Monterey Bay Aquarium
Seafood Watch

Environmental sustainability assessment of wild-caught Weathervane scallop (*Patinopecten caurinus*) from Alaska caught using towed dredges

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Species:	Weathervane scallop (*Patinopecten caurinus*)
Location:	Alaska: Bering Sea and Gulf of Alaska
Gear:	Towed dredges
Type:	Wild Caught
Author:	Seafood Watch
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Assessed using Seafood Watch Fisheries Standard v4

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About the Monterey Bay Aquarium Seafood Watch Program

The mission of the Monterey Bay Aquarium is to inspire conservation of the ocean and enable a future where the ocean flourishes and people thrive in a just and equitable world. To do this, the Aquarium is focused on creating extraordinary experiences that inspire awe and wonder, championing science-based solutions, and connecting people across the planet to protect and restore the ocean. We know that healthy ocean ecosystems are critical to enabling life on Earth to exist, and that our very survival depends on them. As such, our conservation objectives are to mobilize climate action, improve the sustainability of global fisheries and aquaculture, reduce sources of plastic pollution, and restore and protect ocean wildlife and ecosystems.

The aquarium is focused on improving the sustainability of fisheries and aquaculture given the role seafood plays in providing essential nutrition for 3 billion people globally, and in supporting hundreds of millions of livelihoods. Approximately 180 million metric tons of wild and farmed seafood is harvested each year (excluding seaweeds). Unfortunately, not all current harvest practices are sustainable and poorly managed fisheries and aquaculture pose the greatest immediate threat to the health of the ocean and the economic survival and food security of billions of people.

The Seafood Watch program was started 25 years ago as a small exhibit in the Monterey Bay Aquarium highlighting better fishing practices and grew into one of the leading sources of information on seafood sustainability, harnessing the power of consumer choice to mobilize change. The program's comprehensive open-source information and public outreach raises awareness about global sustainability issues, identifies areas for improvement, recognizes and rewards best practices and empowers individuals and businesses to make informed decisions when purchasing seafood.

We define sustainable seafood as seafood from sources, whether fished or farmed, that can maintain or increase production without jeopardizing the structure and function of affected ecosystems, minimize harmful environmental impacts, assure good and fair working conditions, and support livelihoods and economic benefits throughout the entire supply chain. As one aspect of this vision, Seafood Watch has developed trusted, rigorous standards for assessing the environmental impacts of fishing and aquaculture practices worldwide. Built on a solid foundation of science and collaboration, our standards reflect our guiding principles for defining environmental sustainability in seafood.

Seafood Watch Ratings

The Seafood Watch Standard for Fisheries is used to produce assessments for wild-capture fisheries resulting in a Seafood Watch rating of green, yellow, or red. Seafood Watch uses the assessment criteria to determine a final numerical score as well as numerical subscores and colors for each criterion. These scores are translated to a final Seafood Watch color rating according to the methodology described in the table below. The table also describes how Seafood Watch defines each of these categories. The narrative descriptions of each Seafood Watch rating, and the guiding principles listed below, compose the framework on which the criteria are based.

Green	Final Score >3.2, and either criterion 1 or criterion 3 (or both) is green, and no red criteria, and no critical scores	Wild-caught and farm-raised seafood rated green are environmentally sustainable, well managed and caught or farmed in ways that cause little or no harm to habitats or other wildlife. These operations align with all of our guiding principles.
Yellow	Final score >2.2, and no more than one red criterion, and no critical scores, and does not meet the criteria for green (above)	Wild-caught and farm-raised seafood rated yellow cannot be considered fully environmentally sustainable at this time. They align with most of our guiding principles, but there is either one conservation concern needing substantial improvement, or there is significant uncertainty associated with the impacts of the fishery or aquaculture operations.
Red	Final Score ≤2.2, or two or more red criteria, or one or more critical scores.	Wild-caught and farm-raised seafood rated red are caught or farmed in ways that have a high risk of causing significant harm to the environment. They do not align with our guiding principles and are considered environmentally unsustainable due to either a critical conservation concern, or multiple areas where improvement is needed.

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Guiding Principles

Monterey Bay Aquarium defines sustainable seafood as seafood from sources, whether fished or farmed, that can maintain or increase production without jeopardizing the structure and function of affected ecosystems, minimize harmful environmental impacts, assure good and fair working conditions, and support livelihoods and economic benefits throughout the entire supply chain.

As one aspect of this vision, Seafood Watch has developed trusted, rigorous standards for assessing the environmental impacts of fishing and aquaculture practices worldwide. Environmentally sustainable wild capture fisheries:

1. **Follow the principles of ecosystem-based fisheries management**

   The fishery is managed to ensure the integrity of the entire ecosystem, rather than solely focusing on maintenance of single species stock productivity. To the extent allowed by the current state of the science, ecological interactions affected by the fishery are understood and protected, and the structure and function of the ecosystem is maintained.

2. **Ensure all affected stocks[1] are healthy and abundant**

   Abundance, size, sex, age and genetic structure of the main species affected by the fishery (not limited to target species) is maintained at levels that do not impair recruitment or long-term productivity of the stocks or fulfillment of their role in the ecosystem and food web.

   Abundance of the main species affected by the fishery should be at, above, or fluctuating around levels that allow for the long-term production of maximum sustainable yield. Higher abundances are necessary in the case of forage species, in order to allow the species to fulfill its ecological role.

3. **Fish all affected stocks at sustainable levels**

   Fishing mortality for the main species affected by the fishery should be appropriate given current abundance and inherent resilience to fishing while accounting for scientific uncertainty, management uncertainty, and non-fishery impacts such as habitat degradation.

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[1]"Affected" stocks include all stocks affected by the fishery, no matter whether target or bycatch, or whether they are ultimately retained or discarded.

The cumulative fishing mortality experienced by affected species must be at or below the level that produces maximum sustainable yield for single-species fisheries on typical species that are at target levels.

Fishing mortality may need to be lower than the level that produces maximum sustainable yield in certain cases such as forage species, multispecies fisheries, highly vulnerable species, or fisheries with high uncertainty.

For species that are depleted below target levels, fishing mortality must be at or below a level that allows the species to recover to its target abundance.

4. **Minimize bycatch**

   Seafood Watch defines bycatch as all fisheries-related mortality or injury other than the retained catch. Examples include discards, endangered or threatened species catch, pre-catch mortality and ghost fishing. All discards, including those released alive, are considered bycatch unless there is valid scientific evidence of high post-release survival and there is no documented evidence of negative impacts at the population level.

   The fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss and by efficiently using marine and freshwater resources as bait.

5. **Have no more than a negligible impact on any threatened, endangered or protected species**

   The fishery avoids catch of any threatened, endangered or protected (ETP) species. If any ETP species are inadvertently caught, the fishery ensures and can demonstrate that it has no more than a negligible impact on these populations.

6. **Are managed to sustain the long-term productivity of all affected species**

   Management should be appropriate for the inherent resilience of affected marine and freshwater life and should incorporate data sufficient to assess the affected species and manage fishing mortality to ensure little risk of depletion. Measures should be implemented and enforced to ensure that fishery mortality does not threaten the long term productivity or ecological role of any species in the future.

   The management strategy has a high chance of preventing declines in stock productivity by taking into account the level of uncertainty, other impacts on the stock, and the potential for increased pressure in the future.

   The management strategy effectively prevents negative population impacts on bycatch species, particularly species of concern.

7. **Avoid negative impacts on the structure, function or associated biota of aquatic habitats where fishing occurs**

The fishery does not adversely affect the physical structure of the seafloor or associated biological communities.

If high-impact gears (e.g. trawls, dredges) are used, vulnerable seafloor habitats (e.g. corals, seamounts) are not fished, and potential damage to the seafloor is mitigated through substantial spatial protection, gear modifications and/or other highly effective methods.

8. **Maintain the trophic role of all aquatic life**

   All stocks are maintained at levels that allow them to fulfill their ecological role and to maintain a functioning ecosystem and food web, as informed by the best available science.

9. **Do not result in harmful ecological changes such as reduction of dependent predator populations, trophic cascades, or phase shifts**

   Fishing activities must not result in harmful changes such as depletion of dependent predators, trophic cascades, or phase shifts.

   This may require fishing certain species (e.g., forage species) well below maximum sustainable yield and maintaining populations of these species well above the biomass that produces maximum sustainable yield.

10. **Ensure that any enhancement activities and fishing activities on enhanced stocks do not negatively affect the diversity, abundance, productivity, or genetic integrity of wild stocks**

    Any enhancement activities are conducted at levels that do not negatively affect wild stocks by reducing diversity, abundance or genetic integrity.

    Management of fisheries targeting enhanced stocks ensures that there are no negative impacts on the wild stocks, in line with the guiding principles described above, as a result of the fisheries.

