
37. Increase Alaska Native participation and consultation in fishery management.
Improve Data Quality, Monitoring and Enforcement:
38. Increase the utility of groundfish fishery observer data for the conservation and management of living marine resources.
39. Develop funding mechanisms that achieve equitable costs to the industry for implementation of the North Pacific Groundfish Observer Program.
40. Improve community and regional economic impact costs and benefits through increased data reporting requirements.
41. Increase the quality of monitoring and enforcement data through improved technology.
42. Encourage a coordinated, long-term ecosystem monitoring program to collect baseline information and compile existing information from a variety of ongoing research initiatives, subject to funding and staff availability.
43. Cooperate with research institutions such as the North Pacific Research Board in identifying research needs to address pressing fishery issues.
44. Promote enhanced enforceability.
45. Continue to cooperate and coordinate management and enforcement programs with the Alaska Board of Fish, Alaska Department of Fish and Game, and Alaska Fish and Wildlife Protection, the U.S. Coast Guard, NMFS Enforcement, International Pacific Halibut Commission, Federal agencies, and other organizations to meet conservation requirements; promote economically healthy and sustainable fisheries and fishing communities; and maximize efficiencies in management and enforcement programs through continued consultation, coordination, and cooperation.

Exempted fishing permits (EFPs) allows fishing activities that would otherwise be prohibited by fishery management plans. EFPs are issued for a variety of purposes, including:

- Research: Landing undersized fish, collecting fish for public display, and developing seafood products
- Conservation: Conservation engineering and environmental cleanup
- Data collection: Collecting data on size, sex, and other characteristics of fish
- Health and safety: Conducting health and safety surveys
- Hazard removal: Removing hazards

EFPs are issued by NOAA Fisheries under the Magnuson-Stevens Act. EFPs can be an important tool for fisheries management, as they allow for experimentation to explore new practices and scientific approaches. In some cases, EFP projects have provided the scientific information needed to make regulatory changes (**SC 8.4.1**)

AFSC also runs the Economic and Social Sciences Research Program (ESSRP) in Alaska. The aim of the Program is to provide economic and sociocultural information to assist NMFS in meeting its stewardship responsibilities with activities being conducted in support of this mission. The Council has established the Social Science Planning Team to improve the quality and application of social science data that informs management decision-making and program evaluation. The FMPs include a substantial section on the economic and socioeconomic characteristics of the fisheries and communities in Alaska. There is a detailed annual SAFE report on economic status of Alaskan fisheries (Aydin et al. 2023; Adams et al. 2023) and a section on economics in the SAFE reports. Harvest levels for each groundfish species or species group that are set by the Council for a new fishing year are based on the best biological, ecological, and socioeconomic information available, and follow a rigorous and public peer-reviewed process. **(SC 8.1.1; 8.4.1)**

As listed in the FMPs and in NMFS regulations, the only legal gears for taking AK Atka mackerel and rockfish in the Alaskan fisheries are pelagic trawl, bottom trawl, jig, longline, and pot. Regulations pertaining to vessel and gear markings in the fishery are established in NMFS and ADFG regulations as prescribed in the annual management measures published in the Federal Register. There is no evidence that indicated the marking of gear is not being followed or is not effective. No destructive gears such as dynamite or poison are permitted, nor is there any evidence that such methods are being used illegally. There is no evidence that regulations involving gear selectivity in BSAI

Atka mackerel, BSAI and GOA Northern rockfish, BSAI and GOA POP and GOA dusky rockfish in Alaska fisheries are being circumvented either by omission, or through the illegal use of gear technology. Evidence provided by fishing fleets indicates that lost fishing gear is minimal. A NOAA (2015) study shows ghost fishing mortality and gear loss for derelict trawl (and other gears such as longline) are likely to be lower in comparison to gillnets and trap gears, although less is known of the effects of derelict trawls and longlines. The gear regulations also contain details on mesh sizes permitted, biodegradable panels in pot gears, types of hook and line gear allowed, etc. The use of bottom contact gear is prohibited in the Gulf of Alaska Coral and Alaska Seamount Habitat Protection Areas year-round. Fishing with trawl vessels is not permitted year-round in the Crab and Halibut Protection Zone and the Pribilof Island Habitat Conservation Area. Also, a number of closure zones for trawl gears are described in the FMPs for GOA and BSAI. A suite of measures specific to seabird avoidance in hook and line fisheries in Alaskan waters also exists, and data on seabirds are collected by observers, and included in the SAFE documents. Various measures to reduce bycatches of PSC species (e.g., crabs, halibut, Chinook) in BSAI and GOA, including gear modifications and closed areas and seasons, have been adopted in recent years. Other industry-driven measures taken to reduce halibut catch include use of excluder devices, improved communication and data sharing among vessels to avoid halibut, and enhanced deck sorting to reduce mortality of halibut returned to the sea (Gauvin 2013). Exempted fishing permits have been issued for deck sorting on Amendment 80 C/Ps to reduce halibut mortality, and implementing regulations were adopted in October 2019. Numerous measures to protect Steller sea lion populations and habitat affect are implemented in the FMPs for GOA and BSAI groundfish. NMFS and the Council must describe and identify EFH in FMPs, minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to encourage the conservation and enhancement of EFH. Further details on this are described under Fundamental Clause 12 below. **(SC 8.2; 8.5; 8.5.1; 8.6; 8.7; 8.10)**.

The Council and BOF have extensive processes in place to allow for identifying and consulting with domestic parties having interest in the Alaska groundfish fisheries. The Council is responsible for allocation of the target stocks resource among user groups in Alaskan waters, and the BOF public meeting process provides a regularly scheduled public forum for all interested individuals, fishermen, fishing organizations, environmental organizations, Alaskan Native organizations and other governmental and non-governmental entities that catch target stocks off Alaska to participate in the development of legal regulations for fisheries. Organizations and individuals involved in the fishery and management process have been identified. The Alaska management process has many stakeholders, including license holders, processors, fishermen's organizations, cooperatives, coalitions, the states of Alaska, Washington, and Oregon, CDQ groups, and environmental groups. The Council's process is the primary means for soliciting stakeholder information important to the fisheries, and this is fully transparent and open to the public. Proposals for management measures may come from the public, state and federal agencies, advisory groups, or Council members. Fishing industry stakeholders work extensively with fishery scientists, managers, and other industry members on various initiatives to ensure sustainability of Alaska groundfish fisheries. The Council established a Rural Outreach Committee in 2009 to improve outreach and communications with rural communities and Alaska Native entities and develop a method for systematic documentation of Alaska Native and community participation in the development of fishery management actions. The Western Alaska CDQ Program, established by the Council in 1992, allocates a percentage of all BSAI quotas for groundfish, prohibited species, halibut, and crab to eligible communities. There are approximately 65 communities within a 50-mile radius of the BS coastline who participate in the program.

The fisheries for AK Atka mackerel and rockfish in Alaska are conducted by U.S. vessels only. In adjacent waters of the GOA cooperation on research and management between Canada and the United States occurs as part of the science and management process (**SC 8.11**). The Technical Subcommittee (TSC) of the Canada-U.S. Groundfish Committee April 2024 has further information. https://www.psmfc.org/tsc-drafts/2024/AFSC_2024_TSC_Report.pdf

There are numerous measures implemented in Alaskan fisheries to minimize non-utilized catches, such use prohibition of discarding (Improved Retention/Improved Utilization (IR/IU) Program), use of salmon and halibut excluder devices in trawl nets, and use of streamers on longline gear to reduce seabird bycatch. Many of the studies and subsequent implementation have involved cooperative efforts between researchers at institutions in NMFS, ADFG, universities, and industry, and are introduced into regulations only after extensive testing has occurred. Key studies include research on excluder devices, deck sorting of halibut, and research on pots to reduce Tanner crab bycatch **(SC 8.12)**. Additional information on bycatch is presented in Fundamental Clause 12 below.

There have not been any new gear types in the last three years, nor is there artificial reef structures, thus 8.10 and 8.13 are not applicable.

Evaluation Parameter Rationale - Process	Met? (Yes/No/NA)
8.1 The process by which management measures are developed for the fishery utilizes the best scientific evidence available, including traditional sources where these are verifiable,	**Yes**

and also considers the cost-effectiveness and social impact of potential new measures. The assessment team shall provide evidence for the main type of management measures present in the fishery. Some of the main examples may include (but are not limited to) legal gear specifications, permit requirements, observer requirements, reporting requirements, limited access, vessel license limitations, size limits, sex restrictions, total allowable catch, in season adjustments, fishing seasons, geographical registrations areas, bycatch reduction devices, gear modification, minimizing waste and ghost fishing, closed waters, catch limits for other fisheries, and bycatch management.	
8.1.1 The process by which management measures are developed for the fishery allows for consideration of the cost-effectiveness and social impact of potential new or modified management measures.	**Yes**
8.1.2 The responsible fisheries management organizations has adopted and implemented effective measures necessary to ensure the management of bycatch and reduction of discards as part of fisheries management.	**Yes**
8.2 There are management measures, or regulations, or laws that prohibit destructive fishing practices.	**Yes**
8.3 There is a process that allows for identifying and consulting with domestic parties (giving due recognition where relevant, in accordance with national laws and regulations, to the traditional practices, needs, and interests of indigenous people and local fishing communities which are highly dependent on these resources for their livelihood) having a legitimate interest in the use and management of the fisheries resource.	**Yes**
8.4 There is a system to measure fleet capacity and maintain regularly updated data on all fishing operations. Research has been conducted to determine or estimate the fishing capacity commensurate with the sustainable use of the resource. There are mechanisms in place to measure the total fishing capacity within the unit of certification, and to reduce this capacity if it is determined to exceed the sustainable level.	**Yes**
8.4.1 There is a need and a process that allows, as appropriate, for studies to understand the costs, benefits, and effects of alternative management options designed to rationalize fishing.	**Yes**
8.5 The management system has taken into account technical measures, where and as appropriate (i.e., some fisheries do not have the requirement for a minimum fish size), to the fishery and stock under assessment, in relation to fish size, mesh size, gear, closed seasons, closed areas, areas reserved for particular (e.g., artisanal) fisheries, and protection of juveniles or spawners.	**Yes**
8.5.1 There is a mechanism by which management measures are developed to minimize the catch, waste and discarding of non-target species and the impact of the fishery on associated, dependent, and ETP species. This system shall include the development of specific management objectives.	**Yes**
8.6 There is regulation for gear marking.	**Yes**
8.7 The management system and relevant groups from the fishing industry have encouraged the development of technologies and operational methods to reduce waste and discard of the target species. Relevant groups includes fishers, processers, distributers, and marketers. There are mechanisms in place by which the selectivity, environmental impact, and cost-effectiveness of gears included in the unit of certification are measured.	**Yes**
8.8 There has been development of technologies, materials, and operational methods that minimize the loss of fishing gear, the ghost fishing effects of lost or abandoned fishing gear, and a system to minimize pollution and waste.	**Yes**
8.9 There is a system that makes available information on new developments and requirements to all fishers to avoid circumvention of fishing regulations.	**Yes**
8.10 New gear has been recently introduced on a commercial scale within the last 3 years, or there is a plan to introduce new gear in the foreseeable future.	**NA**
8.11 There is a system of international information exchange to allow knowledge to be shared.	**Yes**
8.12 There is collaborative research into fishing gear selectivity, fishing methods, and strategies.	**Yes**
8.13 There is a mechanism in place for identifying potential for increasing stock populations and enhancing fishing opportunities through the use of artificial structures. This mechanism ensures that where artificial structures are deemed appropriate, environmental protection, safety, and navigation are considered in their application.	**NA**
Rationale:	

As noted in the rationale for the Supporting Clauses, there are mechanisms and objectives in place in the BSAI and GOA FMPs, along with the MSA, National Standards to reduce bycatch and ensure the conservation of the resources, surrounding habitat and impact to other species. There have been numerous regulations, as well as technological developments, aimed at reducing waste and discards in the AK mackerel and rockfish fisheries, and to ensure that the resources are harvested sustainably. These include various measures to address fish size, discards, and closed seasons and areas. Specific examples include development of excluder devices for trawl gear to reduce these by-catches, and closures of large areas to protect numerous endangered species (including salmon, crab, and marine mammals). Since 1998, full retention of Atka mackerel and rockfish in Alaska is required in all Alaskan fisheries under the Improved Retention/Improved Utilization Program. In addition, some vessels have made various gear modifications to avoid catch of smaller fish, and/or to minimize bottom contact. Marine Reserve Areas (MRAs) are put in place to help manage bycatches in groundfish fisheries. Fishing industry groups such as cooperatives and coalitions have undertaken numerous conservation-oriented measures in relation to fish size, bycatch avoidance, and product utilization. NMFS has a full suite of fishery regulations for Alaskan waters which cover all aspects of fishing, including seasons, gear limitations, and numerous area closures.