    Enhancement activities do not negatively affect the ecosystem through density dependent competition or any other means, as informed by the best available science.

Final Ratings

Ratings Details	C 1 Target Species	C 2 Other Species	C 3 Management	C 4 Habitat	Rating
Weathervane scallop United States - Alaska - Bering Sea - Towed dredges - 145 mt	3.413	5.000	4.000	3.873	Green (4.032)
Weathervane scallop United States - Alaska - Gulf of Alaska - Towed dredges	3.413	5.000	4.000	3.873	Green (4.032)

Abbreviations

Table 1

Abbreviation	Description
ABC	Acceptable biological catch
ADF&G	Alaska Department of Fish and Game
AI	Aleutian Islands
B_{MSY}	Biomass at maximum sustainable yield
BSAI	Bering Sea and Aleutian Islands
CBL	Crab bycatch limit
EBS	Eastern Bering Sea
EFH	Essential fish habitats
EIS	Environmental impact statement
ETP	Endangered, threatened, or protected
FMP	Fisheries management plan
F_{MSY}	Fishing mortality at maximum sustainable yield
GHL	Guideline harvest level
GOA	Gulf of Alaska
HAPC	Habitat areas of particular concern
KNE	Kodiak Northeast
KSH	Kodiak Shelikof
M	Natural mortality
MMB	Mature male biomass
MSST	Minimum stock size threshold
MSY	Maximum sustainable yield
NMFS	National Marine Fisheries Services
NOAA	National Oceanic and Atmospheric Administration

NPFMC	North Pacific Fishery Management Council
OFL	Overfishing limit
OY	Optimum yield
PSA	Productivity-susceptibility analysis
SAFE	Stock assessment and fishery evaluation

Summary

The Alaskan weathervane scallop (*Patinopecten caurinus*) fishery uses scallop dredge gear to fish in the Gulf of Alaska, Bering Sea, and Aleutian Islands. Weathervane scallop is the largest scallop in the world and ranges from Point Reyes, California, to the Pribilof Islands, Alaska, but is fished commercially only in Alaska. It is found from intertidal waters to depths of 300 meters, but abundance tends to be greatest between 40 and 130 m on mud, clay, sand, and gravel substrate.

Weathervane scallop has maintained relatively high recruitment in most areas over the past 10 years; however, because a quantitative stock assessment is lacking, a productivity–susceptibility analysis (PSA) was conducted, which indicated medium vulnerability of the species. Fishing pressure on weathervane scallop has been less than 0.5 MSY since 1996, and current fishing removals are below 30% of reference points.

Bycatch rates are generally less than 5% of the scallop catch for each bycatch species, and there are currently no concerns over the amount of finfish bycatch. Since the 2009–10 fishing season, weathervane scallop consistently makes up to 90–95% of the total catch composition. The previous version of this report included tanner crab because of low population abundance; however, since 2012 the stock has been declared rebuilt. Established crab bycatch limits are adhered to and have not resulted in exceeding fishing limits. No Criterion 2 species were included in this assessment.

The Alaskan weathervane scallop fishery is well managed. The fishery has been managed under state and federal fishery management projects (FMPs) since 1993. FMPs detail precautionary management measures including a limited entry program, area-specific catch quotas to prevent overfishing, gear and crew size restrictions, and bycatch controls. Annual harvest levels are set before the season for all scallop management areas at a level below the catch limits, so the sum of the estimated discard mortality in scallop and groundfish fisheries as well as the directed scallop fishery catch does not exceed the statewide catch limits. There are currently only two vessels operating in the fishery, and there is 100% observer coverage to collect biological, bycatch, and effort data as well as to provide information on regulatory enforcement. Crab bycatch limits are set at the beginning of the fishing season. These catch limits are based on the condition of individual crab stocks. Scallop observer data are released to the public in reports prepared by the Alaska Department of Fish and Game in a management process that is transparent and open to the public.

Scallop dredges have been shown to have severe impacts on benthic populations, communities, and habitats by damaging or reducing structural biota and habitat complexity, and by altering seafloor structure and reducing habitat features. Concerns about habitat effects associated with dredging in Alaska prompted the Alaska Board of Fisheries to establish extensive closures to fishing with scallop dredges in state and federal waters. In addition, the overall fishing footprint of weathervane scallop fishing is quite small (149 square nautical miles), equal to about 0.1% of the total available benthic essential fish habitat area. In Alaska, management regulations already include ecosystem-based fishery management measures such

as control of directed and incidental catches, protection of habitat for fish, crabs, and marine mammals, and temporal and spatial controls of fishing.

Weathervane scallop caught in Alaska (Bering Sea and Gulf of Alaska) with dredges are rated green.

Introduction

Scope of the analysis and ensuing rating

The Alaskan weathervane scallop (*Patinopecten caurinus*) fishery uses scallop dredge gear to fish in the Gulf of Alaska, Bering Sea, and Aleutian Islands. Weathervane scallop ranges from Point Reyes, California to the Pribilof Islands, Alaska; despite its range, it is fished commercially only in Alaska, where it is most abundant (NPFMC 2024). It is found from intertidal waters to depths of 300 meters, but abundance tends to be greatest between 40 and 130 m on mud, clay, sand, and gravel substrate (ibid).

Species Overview

There are eight species of scallops found in Alaskan waters, but weathervane scallop (*Patinopecten caurinus*) is the only species in Alaska that is commercially fished (although according to ADF&G managers, there have been occasional accounts of scuba divers engaging in limited scallop fishing in the southeast) (NPFMC 2024).

Alaska weathervane scallop populations were first investigated for commercial harvest in the early 1950s (NPFMC 2024). Interest in the Alaska fishery increased in the late 1960s as catches from Atlantic sea scallop (*Placopecten magellanicus*) fisheries on Georges Bank declined due to poor stock status, and consumer demand for scallops remained high (ibid). The Alaskan weathervane scallop fishery began in 1967 (Kruse et al. 2005; NPFMC 2024). Initially, the fishery was unregulated, which led to widespread depletion of stocks (Kruse et al. 2005). In 1993, ADF&G closed the fishery and established an interim management plan before reopening it (NPFMC 2024). Since the 1990s, the fishery has been managed under state and federal FMPs that contain precautionary management measures, including a limited entry program, area-specific catch quotas, gear and crew size restrictions, bycatch controls, and area closures to minimize adverse benthic impacts (Kruse et al. 2005; NPFMC 2024).

The scallop fishery is managed jointly by the NMFS and the ADF&G under the federal FMP for weathervane scallop (NPFMC 2024). Under the current scallop FMP, management of all aspects of the scallop fishery, except limited access, is delegated to the state of Alaska (NOAA 2024). To limit access, the NPFMC has developed a scallop license limitation program, implemented in 2000 (ibid). NMFS and the NPFMC have recently developed overfishing definitions and a plan for essential fish habitat for scallops (ibid). State regulations have established GHLs, fishing seasons, open and closed fishing areas, the scallop observer program, bycatch limits, gear restrictions, and measures to limit processing efficiency (including a ban on the use of mechanical shucking machines) (ibid).

Production Statistics

Within the last three decades, weathervane scallop landings reached a high of over 1.2 million lb in the 1994–95 fishing year (NPFMC 2022). In the past 10 years, the annual catch of weathervane scallop has remained below 400,000 lb (Figure 1) (ibid) (NPFMC 2023). Landings

from the recent fishing season (2023–24; not included in Figure 1) totaled 318,647 lb of shucked meats (NPFMC 2024b).

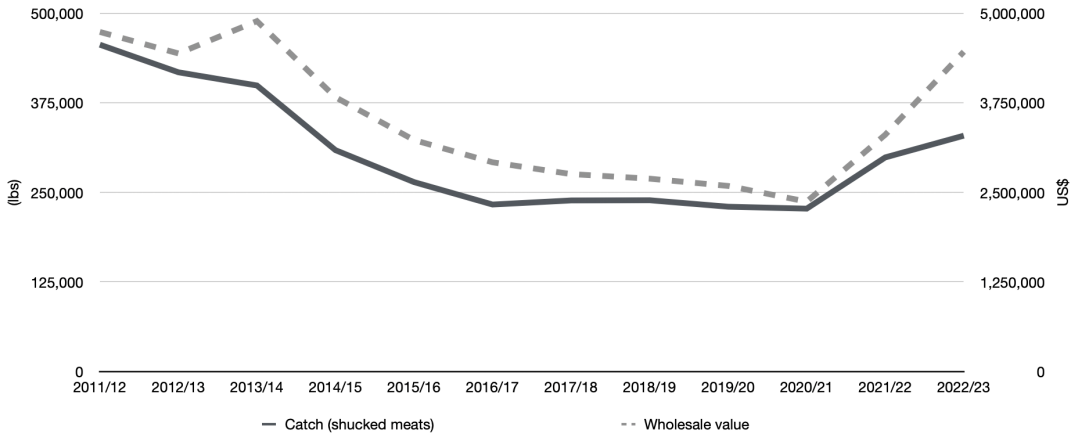

Figure 1: Weathervane scallop landings (in lb; left axis, solid line) and value (in USD; right axis; dashed line) by fishing seasons 2011–12 through 2022–23. Graph created from data compiled by (NPFMC 2022; NPFMC 2023).

Importance to the US/North American market

The U.S. scallop market is dominated by Atlantic sea scallops and imports, which far surpass Alaska's weathervane scallop production (NPFMC 2022). In 2021, for example, Atlantic sea scallop landings totaled 40 million lb, and Atlantic scallop imports reached 55.4 million lb, compared to less than 300,000 lb of weathervane scallop (ibid). Imports of various scallop species act as substitutes, further shaping domestic market prices (ibid). This dynamic leaves North Pacific harvesters with limited market influence, positioning them as price takers reliant on quality and taste to differentiate their product (ibid).

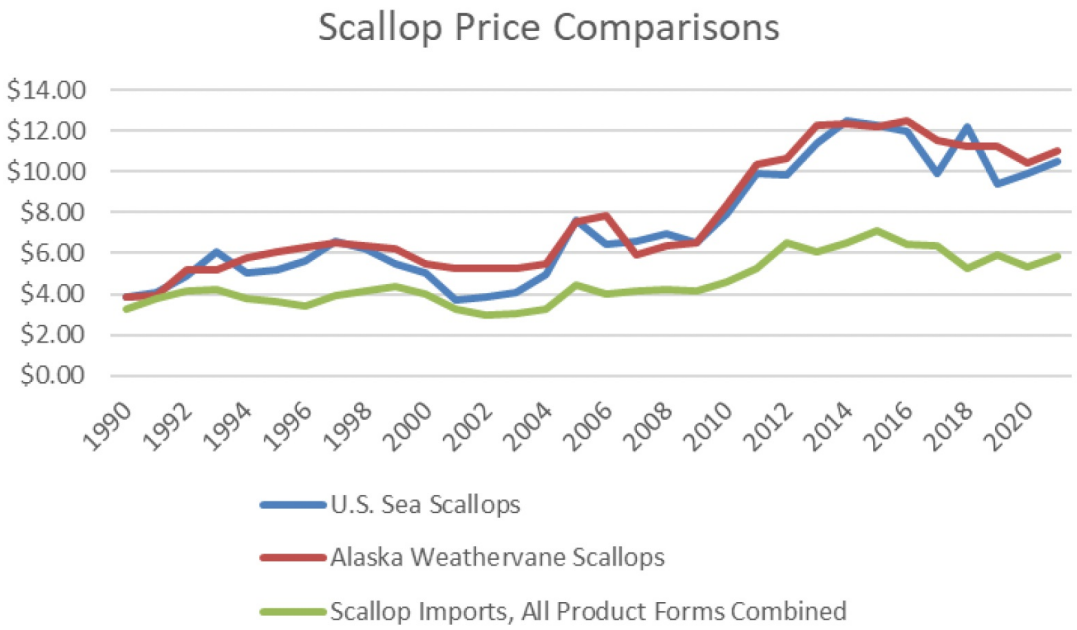

Figure 2: Scallop price comparisons, 1990–2021. Caption taken verbatim from (NPFMC 2022).

The Alaska weathervane scallop fishery has experienced modest growth in recent years, with improved fishing performance in areas such as Kodiak Shelikof and Kodiak Northeast contributing to increased landings. Annual catches rose from 298,770 lb in 2021 to 329,095 lb in 2022 before settling slightly lower at 318,647 lb in the 2023–24 season (NPFMC 2022; NPFMC 2023; NPFMC 2024b). The growth in recent years, coupled with inflation-driven price hikes, resulted in a 35.05% increase in gross first wholesale value, reaching $4.462 million during the 2022–23 fishing season (NPFMC 2023). Despite these fluctuations, the fishery maintains its value through consistent demand and high-quality product, with wholesale prices heavily influenced by broader market dynamics and the dominance of the Atlantic sea scallop and imported scallop markets.

Common and market names

Alaska weathervane scallop is marketed as either weathervane scallop or Alaska scallop (ASMI 2024).

Primary product forms

All landed weathervane scallop meats are processed (shucked) and frozen at sea (NPFMC 2024). Frozen scallops are available year-round.

Production volume notes

Production volume represents Alaska statewide landings during the 2023–24 fishing season (NPFMC 2024b).

Summary

Weathervane scallop is rated green for fisheries in Alaska (Bering Sea and Gulf of Alaska, dredges) as a result of adequate and effective management measures and of low footprint impacts from a quite restricted fishing area.

Assessments

This section assesses the sustainability of the fishery(s) relative to the Seafood Watch Standard for Fisheries, available at www.seafoodwatch.org. The specific standard used is referenced on the title page of all Seafood Watch assessments.

Criterion 1: Impacts on the Species Under Assessment

This criterion evaluates the impact of fishing mortality on the species, given its current abundance. When abundance is unknown, abundance is scored based on the species' inherent vulnerability, which is calculated using a Productivity-Susceptibility Analysis. The final Criterion 1 score is determined by taking the geometric mean of the abundance and fishing mortality scores. The Criterion 1 rating is determined as follows:

- Score >3.2 = **Green** or Low Concern
- Score >2.2 and ≤3.2 = **Yellow** or Moderate Concern
- Score ≤2.2 = **Red** or High Concern

Rating is Critical if Factor 1.3 (Fishing Mortality) is Critical.

Guiding principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level*

Criterion 1 Summary

Weathervane scallop			
Region / Method	**Abundance**	**Fishing Mortality**	**Score**
United States - Alaska - Bering Sea - Towed dredges - 145 mt	2.330 Moderate Concern	5.000 Low Concern	**Green (3.413)**
United States - Alaska - Gulf of Alaska - Towed dredges	2.330 Moderate Concern	5.000 Low Concern	**Green (3.413)**

Criterion 1 Assessment

Scoring Guidelines

Factor 1.1 - Abundance

Goal: Stock abundance and size structure of native species is maintained at a level that does not impair recruitment or productivity.

- *5 (Very Low Concern) — Strong evidence exists that the population is above an appropriate target abundance level (given the species' ecological role), or near virgin biomass.*
- *3.67 (Low Concern) — Population may be below target abundance level, but is at least 75% of the target level, OR data-limited assessments suggest population is healthy and species is not highly vulnerable.*
- *2.33 (Moderate Concern) — Population is not overfished but may be below 75% of the target abundance level, OR abundance is unknown and the species is not highly vulnerable.*
- *1 (High Concern) — Population is considered overfished/depleted, a species of concern, threatened or endangered, OR abundance is unknown and species is highly vulnerable.*

Factor 1.2 - Fishing Mortality

Goal: Fishing mortality is appropriate for current state of the stock.

- *5 (Low Concern) — Probable (>50%) that fishing mortality from all sources is at or below a sustainable level, given the species ecological role, OR fishery does not target species and fishing mortality is low enough to not adversely affect its population.*
- *3 (Moderate Concern) — Fishing mortality is fluctuating around sustainable levels, OR fishing mortality relative to a sustainable level is uncertain.*
- *1 (High Concern) — Probable that fishing mortality from all source is above a sustainable level.*

Weathervane scallop *(Patinopecten caurinus)*

1.1 Abundance

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

Moderate Concern

The current status of the weathervane scallop stock, in terms of being "overfished," is unknown (NPFMC 2024b). Despite the stock having some reference points in place, there are concerns about the time series used for these estimates (see Justification). A productivity-susceptibility analysis (PSA) was performed for the species, and a medium vulnerability resulted from the PSA (score = 3.10; see Justification). Therefore, because there is no stock assessment available for the full stock and the stock has medium vulnerability, abundance is considered a "moderate concern" (per line 2.a. and 2.e. in table 1.1.1 of the Seafood Watch Standard).

Supplementary Information

According to the weathervane scallop FMP, MSY is set at 1.284 million lb (or 582 metric tons, MT) of shucked meat (NPFMC 2024); the MSST for these scallops is based on 2 MSY stock size = 2 B_{MSY} = 4.93 million lb (2,236 MT) of shucked scallop meats (ibid). Biomass estimates are available for only two portions of the nine registration areas since 1996 (Cook Inlet [Area H] and Prince William Sound [Area E]), with the addition of Kodiak (Area K) and Yakatut (Area D) since 2016 (NPFMC 2024b). The full stock is unassessed, and surveys now alternate every two years between the western GOA (Cook Inlet and some Kodiak districts) and eastern GOA (Prince William Sound, Yakutat) (ibid).