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	**Met? (Yes/No)**
8.1 There is evidence that the overall framework of management measures in place is effective at achieving the long-term optimum yield, which is defined by the FAO as "the harvest levels for a species that achieves the greatest overall benefits, including economic, social and biological considerations." If the stock has been maintained above the limit reference point, this shall be taken as evidence that management measures are effective in avoiding overfishing.	**Yes**
8.1.1 There is evidence for the consideration of the cost-effectiveness and social impact of potential new or modified management measures.	**Yes**
8.1.2 There is evidence of adoption and implementation of effective measures to ensure the management of bycatch and reduction of discards as part of fisheries management (1) in accordance with the PA, as reflected in Article 6 of the UN Fish Stocks Agreement, and as set out in Article 6.5 and 7.5 of the Code; (2) in accordance with the responsible use of fish as set out in the Code; and (3) based on the best scientific evidence available, taking into account fishers' knowledge. Please note that traditional knowledge should be verifiable. The strategy to ensure the management of bycatch and reduction of discards as part of fisheries management is being implemented successfully (e.g., there is a well-known track record of consistently setting conservative bycatch limits based on quality information and advice about bycatch); or bycatch is minimized to the greatest extent possible, especially for vulnerable species such as sharks, seabirds, turtles, and marine mammals, through mitigation measures that have been shown to be highly effective (e.g., observer coverage and procedures, bycatch caps, utilization measures, full catch accounting, on-deck techniques, avoidance mechanisms and gear technology, etc.). Also, the fishery is not a leading cause of a high level of mortality for any species of concern (e.g., not a Category I fishery for marine mammal bycatch as designated by the National Marine Fisheries Service).	**Yes**
8.2 The regulations or laws effectively prohibit dynamiting, poisoning, and other similar destructive fishing practices.	Yes
8.3 In accordance with national laws and regulations, there is evidence that domestic parties having a legitimate interest in the use and management of the fishery (as described above) have been identified and encouraged to collaborate in the fisheries management process.	**Yes**
8.4 There is evidence of the size of fleet capacity, and of data describing fishing operation, and that the mechanisms described above are successful at maintaining the effective fishing capacity of the unit of certification at a level commensurate with the sustainable use of the resource. Management mechanisms, which restrict the application of fishing capacity, such as quotas, shall be considered valid mechanisms in relation to this parameter. The core emphasis of this requirement is to ensure that exploitation is sustainable. Assessment teams should ensure that fisheries are within catch limit recommendations to determine whether excess capacity is having an effect on resource overexploitation.	**Yes**
8.4.1 There is evidence for studies conducted on alternative management options designed to rationalize fishing.	**Yes**
8.5 Technical measures are related to sustainability objectives, ensuring sustainable exploitation of the target species, and minimizing the potential negative impacts of fishery activities on non-target species, ETP species, and the physical environment.	**Yes**

8.5.1 There are measures in place to minimize catch, waste, and discards of nontarget species (both fish and non-fish species). These measures are considered effective at achieving the specific management objectives described in the process parameter. There are measures in place to minimize impacts on associated, dependent, or endangered species. These measures are considered effective at achieving the specific management objectives described in the process parameter.	**Yes**
8.6 Fixed gear is marked according to national legislation, and lost fixed gear can be identified back to owner.	**Yes**
8.7 Such technologies and operational methods have been implemented. The methods in use are effective in reducing waste and discards of the non-target species. There is evidence that the gears used in the fishery are appropriate, in terms of selectivity, environmental impact, and cost-effectiveness, as assessed by the responsible scientific authority of the fishery. Methods shall be considered successful if there is evidence that the fishery under assessment is not causing significant risk of overfishing to non-target species.	**Yes**
8.8 Technologies, materials, and operational methods that minimize the loss of fishing gear and ghost fishing by lost or abandoned gear are applied whenever appropriate. Also, these measures are effective in minimizing, to the extent practicable, pollution and waste.	**Yes**
8.9 The adopted methods are successful and effective and fishing regulations are made known to the participants. Enforcement data are highlighting significant violations.	**Yes**
8.10 An appropriate assessment of potential impacts has been carried out. There is evidence to suggest that the assessment is adequate to support habitat conservation and fishery management purposes. Additionally, there is a monitoring regime in place.	**Yes**
8.11 There is evidence for international information exchange, such as meeting records or other information.	**Yes**
8.12 There is evidence of such research, and the results have been applied accordingly in fisheries management.	**Yes**
8.13 This mechanism has been applied to the stocks under consideration, resulting in the conclusion to either use artificial structures, or that artificial structures are inappropriate. Care has been taken in the selection of materials to use in constructing artificial reefs, the selection of sites for their deployment, and to ensure that relevant conventions concerning the environment and the safety of navigation have been observed.	**NA**
Rationale: Evidence can be seen in the FMPs, the SAFE reports, stock assessments and in the fishery regulations. See the rationale above for further details.	

Evaluation Parameter Rationale – Evidence Basis	**Met? (Yes/No/NA)**
8.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that conservation and management measures are designed to ensure the long-term sustainability of fishery resources at levels which promote optimum utilization, and are based on verifiable and objective scientific and/or traditional, fisher, or community sources. Examples may include reports, fishery management plans, regulations, or other management measures.	**Yes**
8.1.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that in the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact are considered. Examples may include reports, fishery management plans, regulations or other management measures.	**Yes**
8.1.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the responsible fisheries management organizations have adopted and implemented effective measures necessary to ensure the management of bycatch and reduction of discards as part of fisheries management. Examples may include stock assessment, bycatch or other ecosystem assessment reports.	**Yes**
8.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization prohibits dynamiting, poisoning, and other similar destructive fishing practices. Examples may include laws, fishery management plans, regulations, and enforcement data.	**Yes**
8.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization seeks to identify domestic parties having a legitimate interest in the use and management of the fishery. When deciding on use, conservation, and management of the resource, due recognition is given, where relevant, in accordance with national laws and regulations, to the traditional practices, needs, and interests of indigenous people and local fishing communities which are highly dependent on these resources for their livelihood. Arrangements are made to consult all the interested parties and gain their	**Yes**

collaboration in achieving responsible fisheries. Examples may include laws, fishery management plans, regulations, and meeting records.	
8.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fleet capacity operating in the fishery is monitored and measured, and statistical data on all fishing operations allowed is updated and maintained. Where excess capacity exists, mechanisms are established to reduce capacity to levels commensurate with sustainable use of the resource. Examples may include fleet reports or other documents or reports.	**Yes**
8.4.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that studies are promoted that provide an understanding of the costs, benefits, and effects of alternative management options designed to rationalize fishing, especially options relating to excess fishing capacity and excessive levels of fishing effort. Examples may include various evaluation or reports on fishing rationalization.	**Yes**
8.5 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that technical measures regarding the stock under consideration are taken into account, where appropriate, in relation to fish size, mesh size, gear, closed seasons, closed areas, areas reserved for particular (e.g., artisanal) fisheries, and protection of juveniles or spawners. Examples may include fishery management plans, regulations or various other reports.	**Yes**
8.5.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that appropriate measures are applied to minimize catch, waste and discards of non-target species (both fish and non-fish species), and impacts on associated, dependent, or endangered species. Examples may include various stock and ecosystems assessment reports.	**Yes**
8.6 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fishing gear is marked in accordance with State's legislation in order that the owner of the gear can be identified. Gear marking requirements take into account uniform and internationally recognizable gear marking systems. Examples may include various fleet reports and regulations.	**Yes**
8.7 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization and relevant groups from the fishing industry measure performance and encourage the development, implementation, and use of selective, environmentally safe, and cost effective gear, technologies and techniques, that are sufficiently selective as to minimize catch, waste, discards of non-target species (both fish and non-fish species), and impacts on associated or dependent species. Examples may include various reports, regulations, or other data.	**Yes**
8.8 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate those technologies, materials, and operational methods or measures—including, to the extent practicable, the development and use of selective, environmentally safe, and cost effective fishing gear and techniques—are applied to minimize the loss of fishing gear, the ghost fishing effects of lost or abandoned fishing gear, pollution, and waste. Examples may include various regulations, data, and reports.	**Yes**
8.9 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the intent of fishing selectivity and fishing impacts-related regulations is not circumvented by technical devices. Information on new developments and requirements is made available to all fishers. Examples may include various data and reports.	**Yes**
8.10 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that assessment and scientific evaluation is carried out on the implications of habitat disturbance impact on the fisheries and ecosystems prior to the commercial-scale introduction of new fishing gear, methods, and operations. Accordingly, the effects of such introductions are monitored. Examples may include various regulations, data, and reports.	**Yes**
8.11 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that international cooperation is encouraged for research programs involving fishing gear selectivity, fishing methods and strategies, dissemination of the results of such research programs, and the transfer of technology. Examples may include various data and reports.	**Yes**
8.12 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization and relevant institutions involved in the fishery collaborate in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies, and on the behavior of target and non-target species in relation to such fishing gear—as an aid for management decisions and with a view to minimizing non-utilized catches. Examples may include various data and reports.	**Yes**
8.13 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that where appropriate, policies are developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures. The fishery management organization shall also ensure that, when selecting the materials to be used in the creation of	**NA**

artificial reefs, as well as when selecting the geographical location of such artificial reefs, the provisions of relevant international conventions concerning the environment and the safety of navigation are observed. Examples may include various laws, data and reports.	
Rationale: See rationale above under the Supporting Clauses.	

	Starting score	- (Number of EPs NOT met x 3) =	Overall score
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: **(10 = High; 4 or 7 = Medium; 1 = Low)**			**High**
Corresponding Conformance Level: **(10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)**			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 9

Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards, guidelines and regulations.

Supporting Clause		Met? (Yes/No/NA)
9.1	*States shall advance, through education and training programs, the education and skills of fishers and, where appropriate, their professional qualifications. Such programs shall take into account agreed international standards and guidelines.*	**Yes**
9.2	*States, with the assistance of relevant international organizations, shall endeavour to ensure, through education and training, that all those engaged in fishing operations be given information on the most important provisions of the FAO CCRF (1995), as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations.*	**Yes**
9.3	*The fishery management organization shall, as appropriate, maintain records of fishers which shall, whenever possible, contain information on their service and qualifications, including certificates of competency, in accordance with their State's laws.*	**Yes**

Rationale:

Programs are available at various institutions that provide training and education for those seeking to enter commercial fishing or a maritime career. For example, the Alaska Maritime Workforce Development Plan was developed in 2014 by representatives of Alaska Fisheries, Seafood, and Marine Industry Sectors, Alaska State Agencies and the University of Alaska to support a sustainable maritime workforce in Alaska.[13]

The NOAA Fisheries Alaska Marine Education and Training Mini-Grant Program supports projects that will increase sustainability, communication, education, and training on marine resource issues and education for marine-related professions in Alaska. Projects prepare communities for employment in marine-related professions by supporting aquaculture; increasing seafood and fishing safety, seafood marketing, or management; and by increasing the sustainability of fishing practices through technology improvements. Further details can be found under the NOAA Fisheries Funding opportunities.[14] **(SC 9.1)**

The 1995 Code of Conduct for Responsible Fisheries or—CCRF—sets out international principles and standards of behavior to ensure effective conservation, management, and development of both marine and freshwater living aquatic resources. It accounts for the impact of fishing on ecosystems, the impact of ecosystems on fisheries, and

[13] https://www.alaska.edu/fsmi/AKMaritimeWFDPlan_HighRes_5-22-14.pdf
[14] https://www.fisheries.noaa.gov/alaska/funding-financial-services/alaska-region-funding-opportunities

the need to conserve biodiversity. The CCRF is voluntary, although parts of it are based on relevant international laws. NMFS, the Council and ADFG have rules and regulations governing AK fisheries available on their websites. The BSAI and GOA FMPs also contain a summary of management measures that apply to these fisheries. These also cover legal definitions such as quota shares, individual fishing quotas, etc (**SC 9.2).**

Data on the number and location of Alaskan fishers, permits issued, etc. can be found in the annual SAFE documentation. Information on Alaska sport fish and crew license holders has been compiled through the Alaska Fisheries Information Network. Data on fishing in Alaskan state-managed fisheries can be found in the State of Alaska's Commercial Fisheries Entry Commission (CFEC) website.[15] Fishermen in the state-managed fisheries must register prior to fishing and are required to keep a logbook during the fishery. Completed logbook pages must be attached to the ADFG copy of the fish ticket at the time of delivery. USCG also maintains records and issues credentials on licenses for crewmembers, including engineers, captains, mates, deckhands, etc. The State of Alaska issues commercial fishing licenses for all crew **(SC 9.3)**.