The lack of a complete status assessment is not seen as a conservation issue because scallop is widely distributed, including in areas closed to fishing to protect crab populations and in regions not designated as commercial scallop beds (NPFMC 2023). The last FMP update also has a personal comment confirming that "[the] weathervane scallop resource is considered to be at sustainable biomass levels and has maintained relatively high recruitment in most areas over the past 10 years" (Barnhart 2024, pers comm in (NPFMC 2024)). On the other hand, reviews made by the SSC on the 2024 SAFE report (NPFMC 2024b) state that, regarding the period used to define reference points, "1990–1997 likely does not represent the prevailing conditions and stock productivity in 2024," because approximately 20% of the assumed OFL is based on historic catch from areas now considered noncore (i.e., areas with low to zero fishing activity) (Jackson et al. 2024).

Productivity-Susceptibility Analysis for weathervane scallop

Table 2

Productivity Attributes	Value	Score (1 = low; 2 = medium; 3 = high)	Reference(s)
Average age at maturity; Tm (years)	3	1	(Hennick 1970) in (Masuda and Stone, 2003)
von Bertalanffy growth coefficient (K) (fish only)	NA		
Average maximum age; Tmax (years). Inverts only when Lmax is known for finfish (Col. J)	15–28*	2	(Palomares and Pauly 2024) (Hennick 1973) in (NPFMC 2024b)
Fecundity (eggs/year)	NA		
Average maximum size; Lmax (cm) (fish only)	28	1	(Palomares and Pauly 2024)
Average size at maturity; Lm (cm) (fish only)	NA		
Reproductive strategy	Broadcast spawner	1	(Palomares and Pauly 2024)
Density dependence (inverts only)	NA		
Productivity Subscore		**1.33**	

* Weathervane scallop is long-lived, with ages commonly observed in the twenties and as

old as 28 years (Hennick 1973) in (NPFMC 2024b). The oldest recorded maximum age is 28 years, though it is more typical for the average maximum age to be much lower, with 15 years considered a more reasonable upper limit (Palomares and Pauly 2024). Because it is more likely that the average maximum age for weathervane scallop falls within 10–25 years, this attribute receives a score of 2.

Table 3

Susceptibility Attribute	**Information**	**Score (1 = low; 2 = medium; 3 = high)**	**Reference(s)**
Areal overlap	Default value used	3	
Vertical overlap	Default value used	3	
Seasonality	Default value used	3	
Selectivity	Default value used	2	
Post-capture mortality	Default value used	3	
Susceptibility Subscore		**2.80**	

Table 4

Productivity-Susceptibility Score	**3.10**
Vulnerability Rating (high, medium or low)	**Medium**

1.2 Fishing Mortality

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

Low Concern

In the 2022–23 and 2023–24 seasons, total fishing removals of shucked scallop meats reached 345,690 lb (156.8 MT) and 318,647 lb (145 MT), respectively, remaining under 30% of both the ABC and OFL (NPFMC 2024b). This indicates that overfishing did not occur during either season, or any previous season in the time series (ibid). For 2023/–24, the Scallop Plan Team suggested setting the OFL at the maximum OY of 1.284 million lb (582 MT) as outlined in the 2014 Scallop FMP (ibid). In ddition, they recommend setting the ABC at 90% of this OFL, following the maximum ABC control rule, which would bring it to 1.156 million lb (524 MT) (ibid).

Because current fishing removals are below 30% of the OY/MSY/OFL (see Justification), this factor is scored a "low concern" (per line 1 in table 1.2.1 of the Seafood Watch Standard).

Supplementary Information

The reference points specific for fishing mortality evaluation in the FMP for weathervane scallop are the following: MSY = 1.284 million lb (582 MT) of shucked meats; MSY Control Rule (F_{MSY}) = M, or F_{MSY} = 0.13 (NPFMC 2024).

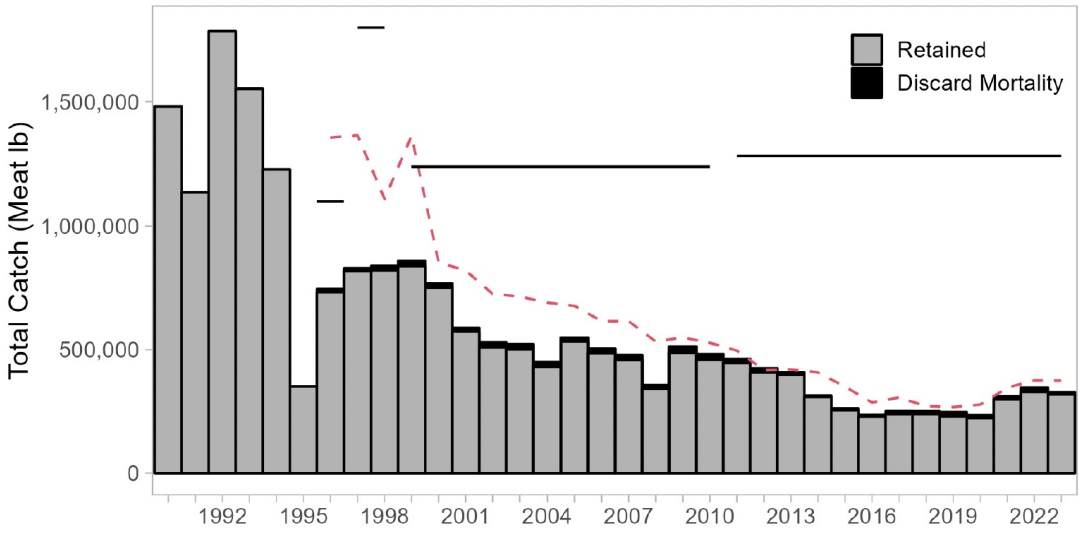

Figure 3: State-wide total catch estimates from 1990 to 2023. OFL is indicated by solid horizontal lines. The red dashed line indicates the statewide cumulative GHL. Caption taken verbatim from (NPFMC 2024b).

Season	Total Removals (lb meats)	OFL (lb meats)	ABC (lb meats)	% OFL	% ABC
1993/94	984,583	1,800,000	1,620,000	54.7	60.8
1994/95	1,240,775	1,800,000	1,620,000	68.9	76.6
1995/96	410,743	1,800,000	1,620,000	22.8	25.4
1996/97	732,424	1,800,000	1,620,000	40.7	45.2
1997/98	818,913	1,800,000	1,620,000	45.5	50.6
1998/99	822,096	1,240,000	1,116,000	66.3	73.7
1999/00	837,971	1,240,000	1,116,000	67.6	75.1
2000/01	750,617	1,240,000	1,116,000	60.5	67.3
2001/02	572,838	1,240,000	1,116,000	46.2	51.3
2002/03	509,455	1,240,000	1,116,000	41.1	45.7
2003/04	492,000	1,240,000	1,116,000	39.7	44.1
2004/05	425,477	1,240,000	1,116,000	34.3	38.1
2005/06	525,357	1,240,000	1,116,000	42.4	47.1
2006/07	487,473	1,240,000	1,116,000	39.3	43.7
2007/08	458,313	1,240,000	1,116,000	37.0	41.1
2008/09	342,434	1,240,000	1,116,000	27.6	30.7
2009/10	512,958	1,240,000	1,116,000	41.4	46.0
2010/11	481,509	1,240,000	1,116,000	38.8	43.1
2011/12	461,946	1,284,000	1,156,000	36.0	40.0
2012/13	424,491	1,284,000	1,156,000	33.1	36.7
2013/14	408,101	1,284,000	1,156,000	31.8	35.3
2014/15	314,364	1,284,000	1,156,000	24.5	27.2
2015/16	261,930	1,284,000	1,156,000	20.4	22.7
2016/17	236,559	1,284,000	1,156,000	18.4	20.5
2017/18	250,591	1,284,000	1,156,000	19.5	21.7
2018/19	250,372	1,284,000	1,156,000	19.5	21.7
2019/20	246,900	1,284,000	1,156,000	19.2	21.4
2020/21	234,662	1,284,000	1,156,000	18.3	20.3
2021/22	311,978	1,284,000	1,156,000	24.3	27.0
2022/23	345,690	1,284,000	1,156,000	26.9	29.9

Figure 4: Total Alaska weathervane scallop removals (landings + discards) and OY/MSY/OFL, 1993/94–2022/23 seasons. Caption taken verbatim from (NPFMC 2023).

Season	Combined GHL	Retained Catch (lb)	Total Catch (lb)	OFL (mil lb)	ABC (mil lb)
2019/20	267,500	229,945	246,900	1.284	1.156
2020/21	277,500	222,560	234,662	1.284	1.156
2021/22	345,500	298,770	311,978	1.284	1.156
2022/23	375,500	329,095	345,689	1.284	1.156
2023/24	374,700	318,647	328,112	1.284	1.156

Season	Combined GHL	Retained Catch (t)	Total Catch (t)	OFL (t)	ABC (t)
2019/20	121	104	112	582	524
2020/21	126	101	106	582	524
2021/22	157	136	142	582	524
2022/23	170	149	157	582	524
2023/24	170	145	149	582	524

Figure 5: Management quanities for the state-wide Alaska weathervane scallop fishery during the previous five seasons. All weights represent schucked meats. Total catch includes estimated discard removals assuming 20% handling mortality. Caption taken verbatim from (NPFMC 2024b).

Criterion 2: Impacts on Other Species

All main retained and bycatch species in the fishery are evaluated under Criterion 2. Seafood Watch defines bycatch as all fisheries-related mortality or injury to species other than the retained catch. Examples include discards, endangered or threatened species catch, and ghost fishing. Species are evaluated using the same guidelines as in Criterion 1. When information on other species caught in the fishery is unavailable, the fishery's potential impacts on other species is scored according to the Unknown Bycatch Matrices, which are based on a synthesis of peer-reviewed literature and expert opinion on the bycatch impacts of each gear type. The fishery is also scored for the amount of non-retained catch (discards) and bait use relative to the retained catch. To determine the final Criterion 2 score, the score for the lowest scoring retained/bycatch species is multiplied by the discard/bait score. The Criterion 2 rating is determined as follows:

- Score >3.2 = **Green** or Low Concern
- Score >2.2 and ≤3.2 = **Yellow** or Moderate Concern
- Score ≤2.2 = **Red** or High Concern

Rating is Critical if Factor 2.3 (Fishing Mortality) is Crtitical

Guiding principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level.*
- *Minimize bycatch.*

Criterion 2 Summary

Criterion 2 score(s) overview

This table(s) provides an overview of the Criterion 2 subscore, discards+bait modifier, and final Criterion 2 score for each fishery. A separate table is provided for each species/stock that we want an overall rating for.

Weathervane scallop			
Region / Method	**Sub Score**	**Discard Rate/Landings**	**Score**
United States - Alaska - Bering Sea - Towed dredges - 145 mt	5.000	1.000: < 100%	Green (5.000)
United States - Alaska - Gulf of Alaska - Towed dredges	5.000	1.000: < 100%	Green (5.000)

Criterion 2 main assessed species/stocks table(s)

This table(s) provides a list of all species/stocks included in this assessment for each 'fishery' (as defined by a region/method combination). The text following this table(s) provides an explanation of the reasons the listed species were selected for inclusion in the assessment.

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges			
Sub Score: 5.000	**Discard Rate: 1.000**		**Score: 5.000**
Species	**Abundance**	**Fishing Mortality**	**Score**
Weathervane scallop	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Gulf of Alaska - Pacific, Northeast - United States - Towed dredges			
Sub Score: 5.000	**Discard Rate: 1.000**		**Score: 5.000**
Species	**Abundance**	**Fishing Mortality**	**Score**
Weathervane scallop	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)

The fisheries targeting weathervane scallop do not catch any other species making up for more than 5% of the total catch. Weathervane scallop consistently makes up 90–95% of the total catch composition (NPFMC 2024b). Southern tanner crab is regulated within the annual weathervane scallop guideline harvest (NPFMC 2024); however, because the species is caught at more substantial levels in other fisheries (directed tanner crab fishery in the EBS, and as bycatch in the snow crab and Bristol Bay red king crab fisheries and the groundfish fisheries), the contribution of the weathervane scallop fishery is considered minimal (Stockhausen 2024). The previous version of this report included tanner crab because of low population abundance; however, since 2012 the stock has been declared rebuilt. For this reason, the species was removed from the Criterion 2 species list. No ETP species is known to interact with this fishery.

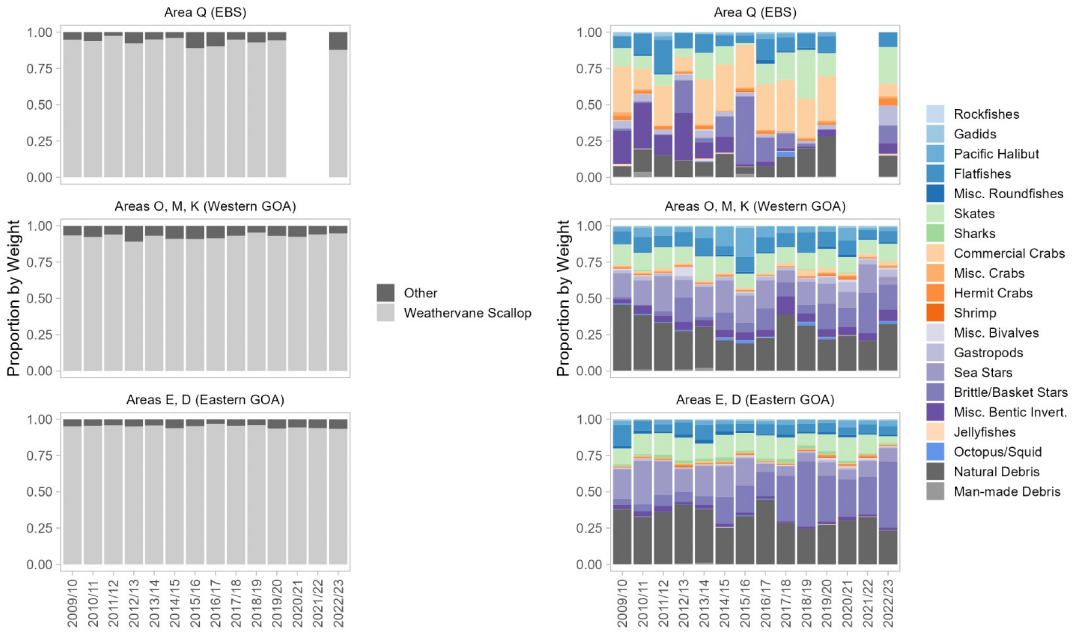

Figure 6: Proportion of directed scallop fishery catch as the target species or all other bycatch species (left) and the proportion of bycatch by taxonomic group (right) by ecoregion. Caption taken verbatim from (NPFMC 2024b).

Criterion 2 Assessment

Scoring Guidelines

Factor 2.1 - Abundance

(same as Factor 1.1 above)

Factor 2.2 - Fishing Mortality

(same as Factor 1.2 above)

Factor 2.3 - Modifying Factor: Discards and Bait Use

Goal: Fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss. For fisheries that use bait, bait is used efficiently.

Scoring Guidelines: The discard rate is the sum of all dead discards (i.e. non-retained catch) plus bait use divided by the total retained catch.

Ratio of bait + discards/landings	**Factor 2.3 score**
<100%	1
>=100	0.75

2.3 Discard Rate/Landings

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

< 100%

Discards in the weathervane scallop fishery include juvenile scallops (making up to less than 10% of the total catch in most recent years (NPFMC 2023)), and may also include sea stars (1%), several species of skates (0.8%), and brittle and basket stars (0.7%) (NPFMC 2022; NPFMC 2024b).

Criterion 3: Management Effectiveness

Five factors are evaluated in Criterion 3: Management Strategy and Implementation, Bycatch Strategy, Scientific Research/Monitoring, Enforcement of Regulations, and Inclusion of Stakeholders. Each is scored as either 'highly effective', 'moderately effective', 'ineffective,' or 'critical'. The final Criterion 3 score is determined as follows:

- *5 (Very Low Concern) — Meets the standards of 'highly effective' for all five factors considered.*
- *4 (Low Concern) — Meets the standards of 'highly effective' for 'management strategy and implementation' and at least 'moderately effective' for all other factors.*
- *3 (Moderate Concern) — Meets the standards for at least 'moderately effective' for all five factors.*
- *2 (High Concern) — At a minimum, meets standards for 'moderately effective' for Management Strategy and Implementation and Bycatch Strategy, but at least one other factor is rated 'ineffective.'*
- *1 (Very High Concern) — Management Strategy and Implementation and/or Bycatch Management are 'ineffective.'*
- *0 (Critical) — Management Strategy and Implementation is 'critical'.*

The Criterion 3 rating is determined as follows:

- Score >3.2 = **Green** or Low Concern
- Score >2.2 and ≤3.2 = **Yellow** or Moderate Concern
- Score ≤2.2 = **Red** or High Concern

Rating is Critical if Management Strategy and Implementation is Critical.

Guiding principle

- The fishery is managed to sustain the long-term productivity of all impacted species.