Evaluation Parameter Rationale - Process	**Met? (Yes/No/NA)**
9.1 There are implemented education programs for fishers (e.g., health and safety, fisheries management framework, rule and regulation, etc.).	**Yes**
9.2 There are relevant measures of the FAO CCFR and other applicable environmental and other standards being exposed to fishers for their training.	**Yes**
9.3 There is a system to collect and maintain fisher records.	**Yes**
Rationale: See above.	

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	**Met? (Yes/No/NA)**
9.1 These programs are effective in training fishers, in line with international standards and guidelines.	**Yes**
9.2 These programs are effective in training fishers, in line with international standards, guidelines, and key CCRF principles. The presence of general training programs for fishermen (e.g., health and safety, fisheries management framework, rule and regulation, etc.) shall be evidence that the key principles of the CCRF have been filtered down from management to fishermen. Furthermore, the existence of laws and regulation with which fishermen are compliant demonstrate further compliance to this clause.	**Yes**
9.3 These records are considered accurate and effective for management purposes.	**Yes**
Rationale: See rationale above.	

Evaluation Parameter Rationale – Evidence Basis	**Met? (Yes/No/NA)**
9.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States enhance, through education and training programs, the education and skills of fishers and, where appropriate, their professional qualifications. Such programs take into account agreed international standards and guidelines. Examples may include various data, websites.	**Yes**
9.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States, with the assistance of relevant international organizations, endeavor to ensure, through education and training, that all those engaged in fishing operations be given information on the most important provisions of the FAO CCRF, as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations. Examples may include various data, websites.	**Yes**
9.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization maintains, as appropriate, records of fishers which, whenever possible, contain information on their service and qualifications, including	**Yes**

[15] https://www.cfec.state.ak.us/

certificates of competency, in accordance with their national laws. Examples may include various data or reports.	
Rationale: See rationale above.	

	Starting score	- (Number of EPs NOT met x 3) =	Overall score
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: **(10 = High; 4 or 7 = Medium; 1 = Low)**			**High**
Corresponding Conformance Level: **(10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)**			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 10

An effective legal and administrative framework shall be established and compliance ensured, through effective mechanisms for monitoring, surveillance, control, and enforcement for all fishing activities within the jurisdiction.

Supporting Clause		Met? (Yes/No)
10.1	*Effective mechanisms shall be established for fisheries monitoring, surveillance, control, and enforcement measures including, where appropriate, observer programs, inspection schemes, and vessel monitoring systems, to ensure compliance with the conservation and management measures for the fishery in question. This could include relevant traditional, fisher, or community approaches, provided their performance could be objectively verified.*	**Yes**
10.2	*Fishing vessels shall not be allowed to operate on the stock under consideration in question without specific authorization.*	**Yes**
10.3	*States involved in the fishery shall, in accordance with international law, and within the framework of fisheries management organizations or arrangements, cooperate to establish systems for monitoring, control, surveillance, and enforcement of applicable measures with respect to fishing operations and related activities in waters outside the States jurisdiction.*	**NA**
10.3.1	*Fishery management organizations which are members of or participants in fisheries management organizations or arrangements, shall implement internationally agreed measures adopted in the framework of such organizations or arrangements and consistent with international law to deter the activities of vessels flying the flag of non-members or nonparticipants engaging in activities that undermine the effectiveness of conservation and management measures established by such organizations or arrangements. In that respect, port States shall also proceed, as necessary, to assist other States in achieving the objectives of the FAO CCRF (1995), and should make known to other States details of regulations and measures they have established for this purpose without discrimination for any vessel of any other State.*	**NA**
10.4	*Flag States shall ensure that no fishing vessels are entitled to fly their flag, fish on the high seas or in waters under the jurisdiction of other States, unless such vessels have been issued with a Certificate of Registry and have been authorized*	**NA**

	to fish by the competent authorities. Such vessels shall carry on board the Certificate of Registry and their authorization to fish.	
10.4.1	*Fishing vessels authorized to fish on the high seas or in waters under the jurisdiction of a State other than the flag State shall be **marked** in accordance with uniform and internationally recognizable vessel marking systems such as the FAO Standard Specifications and Guidelines for Marking and Identification of Fishing Vessels.*	**NA**

Rationale:

The U.S measures for regulating the BSAI and GOA fisheries are found in 50 CFR 600 and 50 CFR 679. Gear types authorized by the FMP are trawls, hook-and-line, pots, jigs, and other gear as defined in regulations. The fishery is primarily managed by required licenses and/or permits, fishing seasons, annual TACs, closed areas, catch restrictions.

Annually, the Council develops harvest specifications based on information from the Groundfish Plan Teams, SSC, AP, the public, and any other relevant information. Harvest specifications include overfishing limit, acceptable biological catch (ABC), total allowable catch (TAC), ABC surplus and ABC reserve. Final harvest specifications are implemented by mid-February each year to replace those in effect for that year and based on new information contained in the latest groundfish SAFE reports. Current harvest specifications can be found at the following link: https://www.npfmc.org/fisheries-issues/issues/harvest-specs/.
Monitoring, control and surveillance (MCS) is carried out at-sea and shore-side for the federal fisheries by the NMFS Office of Law Enforcement (OLE) and the U.S. Coast Guard (USCG). NOAA's OLE protects marine wildlife and habitat by enforcing domestic laws and international treaty requirements designed to ensure these global resources are available for future generations (NOAA, 2019). OLE special agents and enforcement officers ensure compliance with the nation's marine resource laws and take enforcement action when these laws are violated. All OLE work supports the core mission mandates of NOAA Fisheries—maximizing productivity of sustainable fisheries and fishing communities and protection, recovery, and conservation of protected species. There is also a Cooperative Enforcement Program in place, which is a partnership with the federal and state agencies that increases the enforcement activities and promotes compliance with federal laws and regulations.
Monitoring, control and surveillance actions include:

- Fishing permit requirements
- Fishing permit and fishing vessel registers
- Vessel and gear marking requirements
- Fishing gear and method restrictions
- Reporting requirements for catch, effort, and catch disposition
- Vessel inspections
- Record keeping requirements
- Auditing of licensed fish buyers
- Control of transshipment
- Monitored unloads of fish
- Information management and intelligence analysis
- Analysis of catch and effort reporting and comparison with landing and trade data to confirm accuracy
- Boarding and inspection by fishery officers at sea
- Aerial and surface surveillance **(SC 10.1; 10.2)**

There is also a comprehensive, industry-funded, at sea and on shore Observer Program. All sectors of the groundfish fishery may be required to carry one or more observers or an electronic monitoring system for at least a portion of their fishing time. NMFS develops an Annual Deployment Plan and makes adjustments to the plan after scientific evaluation of data collected under the Observer Program. Vessels and processors in the full observer coverage category are required to obtain observer coverage by contracting directly with observer providers to meet coverage requirements in regulation. The AK mackerel and rockfish fishery is required to have full observer coverage when harvesting, receiving or processing groundfish in a federally managed or parallel groundfish fishery (FR Title 50; § 679.2). The federal regulations also have additional observer requirements for vessels classified as CPs and as CPs using trawl gear and groundfish CDQ fishing. Additionally, motherships that receive unsorted codends from catcher vessels groundfish CDQ fishing must also have two observers aboard the mothership, at least one of whom must be endorsed as a lead level two observer (Federal Register Title 50; § 679.2). These additional observer requirements apply to the AK mackerel and rockfish fishery.

Evaluation Parameter Rationale - Process	**Met? (Yes/No/NA)**

10.1 There are clear mechanisms established for fisheries monitoring, surveillance, control, and enforcement.	**Yes**
10.2 There is a mechanism or system established to maintain a record of fishing authorizations.	**Yes**
10.3 There is a mechanism or system established to conduct enforcement operations outside the State's jurisdiction.	**NA**
10.3.1 There are regulations established against vessels flying the flag of non-member or non-participant States, which may engage in activities that undermine the effectiveness of conservation and management measures established by fisheries management organizations.	**NA**
10.4 There are foreign vessels fishing in State's EEZ. State's EEZ vessels do not fish in high seas or in another State's EEZ.	**NA**
10.4.1 There are foreign vessels fishing in State's EEZ. State's EEZ vessels do not fish in high seas or in another State's EEZ.	**NA**
Rationale: As noted in the rationale above, there is a required MCS system in place and required by Federal law for the AK Atka mackerel and rockfish fishery. A federal groundfish license is required for catcher vessels, including catcher/processor, and all participants in the AK mackerel and rockfish fishery. There is mandatory full observer coverage and additional observer requirements for vessels classified as catcher processors (CPs) and as CPs; using trawl gear and groundfish CDQ fishing. NMFS also provides other observer support services (sampling gear and training documents) and is responsible for maintaining information systems for scientific and operational data, and administrative support.	

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	**Met? (Yes/No)**
10.1 These mechanisms are effective, and include effective observer programs, inspection schemes, and vessel monitoring systems where appropriate for the type of fishery under assessment. Monitoring, surveillance, control, and enforcement mechanisms can be considered effective if they are sufficiently broad to cover the entirety of the unit of certification, there is evidence that rules and regulations are consistently enforced, and there is no evidence of frequent or widespread violation of fishery regulations. This could include relevant traditional, fisher, or community approaches, provided their performance could be objectively verified. With respect to fisheries on the high seas, the legal obligations of UNCLOS and UNFSA have particular relevance. Evidence of the performance of the legal framework can be derived from assessing conformance with requirements covering compliance and enforcement. Specifically, the assessment team shall document the general level/type of fisheries controls (e.g., number of boarding's, reprimands) and the respective level of fisheries violations (e.g., %) on a yearly basis.	**Yes**
10.2 This mechanism is effective for maintaining updated records of fishing authorizations and ensuring fishing vessels operate with appropriate authorization.	**Yes**
10.3 This mechanism is enforcing operations in internationally occurring fisheries. If the stock under consideration is not transboundary, shared, straddling, highly migratory or high seas, then the Standard need only be concerned with the effectiveness and suitability of the monitoring, surveillance, control, and enforcement activities at the States level for the fishery of which the unit of certification is a part. If the unit of certification is part of a States fleet fishing on a transboundary, shared, straddling, highly migratory or high seas stock, then it is still likely to be the effectiveness and suitability of the monitoring, surveillance, control, and enforcement activities at the States level that shall be assessed. If the unit of certification covers all the fishing on the stock under consideration, then the monitoring, surveillance, control, and enforcement of all of the States fleets is of concern and shall be assessed (to ensure full consideration of total fishing mortality on the stock under consideration).	**NA**
10.3.1 These measures are effective in deterring such practices.	**Yes**
10.4 These vessels have been issued with a Certificate of Registry and they are required to carry it on board.	**Yes**
10.4.1 Foreign vessels authorized to fish in the State's EEZ or its vessels fishing in another State's EEZ have been marked accordingly to international guidelines.	**NA**
Rationale: All vessels fishing in Alaska need to be registered and meet all requirements of the Alaska Department of Fish and Game (ADF&G). Details of the permit and participation restrictions can be found in Section 3.3 of the BSAI[16]	

[16] https://www.npfmc.org/wp-content/uploads/BSAIfmp.pdf

and GOA FMP[17]. Evidence of these actions can also be found in Groundfish SAFE reports, and in annual observer reports from the North Pacific Observer Program.[18]

Evaluation Parameter Rationale – Evidence Basis	Met? (Yes/No/NA)
10.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that effective mechanisms are established for fisheries monitoring, surveillance, control, and enforcement measures including, where appropriate, observer programs, inspection schemes, and vessel monitoring systems, to ensure compliance with the conservation and management measures for the fishery in question. This could include relevant traditional, fisher or community approaches, provided their performance could be objectively verified. Examples may include rules and regulations, enforcement reports.	**Yes**
10.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fishing vessels are not allowed to operate on the stock under consideration in question without specific authorization. Examples may include various data.	**Yes**
10.3 *The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States involved in the fishery do, in accordance with international law, and within the framework of fisheries management organizations or arrangements, cooperate to establish systems for monitoring, control, surveillance, and enforcement of applicable measures with respect to fishing operations and related activities in waters outside their States jurisdiction. Examples may include enforcement reports.*	**Yes**
10.3.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organizations which are members of or participants in fisheries management organizations or arrangements implement internationally agreed measures adopted in the framework of such organizations or arrangements and consistent with international law to deter the activities of vessels flying the flag of non-members or non-participants engaging in activities which undermine the effectiveness of conservation and management measures established by such organizations or arrangements. In that respect, port States also proceed, as necessary, to achieve and to assist other States in achieving the objectives of the FAO CCRF, and make known to other States details of regulations and measures they have established for this purpose without discrimination for any vessel of any other State. Examples may include enforcement or other reports.	**NA**
10.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the flag State ensures that no fishing vessels are entitled to fly their flag, fish on the high seas or in waters under the jurisdiction of other States, unless such vessels have been issued with a Certificate of Registry and have been authorized to fish by the competent authorities. Such vessels shall carry on board the Certificate of Registry and their authorization to fish. Examples may include various laws, regulations, and other data or reports.	**NA**
10.4.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that fishing vessels authorized to fish on the high seas or in waters under the jurisdiction of a State other than the flag State, are marked in accordance with uniform and internationally recognizable vessel marking systems such as the FAO Standard Specifications and Guidelines for Marking and Identification of Fishing Vessels. Examples may include various laws, regulations, and other data or reports.	**NA**
Rationale: Evidence of the MCS system in place for the AK Atka mackerel and rockfish fisheries can be found in annual observer reports, observed catch tables and in enforcement reports from the Office of Law Enforcement to the Council. The following links can be accessed for further details on the monitoring actions for this fishery. https://www.fisheries.noaa.gov/resource/document/north-pacific-observer-program-2022-annual-report https://www.fisheries.noaa.gov/alaska/fisheries-observers/observed-and-monitored-catch-tables NOAA, 2023c. Office of Law Enforcement Alaska Division. Report to North Pacific Fishery Management Council. December 2023. ttps://meetings.npfmc.org/CommentReview/DownloadFile?p=475936fa-58f5-4403-b98a-21a19244e4ef.pdf&fileName=B4%20OLE%20Report.pdf	

[17] https://www.npfmc.org/wp-content/PDFdocuments/fmp/GOA/GOAfmp.pdf
[18] https://www.fisheries.noaa.gov/alaska/fisheries-observers/north-pacific-observer-program

	Starting score	- (Number of EPs NOT met x 3)	= Overall score
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			**High**
Corresponding Conformance Level: (10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 11

There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations.

Supporting Clause		Met? (Yes/No/NA)
11.1	*State laws of adequate severity shall be in place that provide for effective sanctions.*	**Yes**
11.2	*Sanctions applicable to violations and illegal activities shall be adequate in severity to be effective in securing compliance and discouraging violations wherever they occur. Sanctions shall also be in force to affect authorization to fish and/or to serve as masters or officers of a fishing vessel in the event of non-compliance with conservation and management measures.*	**Yes**
11.3	*Fisheries management organizations shall ensure that sanctions for IUU fishing by vessels and, to the greatest extent possible, nationals under its jurisdiction are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. This may include the adoption of a civil sanction regime based on an administrative penalty scheme. Fisheries management organizations shall ensure the consistent and transparent application of sanctions.*	**Yes**
11.4	*Flag States shall take enforcement measures towards fishing vessels entitled to fly their flag which have been found by the State to have contravened applicable conservation and management measures. The State shall, where appropriate, make the contravention of such measures an offense under national legislation.*	**NA**

Rationale

There is a strong enforcement program to deter fisheries violations through successful prosecution and deterrent penalties. NOAA has authority and responsibility under more than 30 federal statutes to manage sustainable fisheries, and to protect living marine resources, including marine areas and species (NOAA Policy for Assessment of Penalties and Permit Sanctions – June 24, 2019, 63pp). Officers and agents in the NOAA Office of Law Enforcement, the US Coast Guard, Customs and Border Protection, Immigration and Customs Enforcement, US Fish and Wildlife Service, and State officers authorized under Cooperative Enforcement Agreements, monitor compliance and investigate potential violations of the statutes and regulations enforced by NOAA.

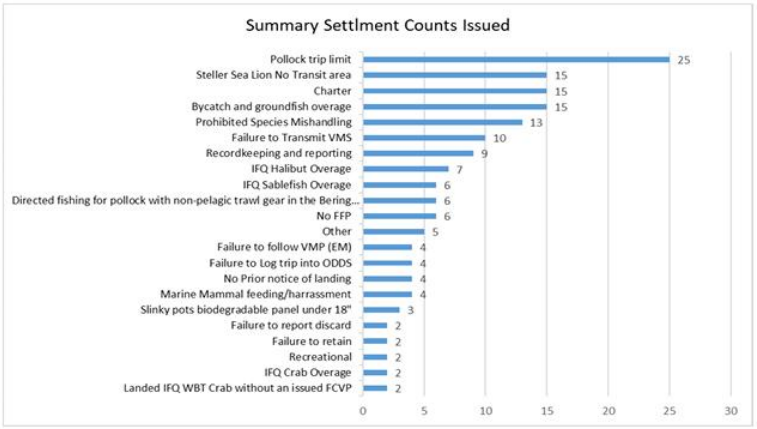
The Code of Federal Regulations list the sanctions to deal with non-compliance. Penalties for fisheries related violations include fines; permit cancellations or suspensions, permanent prohibitions on participation in the fishery, forfeiture of fish, vessels, other property and quota; and imprisonment. With respect to permit sanctions, where applicable, the statutes that NOAA enforces generally provide broad authority to suspend or revoke permits.

OLE agents/officers have the option to provide a written warning for minor offences however, these are taken into account for repeat offenders. More serious offences can be dealt with by a summary settlement, i.e. a violation which is not contested and results in a ticket which may include a discounted fine, thus allowing the violator to quickly resolve the case without incurring legal expenses. Thereafter, an offence is referred to NOAA's Office of General Counsel (OGC) for Enforcement and Litigation which can impose a sanction on the vessels permit or

further refer the case to the US Attorney's Office for criminal proceedings. Penalties may range from severe monetary fines, forfeiture of catch, boat seizure and/or imprisonment. The MSA has an enforcement policy section (50 CFR 600.740) that details these "remedies for violations" (MSA, 2007) **(SC 11.1; 11.2; 11.3)**

In the OLE Alaska Enforcement Division Report to NPFMC (December 2023), efforts were highlighted on the nonpelagic trawl operation. 43 trawl vessels were boarded, 29 trawl gear inspections were completed, 44 incidents/investigations were opened, and enforcement actions were taken in five investigations. Subsequent to the reported time in the June report, in the BSAI Red King Crab Savings Area, 34 more trips were monitored (total 738), and in the Gulf of Alaska 23 more (total 123) (NOAA, 2023c).

From October 1, 2022, to September 30, 2023, NOAA officers opened 1544 incidents including 931 MSA, 454 Northern Pacific Halibut Act, 84 Marine Mammal Protection Act, 65 Endangered Species Act, and 10 involving other statutes and regulations (Lacey Act, Pacific Salmon Fishing Act, Port State Measure Act, and Whaling Convention Act, etc. The following figure shows the summary settlement issued.



**Other includes counts of two or fewer related to chunked halibut, IFQ permit holder not present, selling sport caught halibut, and discarding unsorted pollock catch.*

Figure 35 Summary Settlement Counts Issued. Source: OLE Report to NPFMC, December 2023

Based on this information, there is evidence that sanctions are consistently applied.

However, also in the 2023 OLE report to the Council, there are several Notices of Violation and Assessment (NOVA). Out of 15 NOVAs listed, at least 3 of those incidents could be directly related to the vessels/companies in the UoAs for this fishery. The relevant incidents are as follows:
AK2000930; F/V America's Finest and F/V U.S. Intrepid – Owner Fishermen's Finest, Inc. was charged under the Frank Lobiondo Coast Guard Authorization Act of 2018 with exceeding mothership processing caps of Flathead sole, Yellowfin sole, and Alaska plaice. A $48,183 NOVA was issued, and the case settled for $47,183.

AK2205725; C/P Cape Horn - Owner Cape Horn Vessel, LLC and operator Peter Pack were charged jointly and severally under the Magnuson-Stevens Act with fishing in a closed area. A $26,801 NOVA was issued.

AK2106551; C/P Cape Horn – Crewman Ata Ioapo was charged under the Magnuson-Stevens Act with sexually harassing a female fisheries observer. A $24,000 NOVA was issued.

Overall, the OLE report notes trends across all fleets, including those in the UoA and those trends are declining (2023 OLE) A note was included for the violations in the OLE report that "*Though the statements in this category generally increased over the 4 years, the unique incidents with dispositions of Compliance Assistance decreased from 2019 to 2020, then held relatively steady through 2022, while the number of total actions decreased by more than half. Cases forwarded to GCES remained steady "and "Statements, and statements resulting in Compliance Assistance, dropped in this management program as well following 2019."* (OLE, 2023).

The client representative stated that the Alaska Seafood Cooperative (AKSC) staff meets with OLE quarterly to discuss trends in observer statements. These trends are communicated to the fleet and vessel ownership. Evidence of these trainings was provided to the assessment team. Additionally, OLE attends the annual AKSC captains' meeting and describes and enforcement-related issues from the previous year so that vessel leadership can address them in the subsequent season. While OLE communicates trends they see to AKSC staff and members, specific enforcement actions are dealt with at the company level. Any OLE investigations are

held confidential until they are completed and/or settled under the NOVA process, at which time they are included in the annual enforcement report. OLE stated that it was only allowed to discuss enforcement actions/issues with the company, however the clients were able to provide additional evidence in terms of the infractions listed in the December 2023 enforcement report. It was noted at the ACDR stage that "additional internal processes are in place to communicate to crew fishery management regulations and the important role of observers." (Personal communication, Jason Anderson, AKSC client representative)During the site visit, representatives from the various companies that operate under the AKSC confirmed that violations/infractions are handled at the company level. Frank O'Hara, the O'Hara Corporation, reviewed protocols for their company regarding infractions, and Glenn Merrill, the Director of Government Affairs for North Star Fishing Company (the parent company for the F/V Cape Horn), provided excerpts of the Employee Handbook, that addresses non-discrimination policies, anti-harassment policies, non-retaliation policies, complaint procedures and corrective action. All new hires sign several documents as part of the onboarding process including the handbook. Returning crew re-sign all these documents annually.

It was also noted that the AKSC have partnered with OLE to hold the observer training for the key crew. This training has been completed for the last several years prior to the start of the 'A Season' fishery, that begins on January 20. Meeting details were provided to the assessment team as evidence of the protocols in place and that the trainings occur with regular frequency. In addition to OLE providing observer training, an anti-harassment training for their supervisors was given by their employment law attorney.

It should be noted that the F/V Cape Horn no longer fishes and the person cited for the violations is no longer employed with the company. It should also be noted that by the time violations are listed in a Council report, they may be old or outdated. Regarding the infraction for F/V America's Finest and F/V U.S. Intrepid – Owner Fishermen's Finest, Inc. and notice of being charged under the Frank Lobiondo Coast Guard Authorization Act of 2018 for exceeding mothership processing caps, this is very specific legislation that is applicable to that company and is not incorporated within the cooperative's agreements. Sections 835 and 836 of the Public Law 115-282 was provided and further describes the specific limitations applicable to just that company.

Based on the evidence provided regarding company protocols, OLE trainings and the overall decline in trends noted in the December 2023 enforcement report, evidence exists that sanctions are consistently applied and thought to provide effective deterrence.