Five factors are evaluated in Criterion 3: Management Strategy and Implementation, Bycatch Strategy, Scientific Research/Monitoring, Enforcement of Regulations, and Inclusion of Stakeholders. Each is scored as either 'highly effective', 'moderately effective', 'ineffective,' or 'critical'. The final Criterion 3 score is determined as follows:

Criterion 3 Summary

Fishery	Management Strategy And Implementation	Bycatch Strategy	Scientific Data Collection and Analysis	Enforcement of and Compliance with Management Regulations	Stakeholder Inclusion	Score
Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges	Highly effective	Highly effective	Moderately Effective	Highly effective	Highly effective	Green (4.000)
Gulf of Alaska - Pacific, Northeast - United States - Towed dredges	Highly effective	Highly effective	Moderately Effective	Highly effective	Highly effective	Green (4.000)

Criterion 3 Assessment

Scoring Guidelines

Factor 3.1 - Management Strategy and Implementation

Considerations: What type of management measures are in place? Are there appropriate management goals, and is there evidence that management goals are being met? Do manages follow scientific advice? To achieve a highly effective rating, there must be appropriately defined management goals, precautionary policies that are based on scientific advice, and evidence that the measures in place have been successful at maintaining/rebuilding species.

Factor 3.2 - Bycatch Strategy

Considerations: What type of management strategy/measures are in place to reduce the impacts of the fishery on bycatch species and when applicable, to minimize ghost fishing? How successful are these management measures? To achieve a Highly Effective rating, the fishery must have no or low bycatch, or if there are bycatch or ghost fishing concerns, there must be effective measures in place to minimize impacts.

Factor 3.3 - Scientific Research and Monitoring

Considerations: How much and what types of data are collected to evaluate the fishery's impact on the species? Is there adequate monitoring of bycatch? To achieve a Highly Effective rating, regular, robust population assessments must be conducted for target or retained species, and an adequate bycatch data collection program must be in place to ensure bycatch management goals are met.

Factor 3.4 - Enforcement of Management Regulations

Considerations: Do fishermen comply with regulations, and how is this monitored? To achieve a Highly Effective rating, there must be regular enforcement of regulations and verification of

compliance.

Factor 3.5 - Stakeholder Inclusion

Considerations: Are stakeholders involved/included in the decision-making process? Stakeholders are individuals/groups/organizations that have an interest in the fishery or that may be affected by the management of the fishery (e.g., fishermen, conservation groups, etc.). A Highly Effective rating is given if the management process is transparent, if high participation by all stakeholders is encouraged, and if there a mechanism to effectively address user conflicts.

3.1 Management Strategy And Implementation

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

Highly effective

The weathervane scallop FMP was first published in 1995 and has had several amendments since. The FMP follows the state's established scallop registration areas, historically divided into nine regions, covering both federal and adjacent state waters (Figure 7) (NPFMC 2024): Southeastern Alaska Registration Area (Area A); Yakutat Registration Area (Area D and District 16); Prince William Sound Registration Area (Area E); Cook Inlet Registration Area (Area H); Kodiak Registration Area (Area K), which is subdivided into the Northeast, Shelikof, and Semidi Districts; Alaska Peninsula Registration Area (Area M); Dutch Harbor Registration Area (Area O); Bering Sea Registration Area (Area Q); and Adak Registration Area (Area R) (ibid). Each registration area represents a uniform scallop fishery. Vessels must register with the state to fish in these areas, sometimes needing to register for specific districts (ibid). This registration helps track fishing effort and resource harvest rates (ibid). The Southeast Alaska registration area was never open to the scallop fishery, whereas the Adak registration area was open only once, in 1995 (ibid).

While there are eight vessels with valid permits, more recently only two vessels have been active in the fishery (Woodford 2021; NPFMC 2024b). The FMP includes two types of management measures: Category 1, which the state oversees, and Category 2, which are limited-access measures fixed within the FMP (ibid). Category 2 measures are federally regulated and can only be changed through an FMP amendment (Figure 8) (NPFMC 2024).

The scallop fishery currently lacks a formal stock assessment model. But reference points related to stock abundance and fishing mortality are available (MSY is set at 1.284 million lb of shucked meat; the MSST for these scallops is based on 2 MSY stock size = 2 B_{MSY} = 4.93 million lb of shucked scallop meats; MSY Control Rule (F_{MSY}) = M, or F_{MSY} = 0.13; ABC and OFL are also set for every fishing season) (NPFMC 2024). To manage the stock, the state establishes guideline harvest levels based on data from the scallop fishery observer program and independent dredge surveys (ibid). Lastly, standardized catch-per-unit-effort indices are calculated to assess variations in depth, month, vessel, fishing bed, and season (ibid). There is no minimum legal size for weathervane scallop (ibid).

There are precautionary policies for potential crab bycatch in this fishery: a limited number of snow crab and red king crab can be caught in specific registration areas (Figure 9). An overpass of CBLs may call for early closure of the fishery, even if OY values for weathervane scallop were not reached (NPFMC 2024). Incidental catches of other species are minimal (NPFMC 2022; NPFMC 2024b).

As mentioned in factor 1.1, the lack of a full status assessment for the weathervane scallop

fishery is not considered a conservation concern because of the species' broad distribution, including areas closed to fishing and noncommercial regions (NPFMC 2023). In addition, the resource is regarded as sustainable, with stable recruitment levels in most areas over the past decade (NPFMC 2024). Dredge surveys have been performed since 1996 (Areas E and H), and since 2019 all actively fished beds have been monitored, alternating between eastern GOA (Areas E and D) or western GOA (KSH, KNE, and Area H) on a biennial basis (NPFMC 2024b). Starting in 2025, weathervane scallop assessments will be released every 2 to 3 years unless a formal stock assessment model is developed or there is a decrease in estimated stock abundance (in which case the Council could task the Scallop Plan Team to develop the scallop SAFE report annually) (U.S. Office of the Federal Register 2024).

Management strategy and implementation is considered "highly effective" because targeted species have reference points and precautionary policies in place, and management is responsive to changes in stock (per lines 1, 2 and 5 of table 3.1.1 of the Seafood Watch Standard).

Supplementary Information

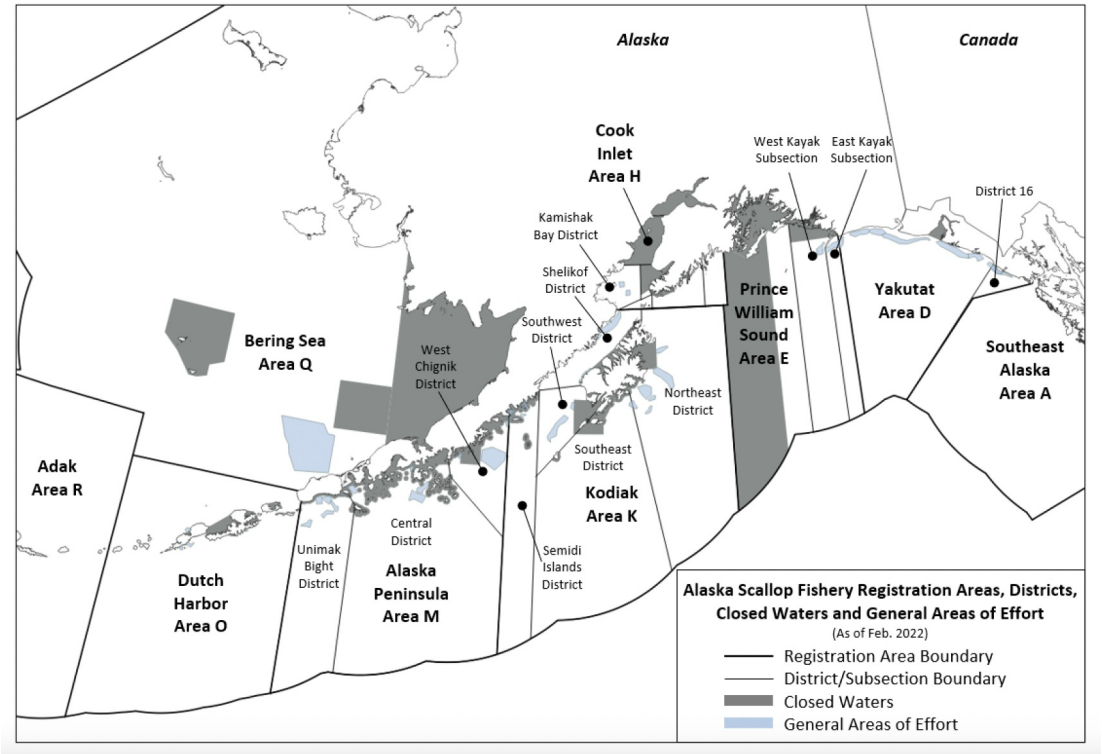

Figure 7: Alaska scallop fishery registration areas. General areas of effort are overlaid by blue polygons. Exploratory fisheries in waters normally closed to scallop fishing (gray shading) have been opened by ADF&G Commissioner's Permit in the Alaska Peninsula Unimak Bight District during past seasons. Caption taken verbatim from (NPFMC 2024b).