Regarding IUU fishing, the Report to Congress, *Report of the Maritime Security and Fisheries Enforcement Act Interagency Working Group on IUU Fishing Regarding Efforts to Investigate, Enforce, and Prosecute Illegal, Unreported and Unregulated Fishing in 2022* lists in summary settlements, fines and violations specifically related to IUU fishing.[19]

Evaluation Parameter Rationale - Process	**Met? (Yes/No)**
11.1 The system of States laws is of adequate severity to provide for effective sanctions.	**Yes**
11.2 The system of sanctions in place is sufficiently severe to deter violations and illegal activities. The system shall be considered adequate in severity if the potential sanctions include fines, suspension or withdrawal of permission to fish, and confiscation of catch or equipment.	**Yes**
11.3 The system of sanctions in place are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. This may include the adoption of a civil sanction regime based on an administrative penalty scheme. The fisheries management organization also ensures the consistent and transparent application of sanctions.	**Yes**
11.4 If applicable, the system of enforcement measures is effective for foreign vessels fishing in the State's EEZ or for its vessels fishing in high seas or in another State's EEZ.	**NA**
Rationale: Evidence of the effectiveness of the sanctions can be seen in the enforcement reports. No IUU fishing was reported in the December OLE report to the Council. NOAA Fisheries also provides annual reports to Congress about the Working Group's efforts, pursuant to Maritime Security and Fisheries Enforcement Act, 2019, to investigate, enforce and prosecute groups and individuals engaging in IUU fishing. The most recent Report To Congress from 2022 shows penalties issued, fines and settlements settled, but none directly applicable to this fishery.	

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	**Met? (Yes/No/NA)**

[19] https://www.fisheries.noaa.gov/s3/2024-06/2024-MSAFE-Report-Final.pdf

11.1 There is evidence to substantiate that States laws are of adequate severity to provide for effective sanctions. The evidence here includes largely (a) whether laws set out effective penalty provisions and the courts respond in a manner that deters further or repeat offenses, (b) the views of the industry, other stakeholders, and the general public, and (c) the outcomes and associated trends of the enforcement efforts when measured against appropriate performance indicators.	**Yes**
11.2 There is evidence to substantiate that sanctions for violations of regulations (e.g., suspension, withdrawal, or refusals of fishing permit or of the right to fish) are adequate in severity to secure compliance and discourage violations.	**Yes**
11.3 There is evidence to substantiate that sanctions for violations of regulations are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. Sanctions are applied transparently and consistently across the board.	**Yes**
11.4 There is evidence to substantiate enforcement action in these cases (i.e., boarding, violations).	**Yes**
Rationale: The December 2023 OLE report to the Council provides evidence of enforcement actions and effective sanctions for violations. As noted in the rationale above, the total actions decreased by more than half and there were not any repeat offenses listed in the report. Additionally, the client group meets with the Office of Law Enforcement to discuss trends in observer statements and any violations or infractions received. This is then communicated with the fleet and vessel owners to reduce the risk of repeat infractions. Evidence was provided to the assessment team on these trainings with the client and OLE.	

Evaluation Parameter Rationale – Evidence Basis	**Met? (Yes/No/NA)**
11.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that States laws of adequate severity are in place that provide for effective sanctions. Examples may include various laws, regulations, and other data or reports.	**Yes**
11.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that sanctions applicable in respect of violations and illegal activities are adequate in severity to be effective in securing compliance and discouraging violations wherever they occur. Sanctions are in force that affects authorization to fish and/or to serve as masters or officers of a fishing vessel, in the event of non-compliance with conservation and management measures. Examples may include various laws, regulations, and other data or reports.	**Yes**
11.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fisheries management organization ensures that sanctions for IUU fishing by vessels and, to the greatest extent possible, nationals under its jurisdiction are of sufficient severity to effectively prevent, deter, and eliminate IUU fishing and to deprive offenders of the benefits accruing from such fishing. This may include the adoption of a civil sanction regime based on an administrative penalty scheme. The fisheries management organization also ensures the consistent and transparent application of sanctions. Examples may include various laws, regulations, and other data or reports.	**Yes**
11.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that flag States take enforcement measures with fishing vessels entitled to fly their flag if the vessels have been found by the State to have contravened applicable conservation and management measures. These enforcement measures will include, where appropriate, making the contravention of such measures an offense under national legislation. Examples may include various laws, regulations, and other data or enforcements reports.	**NA**
Rationale: The rationale provided above details the evidence and effectiveness of the sanctions in place. Please see the following references for further details. National Oceanic and Atmospheric Administration (NOAA). (2023c). *Office of Law Enforcement Alaska Division: Report to North Pacific Fishery Management Council*. December 2023. https://meetings.npfmc.org/CommentReview/DownloadFile?p=475936fa-58f5-4403-b98a-21a19244e4ef.pdf&fileName=B4%20OLE%20Report.pdf NOAA (2022). Report to Congress, *Report of the Maritime Security and Fisheries Enforcement Act Interagency Working Group on IUU Fishing Regarding Efforts to Investigate, Enforce, and Prosecute Illegal, Unreported and Unregulated Fishing in 2022.* https://www.fisheries.noaa.gov/s3/2024-06/2024-MSAFE-Report-Final.pdf	

	Starting score	- (Number of EPs NOT met x 3)	= Overall score
Numerical score:	10	0	10
Corresponding Confidence Rating: (10 = High; 4 or 7 = Medium; 1 = Low)			**High**
Corresponding Conformance Level: (10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)			**Full Conformance**
Non-conformance Number (if applicable):			**NA**

Fundamental Clause 12

Considerations of fishery interactions and effects on the ecosystem shall be based on the best scientific evidence available, local knowledge where it can be objectively verified, and a risk assessment-based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.

Supporting Clause		Met? (Yes, No) EP Process	EP Status	EP Evidence basis	Score
12.1	*The fishery management organization shall assess the impacts of environmental factors on target stocks and associated or dependent species in the same ecosystem, and the relationship among the populations in the ecosystem.*	Yes	Yes	Yes	10
Rationale	Ecosystem Status Reports are produced annually to compile and summarize information about the status of the Alaska marine ecosystems for the North Pacific Fishery Management Council, the scientific community and the public. As of 2016, there are separate reports for the Eastern Bering Sea, Aleutian Islands, the Gulf of Alaska, and Arctic (forthcoming) ecosystems. These reports include ecosystem report cards, ecosystem assessments, and ecosystem and ecosystem-based management indicators that together provide context for ecosystem-based fisheries management in Alaska. **Process**: There is an annual process for updating and producing the ecosystem status reports, and using them when compiling the SAFE documents, which link ecosystem indicators directly to groundfish stock abundance, status, trends and threats. There is also an ongoing process to activate the fishery ecosystem plan, and take into consideration emerging issues such as climate change which are likely impacting or will impact the fisheries. For example, The Council convened a two-day Climate Scenarios Workshop on Wednesday, June 5 and Thursday, June 6.. The purpose was to generate ideas for short- and long-term management approaches to improve climate resiliency of federally managed fisheries in the North Pacific. The workshop included over 200 in-person and virtual participants. The workshop included case studies of climate change impacts in Alaska fisheries, and examples of ongoing work by the Council, NMFS, and communities to build climate readiness and support adaptation. The main focus of the workshop was a set of four hypothetical future scenarios that described varying degrees of climate change impacts that could be experienced in the future, as well as a range of ecosystem-based management approaches that could be practiced by the Council. Participants explored these hypothetical scenarios through small group breakout sessions. This EP is met. **Status**: The annual Ecosystem Status Reports provide evidence that assessments are conducted to determine the impacts of environmental factors on target and associated species as well as relationships among these species. The reports are done separately for each major ecosystem in the				

	Alaska region (EBS, AI, and GOA—soon to also include Arctic) which provides sufficient detail to monitor and allow informed management of the fisheries. **Evidence**: Annual ecosystem status reports provide the required evidence. They are accessible here: https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands. At this link there is also an interactive tool available to help visualize the ecosystem status in each area, along with a "report card" on ecosystem health. Scientists at the Alaska Fisheries Science Center have begun eexploring quantitative linkages among Report Card indicators, illustrating how changes in one variable might affect another (i.e., which indicators are stronger/weaker determinants of trends in other ecosystem components). The method used is dynamic structural equation modeling (DSEM), which can also project next year values and can therefore be used as a tool alongside the Spring PEEC (Preview of Ecosystem and Economic Conditions) meeting to identify emergent trends and potential noteworthy topics to track through summer surveys and research efforts. Understanding ecosystem structure and function usually begins by organizing indicators within a simplified conceptual model, such that ecological relationships among indicators can be expressed, visualized, and discussed. One simplified approach to visualize relationships among variables is a qualitative network model (QNM) (Levins, 1974). QNMs summarize the relationship among multiple variables (represented as boxes) that are linked by hypothesized mechanisms (represented as arrows), where mechanisms are specified as a positive or negative impact of one variable on another. QNMs have been successfully used at the Alaska Fisheries Science Center to identify likely consequences of hypothetical ecosystem changes (Reum et al., 2015, 2021) and can incorporate stakeholder input regarding relevant variables (boxes) and mechanisms (arrows).				
12.2	*The most probable adverse impacts from human activities, including fishery effects on the ecosystem/environment, shall be assessed and, where appropriate, addressed and or/corrected, taking into account available scientific information and local knowledge. This may take the form of an immediate management response or a further analysis of the identified risk. In this context, full consideration should be given to the special circumstances and requirements in developing fisheries, including financial and technical assistance, technology transfer, training, and scientific cooperation. In the absence of specific information on the ecosystem impacts of fishing on the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk, the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures.*	N/A			
12.2.1	*The fishery management organization shall consider the most probable adverse impacts of the unit of certification on **main associated species**, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) shall be monitored and shall not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action shall be taken.*	Yes	Yes	Yes	10

12.2.2	*The fishery management organization shall consider the most probable adverse impacts of the unit of certification on **minor associated species**, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) shall be monitored and shall not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action shall be taken.*	Yes	Yes	Yes	10
12.2.3	*There shall be **outcome indicator(s) consistent with achieving management objectives for non-target species** (i.e., avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible).*	Yes	Yes	Yes	10
Rationale	See section 4.6 for tables showing catches of main and minor associated species in these fisheries, as well as Prohibited Species Catch (PSC) numbers (classified as “bycatch” rather than ETP because these stocks do not qualify as ETP). There is a common rationale for justifying EP scores for 12.2.1-12.2.3 for Process, Status, and Evidence EPs, provided here. **Process**: Only the BSAI rockfish UoA has a main associated species, and that is Alaska pollock. Alaska pollock is separately RFM certified, and there are no issues with stock status, management, or information. There are several minor associated species in each UoA, all of which are managed as part of the BSAI or GOA groundfish FMPs (Pacific cod, arrowtooth flounder, Kamchatka flounder, sablefish). Giant grenadier is also a minor associated species in the GOA rockfish fishery and this is classified as an “ecosystem component” species. The annual harvest specifications process for groundfish in the BSAI and GOA meets this EP because it includes a process to establish “outcome indicators,” in this case reference points, which are precautionary and based on annual stock assessments, and then sets allowable harvests to ensure the stock stays above the target reference point. If the stock is below the TRP, the harvest control rules mandate a reduction in allowable catch designed to enable the stocks to rebuild. **Status:** There is only one main species, and this is Alaska pollock. Pollock is separately RFM certified, and there are no issues with stock status. Four of the five minor associated species are managed under the groundfish FMP, and stocks are healthy. Arrowtooth flounder, P. cod and sablefish are all separately RFM certified with no stock status issues. Giant grenadier is an ecosystem component species and monitored to ensure there is no change in abundance or other factor that may require it to be reclassified as “in the fishery.” This species is not commercially targeted. **Evidence:** These fisheries have full observer or EM coverage, and managed groundfish stocks receive regular quantitative stock assessments with reference points (*outcome indicators*) and allowable harvests are based on clear control rules and are actively monitored. Some species that are not part of the fishery FMP are considered as “ecosystem component” (e.g. giant grenadier) and managed less intensively because they are not targeted. Nevertheless, monitoring of removals is complete, and there are clear triggers for re-evaluation of the stock as “in the fishery” or “ecosystem component.” In summary, excellent information on fishery removals, combined with fishery independent abundance surveys and quantitative stock assessments means that the evidence EP is fully met for associated species.				
12.2.4	*The fishery management organization shall consider the most probable adverse impacts of the unit of certification **on ETP species**, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge.*	Yes	Yes	Yes	10

12.2.5	*There shall **be outcome indicator(s) consistent with achieving management objectives seeking to ensure that ETP species are protected from adverse impacts resulting from interactions with the unit of certification** and any associated enhanced fishery activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.*	Yes	Yes	Yes	10
Rationale	The rationale for 12.2.4 and 12.2.5 is combined because the justification for the three EPs is the same for both (concerning ETP species). **Process**: The ESA (United States 1983), signed on 1973, provides for the conservation of species that are endangered or threatened and the conservation of the ecosystems on which they depend. NOAA has jurisdiction over endangered and threatened marine species and works with the U.S. Fish and Wildlife Service (USFWS) to manage ESA-listed species. Generally, NOAA manages marine species, while USFWS manages land and freshwater species. Section 4(f) ESA directs NOAA's National Marine Fisheries Service (NMFS) to develop and implement recovery plans for threatened and endangered species. NMFS Office of Law Enforcement works with the U.S. Coast Guard and other partners to enforce and prosecute ESA violations (NOAA). Recovery plans for ESA-listed species must include: (1) a description of site-specific management actions necessary to conserve the species or populations; (2) objective, measurable criteria which, when met, will allow the species or populations to be removed from the endangered and threatened species list; and (3) estimates of the time and funding required to achieve the plan's goals. Each ESA-listed species has a recovery plan, and regular updates on progress toward recovery. ESA-listed seabirds also have *outcome indicators* normally contained within Biological Opinions and concomitant Incidental Take Statements. These documents provide the conditions under which "takes" of ESA-listed species can occur in commercial fisheries and what happens if these allowable takes are exceeded. Marine mammals that are not ESA listed are protected under the Marine Mammal Protection Act (MMPA) which also has a process in place to carry out population assessments and establish PBRs ("outcome indicators") and commensurate take limits in commercial fisheries that may cause them serious injury or mortality. The outcome indicators can change based on the level of certainty regarding population status and trends as well as fishery interactions and is biased precautionary in the absence of recent information or other source of uncertainty such as population structure. The MMPA also establishes a process for take reduction action should the take exceed the prescribed limits. This EP is fully met. **Outcome/status:** Section 4.6 of this report provides details on the status of relevant ETP populations. Most are considered "not strategic" meaning total takes are well below PBR, and fishery takes are below 10% of PBR. Where these populations are considered "depleted" due to ESA listing status, the fisheries in this assessment (and all fisheries combined) are well within PBR limits, thus this EP is met. **Evidence basis:** For marine mammals, regular population abundance surveys are carried out, or indicators of population health such as pup count or nesting success are monitored, and, for mammals, this information is fed into Stock Assessment Reports (e.g. Muto et. al 2021 and Young et. al. 2023). These reports provide conservative PBRs, and estimates of fishery and other causes of mortality. The UoA fisheries are monitored with 100% observer or EM coverage, and all takes are recorded. This EP is met.				
12.2.6	*The fishery management organization shall consider the most probable adverse impacts of the unit of certification **on habitats**, by assessing and, where appropriate, addressing and or/correcting them, taking into account the*	Yes	Yes	Yes	10

	best scientific evidence available and local knowledge.				
12.2.7	*There shall be **knowledge of the essential habitats for the stock under consideration and potential fishery impacts on them.** Impacts on essential habitats, and on habitats that are highly vulnerable to damage by the fishing gear involved, shall be avoided, minimized, or mitigated. In assessing fishery impacts, the full spatial range of the relevant habitat shall be considered, not just the part of the spatial range that is potentially affected by fishing.*	Yes	Yes	Yes	10
12.2.8	*There shall be **outcome indicator(s**) consistent with achieving management objectives for avoiding, minimizing, or mitigating the impacts of the unit of certification on essential habitats for the stock under consideration and on **habitats** that are highly vulnerable to damage by the fishing gear of the unit of certification.*	Yes	Yes	Yes	10
Rationale	The rationales for subclauses 12.2.6, 12.2.7 and 12.2.8 are grouped because justifications for meeting each EP are very similar and overlapping for all subclauses pertaining to habitat. **Process:** The MSA requires Councils to identify EFHs for all fisheries and to "prevent, mitigate or minimize, to the extent practicable" any adverse effects of fishing on EFH that are "more than minimal and not temporary". Councils are also required to give special attention to HAPCs. Each Council FMP contains provisions for a review of EFH issues every five years. The latest review was carried out in 2015, and a new review was announced in April 2022. EFH information is also reviewed annually in the "Ecosystems Considerations" section of SAFE reports. As part of the 2015 review, EFHs throughout the EBS, AI, and GOA (i.e., the full spatial range) have been modelled for all major species of groundfish and invertebrates based on available information on distributions of eggs, larvae, juveniles, and adults. This information is principally derived from bottom trawl surveys and commercial catch data. This allows the model to predict distributions of EFHs based on percentile distributions of the species abundance. Fishing effects were then added to the model based on existing literature of effects on sediment types and recovery times. This allows prediction on a monthly basis of the extent of impact and recovery on a 5x5m grid. The model specifically includes long-lived species on deep and rocky habitats. The assessment of impacts first considers whether the stock is above its limit reference point. Mitigation measures would be recommended for any stock below its limit reference point if reductions in EFH are identified as a cause of stock depletion. The next criterion is whether CEA is reduced for each species and life stage. (CEA is generally taken as the 50% quantile threshold of suitable habitat.) If >10% of the CEA is impacted, further analyses are required by stock assessment authors to determine whether there is a significant correlation with life history parameters for the stock to determine any plausible stock effects. Any plausible effects would be investigated by Plan Teams and SSC; if more than minimal and not temporary, these would result in mitigation measures being recommended to the Council. This would result in the Council following its FMP amendment process to mitigate adverse effects. HAPCs are sub-sites with important ecological functions or are especially vulnerable to human impacts, and are identified to or by the Council according to set priorities (e.g., coral beds, seamounts, skate habitat). There is a well-defined process in place to model the extent of EFH for each major species and to evaluate, according to set criteria, the effects of fishing. Where such effects may be appreciated, a process to evaluate and mitigate is in place within the Council. An alternative process is in place to identify priority HAPC and to evaluate and protect them. These processes specifically include the effects of trawl fisheries. The information provided by the EFH model may be used to produce and test management measures designed to avoid significant adverse effects. Both scientific trawl survey and commercial catch data are used to inform the model.				

	Habitat essential to endangered species is identified according to regulatory requirements (ESA and MMPA). NOAA Fisheries has designated critical habitat for Steller sea lions in the Aleutian Islands (see Clause 12.2.4). All fisheries operating in BSAI and GOA must abide by these closed areas, ensuring that cumulative impacts are minimal. **Current Status/Appropriateness/Effectiveness:** Several HAPCs are identified throughout the EBS, AI, and GOA – Alaska Seamounts, Bowers Ridge, GOA Coral Habitat, GOA Slope Habitat (bottom contact gear prohibited or restricted), and skate nursery areas (monitoring priority areas). Figure 29 shows HAPCs and other habitat closures in Alaska waters. All BSAI and GOA certified fisheries must abide by the same area closures, gear limitations, etc., which ensures that cumulative impacts on HAPCs and EFHs are minimal. In the present UoA fisheries, all target species are above their limit reference points, and none of the groundfish SAFE reports or the FMPs conclude that habitat modification or loss is a concern for these species. Habitat in the EBS, AI and GOA has been mapped at a level of 5 km^2 grids, and while this level is likely under sampling habitat, the data provide an idea of what is occurring on the seafloor (Figure 27). Figure 27, Figure 28, and Figure 29 show the percentage of area within each grid cell that has been disturbed (2003-2017) for BS, AI, and GOA, respectively. Figure 25 shows a high occurrence of mud and sand and lesser amounts of gravel, cobble, and boulders. Therefore, it can be concluded that the relevant habitats are not affected substantively by these commercial fisheries and this EP is met. As stated above, several HAPCs are identified throughout the EBS, AI, and GOA – Alaska Seamounts, Bowers Ridge, GOA Coral Habitat, GOA Slope Habitat (bottom contact gear prohibited or restricted), and skate nursery areas (monitoring priority areas). The status EP is met for all subclauses. **Evidence Basis:** FMPs and calls for nominations of HAPC and EFH reviews and methodologies provide fully adequate information on knowledge of the essential habitats for the “stock under consideration” and potential fishery impacts on them and on habitats that are highly vulnerable to damage by the fishing gear. Information and reports are all publicly available on the NOAA Fisheries and Council websites. The evidence EP is met for all habitat-related subclauses.				
12.2.9	*The fishery management organization shall consider the most probable adverse impacts of the fishery under assessment **on the ecosystem**, by assessing and, where appropriate, addressing and or/correcting them, taking into account available scientific information and local knowledge.*	Yes	Yes	Yes	10
12.2.10	*There shall be **outcome indicator(**s) consistent with achieving management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhanced activities) on the **structure, processes, and function of aquatic ecosystems** that are likely to be irreversible or very slowly reversible. Any modifications to the habitat for enhancing the stock under consideration must be reversible and not cause serious or irreversible harm to the natural ecosystem’s structure, processes, and function.*	Yes	Yes	Yes	10
12.2.11	*The fishery management organization shall consider the most probable adverse human impacts on the stock/**ecosystem under consideration**, by assessing and, where appropriate, addressing and or/correcting them,*	Yes	Yes	Yes	10

	taking into account available scientific information and local knowledge.				
Rationale	The rationale for the EPs for subclauses 12.2.9, 12.2.10 and 12.2.11. are grouped here because they are very similar and overlapping. **Process:** Through scientific investigations of NMFS, the PSEIS provides a comprehensive evaluation of the FMPs. The SAFE process evaluates the stock status of the target species on an annual basis, considering major bycatches, effects on prohibited species (i.e., species which cannot be landed and have limits in place on total catches in a fishery sector; these are notably halibut, crab, and salmon), habitat, and a wide-ranging consideration of ecosystem indicators. These evaluations are supported by extensive monitoring programs with specific investigations on issues of concern (such as EFH impacts and impacts on seabirds). The Council has wide-ranging representation from the stakeholder community. In addition, the Groundfish Plan Team, Ecosystem Committee, and the Council meetings are all open to public attendance. Available scientific information is therefore fundamental to the impact evaluation process and is reinforced by information and issues raised by stakeholders throughout the management process. Significant specific information is collected on all appreciable adverse effects of the fishery on the ecosystem, using both specific scientific studies as well as views and information provided by the wider stakeholder community. These are assessed through PSEIS and routinely through the SAFE and the Council processes. Management objectives have been developed in response to these processes. Each major stock is subject to a SAFE assessment, and specific management objectives are developed in response to any new issues arising. In 2014, the Council adopted an Ecosystem Policy, which is considered in all long-term planning initiatives, fishery management actions, and science planning to support ecosystem-based fishery management. The intent is that management explicitly takes “into account environmental variability and uncertainty, changes and trends in climate and oceanographic conditions, fluctuations in productivity for managed species and associated ecosystem components, such as habitats and non-managed species, and relationships between marine species” and incorporates “the best available science, including local and traditional knowledge, and engage scientists, managers, and the public” (NPFMC 2019b). Ecosystem modelling is relatively well developed, including the Forage Euphausiid Abundance in Space and Time (FEAST) model, which is concentrated on climate/forage fish/zooplankton interactions with specific applications for cod, pollock, and arrowtooth flounder. Food-web modelling using Ecopath/Ecosim has been carried out for EBS, AI and GOA, providing predominantly guild-level analyses of cumulative and ecosystem level indicators. The Council approach to groundfish fisheries explicitly includes ecosystem-based management principles that protect managed species from overfishing, and where appropriate and practicable, increase habitat protection and bycatch constraints. This includes the setting of outcome indicators relating to preserving the food web, managing incidental catch, avoidance of impacts on seabirds and mammals and reduce and avoid impacts to habitats. As for the process to develop and maintain “outcome indicators,” setting precautionary single-species TACs is a good example of this, especially as these can be modified as informed by ecosystem trends that may impact stock abundance. In addition, in the BSAI, the 2 million metric ton optimal yield groundfish catch cap is can be considered as a good ecosystem level reference point or “outcome indicator.” This EP is fully met. **Current Status/Appropriateness/Effectiveness:** Management measures are in place, based on ssound, fishery-related evidence platforms and extensive evaluations, designed to achieve the stated objectives for relevant ecosystem components. These specifically include marine mammals, seabirds, prohibited species, target and bycatch species, essential fish habitat, HAPCs, and food-web effects. As such, information and objectives are specific to the fishery and/or fishery management system, and use of more generic information is not considered necessary. This EP is met. **Evidence Basis:**				