CATEGORY 1 (Delegated to the State)	CATEGORY 2 (Fixed in FMP, Implemented by Federal Regulation)
Guideline Harvest Levels	License limitation program
Registration Areas, Districts, Subdistricts and Sections	Optimum Yield specification
Gear Limitations	Overfishing specification
Crew and Efficiency Limits	EFH/HAPC designation
Fishing Seasons	
Observer Requirements	
Prohibited Species and Bycatch Limits	
Recordkeeping and Reporting Requirements	
In-season Adjustments	
Closed Areas	
Other	

Figure 8: List of management actions regulated by the state (Category 1) and by the federal government (Category 2). From (NPFMC 2024).

Scallop Registration Areas	Red King Crab	C. bairdi	C. opilio
Yakutat (D)			
District 16	NA	NA	NA
Remainder of Area D	NA	NA	NA
Prince William Sound (E)			
Eastern Section of outside District	NA	0.5%[a]	NA
Cook Inlet (H)			
Kamishak District	0.5%[a]	60 crabs[a]	NA
Outer/Easter/Barren Island Districts	NA	NA	NA
Kodiak (K)			
Shelikof District	0.5% or 1.0%	0.5% or 1.0%	NA
Northeast District	0.5% or 1.0%	0.5% or 1.0%	NA
Semidi District	Regulated inseason	Regulated inseason	NA
Alaska Peninsula (M)	0.5% or 1.0%	0.5% or 1.0%	NA
Bering Sea (Q)	500 crabs[a]	Three Tier Approach	Three Tier Approach
Dutch Harbor (O)	0.5% or 1.0%	0.5% or 1.0%	NA
Adak (R)	50[b]	10,000[b]	NA

NA= Not applicable

[a]Fixed CBL

[b]Bycatch limit set to allow scallop fleet adequate opportunity to explore and harvest scallop stocks while protecting the crab resource.

Figure 9: Statewide crab bycatch limits, in percent of the crab abundance estimate or number of crab. Caption taken verbatim from (NPFMC 2024).

3.2 Bycatch Strategy

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

Highly effective

There are state regulations that prevent any vessel under the weathervane scallop FMP from keeping prohibited species, such as salmon, halibut, king crab, tanner crab, and herring (NPFMC 2024). Such species must be avoided, and any caught must be promptly released into the water with minimal harm (ibid). Bycatch limits for crab species are available and were discussed in factor 3.1. This factor is considered “highly effective” because no species of concern are caught in this fishery (per line 1 in Table 3.2.1 of the Seafood Watch Standard).

3.3 Scientific Data Collection and Analysis

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

Moderately Effective

Since the inception of the FMP, there is 100% observer coverage (two vessels are currently active in the fishery) (NPFMC 2024b). Observers in the weathervane scallop fishery gather data primarily on the retained catch, discard, and bycatch rates. There is also extensive collection of biological data: shell height of retained and discarded scallops, individual meat weights, gonad conditions, shell samples for aging, and the condition of discarded scallops (ibid). The data obtained through this observer program serve as the primary resource for ADF&G in establishing harvest limits (ibid). Data from the observer program exist since 1993; however, raw data only started to be curated in a local database since 2009 (NPFMC 2024b). For consistency with the quality of data, only data from 2009 to the present are used in the current scallop observer database. A dredge survey program was started by ADF&G in 1984, and has been taken on a biennial basis since 1996, with the goals to: "(1) delineate the primary scallop beds; (2) estimate scallop abundance and biomass within them; (3) characterize bed composition using age and shell height data; and (4) estimate catch rates of non-target species, particularly Tanner crab" (NPFMC 2024b). Since 2019, all actively fished beds—namely, Areas E and D of eastern GOA, and KSH, KNE, and Area H of western GOA—have been sampled biannually by ADF&G (ibid). The available data and research effort among the registration areas are detailed in the Justification (Table 5).

According to the weathervane scallop FMP, understanding the stock's dynamics and the effects of the fishery on its ability to produce MSY on a continuous basis requires coordinated efforts between NMFS and ADF&G to gather the necessary data. This includes collecting data on: "(1) stock abundance and size/age structure; (2) scallop biology, life history, and stock production parameters; (3) analyses of population thresholds and recruitment overfishing; (4) estimation of optimum dredge ring size or minimum shell height based on studies of rates of growth and mortality; (5) investigations of exploitation rates and alternative management strategies; (6) genetic stock structure; and (7) new gear designs to reduce bycatch and to minimize adverse effects on bottom habitat" (NPFMC 2024).

A full stock assessment is not available for the species; however, annual assessments were published every year until 2024. In January 2024, Amendment 18 was approved to allow a more flexible period between assessments: "The management measures in Amendment 18 will amend the FMP to allow flexibility for non-annual assessments. This will remove prescriptive language dictating that the SAFE report is produced on an annual basis. Amendment 18 will give the Council flexibility in modifying the assessment cycle with the potential to set multi-year specifications, based on a period of no more than 3 years, that best suit the needs of the stock. If a formal stock assessment model is developed, or there is a decrease in estimated stock abundance, the Council could task the Scallop Plan Team

to develop the scallop SAFE report annually" (U.S. Office of the Federal Register 2024).

Some data related to stock abundance are consistently collected for some decades, though a full stock assessment is not available for the species, and the data available are used to monitor and maintain the stock (and monitor bycatch), so scientific data collection and analysis receives a score of "moderately effective" (per line 1 of "moderately effective" of table 3.3.1 of the Seafood Watch Standard).

Supplementary Information

Distribution of research effort on biomass estimates and fisheries statistics for weathervane scallop among the registration areas. Recent fishing relevance refers to fishing areas that had at least three open fishing seasons since the 2019–20 season. Data from (NPFMC 2023; NPFMC 2024b).

Table 5

Registration Area/District	Biomass estimates	Fisheries statistics	Recent fishing relevance
Southeast Alaska (Area A)	No	No	Fishery never permitted here
Yakutat (Area D)	Yes	Yes	Very relevant
Prince William Sound (Area E)			
West Kayak Isl.	Yes	Yes	Very relevant
East Kayak Isl.	Yes	Yes	Fishery closed since 2012–13
Cook Inlet (Area H)			
Kamishak Bay	Yes	Yes	Fishery closed since 2017

Kodiak (Area K)			
Shelikof	Yes	Yes	Very relevant
Northeast	Yes	Yes	Very relevant
Southwest	No	Yes	Very relevant
Southeast	No	Yes	Not relevant
Alaska Peninsula (Area M)	No	Yes	Not relevant
Dutch Harbor (Area O)	No	Yes	Not relevant
Bering Sea (Area Q)	No	Yes	Not relevant
Adak (Area R)	No	No	Fishery open only in 1995

3.4 Enforcement of and Compliance with Management Regulations

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

Highly effective

The enforcement framework for Alaska's scallop fishery involves collaboration between NOAA, the U.S. Coast Guard, and trained scallop observers who ensure compliance with regulations (NPFMC 2024). Observers play a key role in monitoring, collecting data, and supporting management efforts, especially in remote areas where vessels rarely dock (ibid). Regulations allow observers full access to inspect catches and vessel operations without needing search warrants (NPFMC 2024). Their duties include scientific monitoring, safeguarding resources, and reporting suspected illegal activities to ADF&G (ibid). Observers are not law enforcement agents but may need to document violations and testify in court if required (ibid). Currently there are only two vessels operating in the

fishery (NPFMC 2024b), with 100% observer coverage. The fishery is regularly enforced and independently verified, with the capacity to control and report compliance; therefore, this factor is considered “highly effective” (per lines 1 and 2 of table 3.4.1 of the Seafood Watch Standard).

3.5 Stakeholder Inclusion

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

Highly effective

The scallop fishery management framework emphasizes collaboration by ensuring that stakeholders (including fishers, processors, scientists, and consumers) have multiple opportunities to engage in the regulatory process (NPFMC 2024). This includes participating in council workgroups, providing testimony to advisory panels, engaging with regulatory officials, and commenting on management plans or amendments (ibid). The process is designed to balance biological, economic, and social objectives while fostering continuous dialogue to address concerns and adapt management strategies (ibid). The state plays a key role in day-to-day management, with stakeholders having access to state-level processes for voicing concerns or requesting adjustments (ibid). Because stakeholder inclusion in the weathervane scallop fishery management process is transparent and includes stakeholder input at various levels, this factor is considered “highly effective” (per lines 1-5 of table 3.5.1 of the Seafood Watch Standard).