	SAFE assessments (including ecosystem indicators and essential fish habitat evaluations) for each species are published annually, together with endangered species management plans, marine mammal monitoring, and management measures. Developments in ecosystem modelling are published in the scientific press and NOAA Fisheries website. All information is readily available through NOAA Fisheries and Council websites. This EP is fully met for these subclauses.				
12.3	*The role of the stock under consideration in the **food web** shall be considered, and if it is a key prey species in the ecosystem, management objectives and measures shall be in place to avoid severe adverse impacts on dependent predators.*	Yes	Yes	Yes	10
12.4	*There shall be outcome indicator(s) consistent with achieving management objectives seeking to avoid severe adverse impacts on dependent predators resulting from the unit of certification fishing on a stock under consideration that is a key prey species.*	Not applicable as none of the target stocks are key prey species in these ecosystems.			
Rationale	**Process:** The role of each stock in the food web is specifically considered in the EBS, AI, and GOA systems. This includes specific monitoring and evaluation of ecosystem interactions, notably through the ecosystem indicators reported to the stock assessment authors and considered at the Plan Team, SSC and Council deliberations. These indicators include physical conditions and prey and predator indicators, such as mesozooplankton, copepod size, capelin populations, and apex fish biomass. In addition, ecosystem modelling is relatively well developed, including the Forage Euphausiid Abundance in Space and Time (FEAST) model, which is concentrated on climate/forage fish/zooplankton interactions with specific applications for cod, pollock, and arrowtooth flounder. Food-web modelling using Ecopath/Ecosim has been carried out for EBS, AI, and GOA, providing predominantly guild-level analyses of cumulative and ecosystem level indicators. The CEATTLE model combines predation between cod, pollock, and arrowtooth flounder inter- and intraspecies predation with climatic effects, aiming to develop reference points in relation to prevailing climatic conditions and multi-species ABCs. Though not specifically relevant to the target species in this assessment, this demonstrates that there are mechanisms in place by which the role in the food web of groundfish stocks like the stocks under consideration, are assessed and monitored. These are not key prey species thus there are no required management objectives relating to minimizing impacts to dependent predators. This EP is fully met. **Current Status/Appropriateness/Effectiveness:** The development of ecosystem indicators and models and the incorporation of these into stock assessments and Plan Team, SSC, and the Council evaluation process allow for the ongoing development of management measures to achieve the management objectives. These may include precautionary adjustments of TACs and designation of essential habitat for mammalian predators if required. This EP is met. **Evidence Basis:** The ecosystem indicators and other ecosystem modelling information used in the SAFE assessments, endangered species management plans, and the outcomes of SSC and Council evaluations are all publicly available on the NMFS and Council websites.				
12.5	*States shall introduce and enforce laws and regulations based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).*	Yes	Yes	Yes	10
Rationale:	MARPOL 73/78 consists of six separate Annexes, each set out regulations covering the various sources of ship-generated pollution. Annex I and II are mandatory for all signatory nations to MARPOL while Annexes III, IV, V and VI are optional.				

	Process: Currently, the U.S. is signatory to Annexes I, II, III, V and VI. Annexes I, II, V and VI have been incorporated into U.S. law by the Act to Prevent Pollution from Ships (APPS) and implemented within 33 USC 1901 and 33 CFR 151. The U.S. incorporates Annex III by the Hazardous Materials Transportation Act (HMTA) implemented within 46 USC 2101 and 49 CFR 171 -174 and 176. Although the U.S. has not ratified Annex IV, the U.S. has equivalent regulations for the treatment and discharge standards of shipboard sewage – the Federal Water Pollution Control Act (FWPCA) as amended by the Clean Water Act (CWA) and implemented by 33 USC 1251 and 33 CFR 159. **Outcome/Status:** The regulations implemented by the US Coast Guard and in the Federal Register directly incorporate the relevant annexes to which the US is signatory. The US Coast Guard has authority to enforce these regulations and has developed guidance and policies enabling them to do so. For example, CG-3PV Policy Letter 06-09 instructs Coast Guard officers in the correct enforcement of MARPOL Annex I, related to oil pollution from ships (USCG 2006). **Evidence basis:** As above, there is a direct link between the MARPOL treaty and its mandatory annexes for signatories, and the implementing legislation within the US government. This is fully and transparently documented, and available from the US Coast Guard on the internet, here: https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Inspections-Compliance-CG-5PC-/Commercial-Vessel-Compliance/Domestic-Compliance-Division/MARPOL/.				
12.6	*Research shall be promoted on the environmental and social impacts of fishing gear especially the impact of such gear on biodiversity and coastal fishing communities.*	Yes	Yes	Yes	10
Rationale	The NPFMC maintains a list of research priorities which are periodically reshuffled to reflect the changing importance of different impacts of fisheries. The current top twelve research priorities for 2024-2028 include: • Research to reduce western Alaska salmon bycatch in the Bering Sea groundfish fisheries, which has a direct link to coastal fishing communities dependent on shrinking salmon runs returning to their rivers. • An explicit priority to examine the economic , social and culture effects of fisheries and fishery management policy on communities over time, including impacts from fishery policy changes and tribal citizen and tribal nation reliance on, participation in and impacts of federally managed fisheries. • A priority to develop predictive tools and models that evaluate the impact of multiple projected climate scenarios on managed resources to inform management options related to ecosystem production and resilience and adaptation of fishing communities Process: The NPFMC process to establish research priorities which include research into environmental and social impacts of fishing on biodiversity and coastal communities meets this EP. Status: There is evidence for this research (see above), and it is considered appropriate for overall fisheries management purposes. This EP is met. Evidence: The evidence (e.g. the published list of research priorities arising from the Council process available here, among other places: https://www.npfmc.org/june-2024-newsletter/) is sufficient to substantiate that research is promoted on the abovementioned issues and impacts. This EP is met.				
12.7	*The fishery management organization shall make use, where appropriate, of Marine Protected Areas (MPAs). The general objectives for establishing MPAs shall include ensuring sustainability of fish stocks and fisheries, and protecting marine biodiversity and critical habitats.*	Yes	Yes	Yes	10
Rationale	**Process:** The MSA requires Councils to identify EFHs for all fisheries and to “prevent, mitigate or minimize, to the extent practicable” any adverse effects of fishing on EFH that are “more than minimal and not				

temporary". Councils are also required to give special attention to HAPCs. Each Council FMP contains provisions for a review of EFH issues every five years. Under the MSA, the Council is required to prepare and submit an FMP to the secretary of Commerce for approval for each fishery under its authority that is considered to require conservation and management. In so doing, the FMPs must be consistent with ten national standards for fishery conservation and management (16 USC § 1851).

The latest EFH review developed a hierarchical impact assessment methodology to operationalize the "more than minimal and not temporary" criterion. This is based on the model of EFH impact and recovery outlined earlier. Stock assessment authors are required to determine whether the population under assessment is above or below its limit reference point. For stocks at this level, mitigation measures would be required if the stock assessment author determines that there is a plausible connection to reductions in EFH. The next question is whether the CEA (defined as the 50% quantile of EFH) is disturbed by fishing. If so, then stock assessment authors must determine whether critical life-history characteristics of the stock are correlated with the proportion of CEA affected. If correlations suggest a plausible stock effect, plan teams and SSC will consider appropriate mitigation measures to recommend to the Council.

HAPCs are designated following a nomination process according to Council priorities. HAPC nominations are generally on a five- year cycle but may be initiated at any time. Previous priorities have been seamounts and undisturbed coral areas; the last process was carried out according to a priority of identifying skate nursery areas. The SAFE reports also include specific indicators of vulnerable habitat (e.g., corals, sponges, sea whips) for which trends are monitored and appropriate mitigation may be implemented as necessary.

The mechanisms developed to identify significant effects on EFH and for identifying HAPC are considered consistent with achieving management objectives for avoidance, minimization, or mitigation of impacts on essential habitats for the "stock under consideration" and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification. This is further supported by habitat ecosystem indicators considered as part of the SAFE process. The process EP is met.

Current Status/Appropriateness/Effectiveness:

The Council has in place groundfish FMPs in the BSAI and GOA that include the Atka mackerel and rockfish fisheries. Within these FMPs, there is a management and policy objective to reduce and avoid impacts to habitat, specifically regarding marine protected areas:

- Develop a marine protected area policy in coordination with national and state policies.
- Develop goals, objectives, and criteria to evaluate the efficacy and suitable design of marine protected areas and no-take marine reserves as tools to maintain abundance, diversity, and productivity.
- Implement marine protected areas if and where appropriate.

Several HAPCs are identified throughout the EBS, AI, and GOA – Alaska Seamounts, Bowers Ridge, GOA Coral Habitat, GOA Slope Habitat (bottom contact gear prohibited or restricted), and skate nursery areas (monitoring priority areas). Figure 29 shows HAPC and other habitat closures in Alaska waters. All BSAI and GOA certified fisheries must abide by the same area closures, gear limitations, etc., which ensures that cumulative impacts on HAPCs and EFHs are minimal.

Evidence Basis:

MPAs cover 26% of U.S. waters, including many within the Alaska EEZ https://marineprotectedareas.noaa.gov/). The Council's FMPs outline the consideration and implementation of MPAs. Research on EFH and bottom habitat in the BSAI and GOA carried out by the Alaska Fisheries Science Center and others is of high quality and applicability.

Evaluation Parameter Rationale - Process	Met? (Yes/No)
12.1 There is a process that allows assessment and monitoring of environmental factors (e.g., climatic, oceanographic) on target and associated species in the same ecosystem, and that assess the relationships between species in the ecosystem.	**Yes**
12.2 None – this is a summary clause and is not scored.	**NA**
*12.2.1 There is a process that accounts for the most probable adverse impacts of the unit of certification on **main associated species**. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on such impacts of fishing for the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse*	**Yes**

impact. However, the greater the risk, the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures. If information has been utilized from generic evidence based on similar fishery situations, then, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP or bycatch of non-target fishery resources (or nontarget stocks, species, harvests, or discards), or fisheries with important concerns for gear–habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.	
12.2.2 There is a process that accounts for the most probable adverse impacts of the unit of certification on minor associated species. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on such impacts of fishing for the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures. If information has been utilized from generic evidence based on similar fishery situations (proxies), then, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP or bycatch of non-target fishery resources (or non-target stocks, species, harvests, or discards), or fisheries with important concerns for gear–habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.	**Yes**
*12.2.3 There is a process to set outcome indicator(s) consistent with achieving management objectives for **non-target species** (i.e., avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible).*	**Yes**
*12.2.4 There is a process that accounts for the most probable adverse impacts of the unit of certification on **ETP species**. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on such impacts of fishing for the unit of certification, generic evidence based on similar fishery situations (proxies) can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures. If information has been utilized from generic evidence based on similar fishery situations, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP or bycatch of non-target fishery resources (or non-target stocks, species, harvests, or discards), or fisheries with important concerns for gear–habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.*	**Yes**
12.2.5 There is a process in place that allowing creation of effective outcome indicators seeking to ensure that ETP species are protected from adverse impacts resulting from interactions with the unit of certification and any associated enhanced fishery activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible.	**Yes**
12.2.6 There is a process that accounts for the most probable adverse impacts of the unit of certification on habitats. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on such impacts of fishing for the unit of certification, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures. If information has been utilized from generic evidence based on similar fishery situations, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP species or bycatch of non-target fishery resources (or non-target stocks, species, harvests, or discards), or fisheries with important concerns for gear–habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.	**Yes**

12.2.7 There is a mechanism in place by which the potential impacts of the fishery upon habitats essential to the stock under consideration and on habitats that are highly vulnerable to damage are identified. This or a similar mechanism shall also be in place to identify habitats that are highly vulnerable to fishery activities by the unit of certification. The information provided by these mechanisms shall be used to produce specific management objectives related to avoiding significant adverse impacts on habitats. The knowledge of the habitats in question can therefore include relevant traditional, fisher, or community knowledge, provided its validity can be objectively verified (i.e., the knowledge has been collected and analyzed though a systematic, objective, and well-designed process, and is not just hearsay). When identifying highly vulnerable habitats, their value to ETP species shall be considered, with habitats essential to ETP species being categorized accordingly.	**Yes**
12.2.8 There is a mechanism in place that allows the establishment of outcome indicator(s) consistent with achieving management objectives for avoiding, minimizing, or mitigating impacts on essential habitats for the stock under consideration and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification.	**Yes**
12.2.9 There is a process that accounts for the most probable adverse impacts of the unit of certification on the ecosystem. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on the ecosystem impacts of fishing for the unit of certification, generic evidence based on similar fishery situations (proxies) can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures. If information has been utilized from generic evidence based on similar fishery situations, then, based on the risk of severe adverse impact, the information shall be of higher precision for higher risk. For example, any of the following elements can be considered high risk for a fishery: keystone species, species with relative low growth rates or high catchability, fisheries with significant ETP species or bycatch of non-target fishery resources (or non-target stocks, species, harvests, or discards), or fisheries with important concerns for gear–habitat interactions. If information specific to the unit of certification area is available, generic evidence based on similar fishery situations may not be necessary.	**Yes**
12.2.10 There is a process to allow for drafting effective outcome indicator(s) consistent with achieving management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhancement activities) on the structure, processes, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible. There is also a process that states modifications to the habitat for enhancing the stock under consideration are reversible and do not cause serious or irreversible harm to the natural ecosystem's structure, processes, and function.	**Yes**
12.2.11 There is a process that accounts for the most probable adverse impacts of the unit of certification on the ecosystem. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on the ecosystem impacts of fishing for the unit of certification, generic evidence based on similar fishery situations (proxies) can be used for fisheries with low risk of severe adverse impact. However, the greater the risk the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures.	**Yes**
12.3 There is a mechanism in place by which the role of the stock under consideration in the food web is assessed and monitored, and its relative importance as a prey species is determined. If the species is considered by the fisheries management organization to be an important prey species, there shall be specific management objectives relating to minimizing the impacts of the fishery on dependent predators. The FAO Guidelines require that all sources of fishing mortality on the stock under consideration are taken into account (whether or not it is a prey species) in assessing the state of the stock under consideration, including discards, unobserved mortality, incidental mortality, unreported catches, and catches in other fisheries.	**Yes**
12.4 There is a mechanism in place that allows the establishment of outcome indicator(s) consistent with achieving management objectives seeking to avoid severe adverse impacts on dependent predators resulting from the unit of certification fishing on a stock under consideration that is a key prey species. Mortality in Alaska is usually accounted for all removals of given species. The state and federal fish accounting systems operate in depth and make an explicit effort to document all removals to confirm with regulations in force. The assessors shall ensure that all removals are accounted for in the system (fish ticket, eLandings) for stock assessment and management purposes.	**N/A**
12.5 The appropriate regulations have been implemented.	**Yes**

12.6 Research is promoted on the environmental and social impacts of fishing gear and its impacts on biodiversity and coastal fishing communities, as applicable to the fishery.	**Yes**
12.7 There is a process available for the consideration of MPAs as appropriate, as a tool for management.	**Yes**

Evaluation Parameter Rationale – Current Status/Appropriateness/Effectiveness	**Met? (Yes/No/NA)**
12.1 There is evidence that assessments have been conducted to determine the impacts of environmental factors on the target and associated or dependent species (to the stock) in the same ecosystems, and on the relationships among these species. The results of these studies are in sufficient detail to allow informed management of the fishery. This requirement is intended to provide information about the current understanding of the overall marine ecosystem structure and relationships among the various species, coupled with environmental monitoring. More information about the effects of the fishery on specific ecosystem components (e.g., associated bycatch and ETPs species interactions, gear-habitat disturbance, ecosystem and food-webs impacts, etc.) are assessed in the following clauses of this section.	**Yes**
12.2 None – this is a summary clause and is not scored.	**NA**
12.2.1 There is evidence that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on main associated species (e.g. recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible), by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action is taken. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.	**Yes**
12.2.2 There is evidence that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on minor associated species, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action is taken. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.	**Yes**
12.2.3 There is evidence that outcome indicator(s) consistent with achieving management objectives for non-target species (i.e., avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible) have been achieved. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.	**Yes**
12.2.4 There is evidence that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on ETP species (e.g. negatively impacting rebuilding efforts), by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these impacts are monitored and do not impede, slow, or reduce likelihood of recovery of the species to target levels (or other planned outcomes). If such impacts arise, effective remedial actions are taken.	**Yes**
12.2.5 There is evidence for established outcome indicators (e.g., in a fishery management plan or other regulation) seeking to ensure that ETP species are protected (through States or international regulations) from adverse impacts resulting from interactions with the unit of certification and any associated enhanced fishery activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored. Overall, fishing activity does not impede, slow, or reduce likelihood of recovery of the species to target levels or other planned outcomes. Management objectives shall be achieved accordingly. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.	**Yes**
12.2.6 There is evidence that the fishery management organization considers the most probable adverse impacts of the unit of certification on habitats, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific	**Yes**

evidence available and local knowledge. Accordingly, if these impacts are likely to be irreversible or very slowly reversible, effective remedial action is taken (please see Appendix 1 part 5, noting specifically the 3 habitat assessment elements, and part 7 for cumulative effects evaluation). Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.	
12.2.7 Successful management measures have been developed and are in place to achieve the objectives described in the process parameter.	**Yes**
12.2.8 Successful outcome indicators and management measures have been developed and are in place to achieve the objectives described in the process parameter.	**Yes**
12.2.9 There is evidence that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on the ecosystem (e.g. food-webs effects), by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these impacts are likely to be irreversible or very slowly reversible; or effective remedial action shall be taken. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored. There are policies in place (e.g., harvest control rules) that are effective at protecting ecosystem functioning and accounting for species' ecological role, and precautionary and effective spatial management is used (e.g., to protect spawning areas, prevent localized depletion, and protect important foraging areas for predators of fished species) if applicable. *The bait used to capture the stock under consideration shall not be formally classified as ETP species (by Alaska or other international designations), and the fishery under consideration does not hinder recovery or rebuilding of overfished species that are not formally classified as ETP species and used as bait.*	**Yes**
12.2.10 There is evidence for outcome indicator(s) consistent with achieving management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhancement activities) on the structure, processes, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible. Any modifications to the habitat for enhancing the stock under consideration are reversible and do not cause serious or irreversible harm to the natural ecosystem's structure, processes, and function. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.	**Yes**
12.2.11 There is evidence that the fishery management organization considers the most probable adverse human impacts of the unit of certification on the ecosystem, by assessing and, where appropriate, addressing and or/correcting them, taking into account available scientific information and local knowledge. Accordingly, these impacts are likely to be irreversible or very slowly reversible; if so, effective remedial action shall be taken. Reversibility refers to the effects of a process or condition capable of being reversed so that the previous state is restored.	**Yes**
12.3 Management measures have been developed and are in place to achieve the management objectives described in the process parameter, and there is evidence to demonstrate that they are successful to this end. If the species under assessment is not considered to be a key prey species, then this parameter shall be considered fulfilled.	**Yes**
12.4 There is evidence that outcome indicators and management measures have been developed, are in place, and have succeeded in achieving the objectives described in the process parameter.	**N/A**
12.5 These regulations and their enforcement are effective and in line with the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).	**Yes**
12.6 There is evidence for this research, and is it considered appropriate for overall fisheries management purposes.	**Yes**
12.7 There shall be evidence for the use of MPAs, if appropriate (e.g. if they are employed MPAs as part of suite of management tools), as a tool for effective management with the general objectives of ensuring sustainability of fish stocks and fisheries, and protecting marine biodiversity and critical habitats.	**Yes**

Evaluation Parameter Rationale – Evidence Basis	**Met? (Yes/No/NA)**
12.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization assesses the impacts of environmental factors on target and other species belonging to the same ecosystem or associated with or	**Yes**

dependent upon the target species, and the relationship among the populations in the ecosystem. Examples may include various stock and ecosystems assessment reports.	
12.2 None – this is a summary clause and is not scored.	**NA**
12.2.1 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on main associated species, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these nontarget species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.	**Yes**
12.2.2 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on minor associated species, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these nontarget stocks with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible. If such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.	**Yes**
12.2.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicator(s) consistent with achieving management objectives for non-target species (i.e., avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible). Examples may include fishery management reports, and stock or ecosystems assessment reports.	**Yes**
12.2.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the fishery under assessment on ETP species, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these nontarget stocks with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action are taken. Examples may include various stock and ecosystems assessment reports.	**Yes**
12.2.5 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicators seeking to ensure that ETP species are protected from adverse impacts resulting from interactions with the unit of certification and any associated enhanced fishery activity, including recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible. Examples may include fishery management plans, or stock and ecosystems assessment reports.	**Yes**
12.2.6 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on habitats, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target species with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.	**Yes**
12.2.7 Successful management measures have been developed and are in place to achieve the objectives described in the process parameter.	**Yes**
12.2.8 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicator(s) consistent with achieving management objectives for avoiding, minimizing, or mitigating impacts on essential habitats for the stock under consideration and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification. Examples may include various regulations, data, and reports.	**Yes**
12.2.9 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on the ecosystem, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not	**Yes**

threaten these non-target stocks with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.	
12.2.10 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicator(s) consistent with achieving management objectives seeking to minimize adverse impacts of the unit of certification (including any fishery enhancement activities) on the structure, processes, and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible. Any modifications to the habitat for enhancing the stock under consideration are reversible and do not cause serious or irreversible harm to the natural ecosystem's structure, processes, and function. Examples may include various regulations, data, and reports.	**Yes**
12.2.11 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization considers the most probable adverse impacts of the unit of certification on the ecosystem, by assessing and, where appropriate, addressing and or/correcting them, taking into account the best scientific evidence available and local knowledge. Accordingly, these catches (including discards) are monitored and do not threaten these non-target stocks with serious risk of extinction, recruitment overfishing, or other impacts that are likely to be irreversible or very slowly reversible; if such impacts arise, effective remedial action is taken. Examples may include various stock and ecosystems assessment reports.	**Yes**
12.3 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the role of the stock under consideration in the food web is considered, and if it is a key prey species in the ecosystem, objectives and management measures are in place to avoid severe adverse impacts on dependent predators. Examples may include various stock and ecosystem assessment reports.	**Yes**
12.4 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that there are effective outcome indicator(s) consistent with achieving management objectives seeking to avoid severe adverse impacts on dependent predators resulting from the unit of certification fishing on a stock under consideration that is a key prey species. Examples may include various stock and ecosystems assessment reports.	**N/A**
12.5 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the State has introduced and enforces laws and regulations based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78). Examples may include various regulations, data, and reports.	**Yes**
12.6 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that research is promoted on the environmental and social impacts of fishing gear especially the impact of such gear on biodiversity and coastal fishing communities. Examples may include various regulations, data, and reports.	**Yes**
12.7 The availability, quality, and/or adequacy of the evidence is sufficient to substantiate that the fishery management organization has made use, where appropriate, of MPAs. The objectives of establishing MPAs are ensuring sustainability of fish stocks and fisheries, and protecting marine biodiversity and critical habitats. Examples may include various regulations, data, and reports.	**Yes**
Rationale:	

	Starting score	**- (Number of EPs NOT met x 3) =**	**Overall score**
Numerical score:	**10**	**0**	**10**
Corresponding Confidence Rating: **(10 = High; 4 or 7 = Medium; 1 = Low)**			**10**
Corresponding Conformance Level: **(10 = Full Conformance; 7 = Minor NC; 4 = Major NC; 1 = Critical NC)**			**Full Conformance**
Non-conformance Number (if applicable):			**N/A**

Fundamental Clause 13

Where fisheries enhancement is utilized, environmental assessment and monitoring shall consider genetic diversity and ecosystem integrity.

No Supporting Clauses under Fundamental Clause 13 were applicable because the fishery under assessment does not use fisheries enhancement techniques.

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