Criterion 4: Impacts on the Habitat and Ecosystem

This Criterion assesses the impact of the fishery on seafloor habitats, and increases that base score if there are measures in place to mitigate any impacts. The fishery's overall impact on the ecosystem and food web and the use of ecosystem-based fisheries management (EBFM) principles is also evaluated. Ecosystem Based Fisheries Management aims to consider the interconnections among species and all natural and human stressors on the environment. The final score is the geometric mean of the impact of fishing gear on habitat score (factor 4.1 + factor 4.2) and the Ecosystem Based Fishery Management score. The Criterion 4 rating is determined as follows:

- Score >3.2 = **Green** or Low Concern
- Score >2.2 and ≤3.2 = **Yellow** or Moderate Concern
- Score ≤2.2 = **Red** or High Concern

Guiding principles

- Avoid negative impacts on the structure, function or associated biota of marine habitats where fishing occurs.
- Maintain the trophic role of all aquatic life.
- Do not result in harmful ecological changes such as reduction of dependent predator populations, trophic cascades, or phase shifts.
- Ensure that any enhancement activities and fishing activities on enhanced stocks do not negatively affect the diversity, abundance, productivity, or genetic integrity of wild stocks.
- Follow the principles of ecosystem-based fisheries management.

Rating cannot be Critical for Criterion 4.

Criterion 4 Summary

Fishery	Physical Impact of Fishing Gear on the Habitat/Substrate	Modifying Factor: Mitigation of Gear Impacts	Ecosystem-based Fisheries Management	Score
Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges	Score: 2	+1	Very Low Concern	Green (3.873)
Gulf of Alaska - Pacific, Northeast - United States - Towed dredges	Score: 2	+1	Very Low Concern	Green (3.873)

Criterion 4 Assessment

Scoring Guidelines

Factor 4.1 - Physical Impact of Fishing Gear on the Habitat/Substrate

Goal: The fishery does not adversely impact the physical structure of the ocean habitat, seafloor or associated biological communities.

- *5 - Fishing gear does not contact the bottom*
- *4 - Vertical line gear*
- *3 - Gears that contacts the bottom, but is not dragged along the bottom (e.g. gillnet, bottom longline, trap) and is not fished on sensitive habitats. Or bottom seine on resilient mud/sand habitats. Or midwater trawl that is known to contact bottom occasionally. Or purse seine known to commonly contact the bottom.*
- *2 - Bottom dragging gears (dredge, trawl) fished on resilient mud/sand habitats. Or gillnet, trap, or bottom longline fished on sensitive boulder or coral reef habitat. Or bottom seine except on mud/sand. Or there is known trampling of coral reef habitat.*
- *1 - Hydraulic clam dredge. Or dredge or trawl gear fished on moderately sensitive habitats (e.g., cobble or boulder)*
- *0 - Dredge or trawl fished on biogenic habitat, (e.g., deep-sea corals, eelgrass and maerl) Note: When multiple habitat types are commonly encountered, and/or the habitat classification is uncertain, the score will be based on the most sensitive, plausible habitat type.*

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

Goal: Damage to the seafloor is mitigated through protection of sensitive or vulnerable seafloor habitats, and limits on the spatial footprint of fishing on fishing effort.

- *+1 —>50% of the habitat is protected from fishing with the gear type. Or fishing intensity is very low/limited and for trawled fisheries, expansion of fishery's footprint is prohibited. Or gear is specifically modified to reduce damage to seafloor and modifications have been shown to be effective at reducing damage. Or there is an effective combination of 'moderate' mitigation measures.*
- *+0.5 —At least 20% of all representative habitats are protected from fishing with the*

gear type and for trawl fisheries, expansion of the fishery's footprint is prohibited. Or gear modification measures or other measures are in place to limit fishing effort, fishing intensity, and spatial footprint of damage caused from fishing that are expected to be effective.

- *0 —No effective measures are in place to limit gear impacts on habitats or not applicable because gear used is benign and received a score of 5 in factor 4.1*

Factor 4.3 - Ecosystem-Based Fisheries Management

Goal: All stocks are maintained at levels that allow them to fulfill their ecological role and to maintain a functioning ecosystem and food web. Fishing activities should not seriously reduce ecosystem services provided by any retained species or result in harmful changes such as trophic cascades, phase shifts or reduction of genetic diversity. Even non-native species should be considered with respect to ecosystem impacts. If a fishery is managed in order to eradicate a non-native, the potential impacts of that strategy on native species in the ecosystem should be considered and rated below.

- *5 — Policies that have been shown to be effective are in place to protect species' ecological roles and ecosystem functioning (e.g. catch limits that ensure species' abundance is maintained at sufficient levels to provide food to predators) and effective spatial management is used to protect spawning and foraging areas, and prevent localized depletion. Or it has been scientifically demonstrated that fishing practices do not have negative ecological effects.*
- *4 — Policies are in place to protect species' ecological roles and ecosystem functioning but have not proven to be effective and at least some spatial management is used.*
- *3 — Policies are not in place to protect species' ecological roles and ecosystem functioning but detrimental food web impacts are not likely or policies in place may not be sufficient to protect species' ecological roles and ecosystem functioning.*
- *2 — Policies are not in place to protect species' ecological roles and ecosystem functioning and the likelihood of detrimental food impacts are likely (e.g. trophic cascades, alternate stable states, etc.), but conclusive scientific evidence is not available for this fishery.*
- *1 — Scientifically demonstrated trophic cascades, alternate stable states or other detrimental food web impact are resulting from this fishery.*

4.1 Physical Impact of Fishing Gear on the Habitat/Substrate

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

Score: 2

The weathervane scallop fishery in Alaska primarily occurs over mud, sand, and gravel substrates, which are the species' preferred habitats (NPFMC 2024). This factor receives a score of "2" (per line 1 in table 4.1.1 of the Seafood Watch Standard).

4.2 Modifying Factor: Mitigation of Gear Impacts

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

+1

According to the weathervane scallop FMP, the scallop fishery has a small annual impact, affecting only 149 square nautical miles, or 0.1% of available habitats like sand, mud, and gravel [(Witherell 2002) cited by (NPFMC 2024)]. Although scallop dredge gear impacts the seabed more significantly than other gear types, the fishery takes place in areas with habitats that recover relatively quickly (ibid). As a result, the environmental effects are limited to a small portion of benthic habitats and are considered minimal and short-lived in terms of scallop spawning and breeding (ibid). A review of fishing effects on EFH for BSAI groundfish species conducted in 2010 found that research supports the habitat sensitivity, recovery rates, and habitat type distributions documented in the EFH EIS analysis (NPFMC 2024). The review emphasized a decrease in overall fishing activity, the introduction of gear regulations to reduce habitat damage, and the creation of area closures to prevent the expansion of effort into sensitive areas (ibid). Because fishing effort is low and quite limited in area (0.1% of available habitats), and the expansion of effort has been limited by area closures to protect vulnerable habitats, this factor is scored as "+1" (per line 2a, 2b, and 2c in table 4.2.1 of the Seafood Watch Standard).

4.3 Ecosystem-based Fisheries Management

Bering Sea - Pacific, Northeast - United States - Alaska - Towed dredges

Gulf of Alaska - Pacific, Northeast - United States - Towed dredges

Very Low Concern

The ADF&G adopts a precautionary and adaptive approach aimed at sustaining weathervane scallop populations, mitigating habitat impacts, and preserving the ecological role of scallops in benthic ecosystems (NPFMC 2024). Within this context, GHRs are established for traditional fishing areas to prevent overfishing and ensure the

reproductive potential of scallop populations (ibid). These GHRs are based on long-term productivity and adjusted as needed to reflect changes in stock status, such as shifts in population size, age structure, or catch-per-unit-effort (ibid). Special use permits provide additional flexibility by allowing the ADF&G to regulate harvests through measures such as location and duration restrictions, gear limitations, and bycatch controls (ibid).

As mentioned in factor 4.2, the weathervane scallop fishery occurs in a quite limited area (about 0.1% of available habitats) and has spatial management (e.g., closed areas and closed seasons) (NPFMC 2024). The impact on scallop feeding by sediment resuspension from dredging remains unclear, though current fishing efforts in Alaska do not seem to disrupt scallop growth, suggesting minimal disturbance (ibid). Weathervane scallop is considered to be at sustainable biomass levels, with strong recruitment in most areas over the past decade (ibid). This species is not reliant on habitats particularly sensitive to fishing, and the overlap between fisheries and scallop distribution suggests limited habitat effects (ibid). Based on the species' ecological role, detrimental food web impacts are unlikely. Because the current fishing effort is quite limited, temporal and spatial management strategies are in place, and detrimental food web impacts are unlikely, this factor is considered a "very low concern" (per lines 1.a, 1.b, and 1.c in table 4.3.1 of the Seafood Watch Standard).

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Scientific review does not constitute an endorsement of the Seafood Watch® program, or its seafood recommendations, on the part of the reviewing scientists. Seafood Watch® is solely responsible for the conclusions reached in this report.

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Appendix A: Review Schedule

Reassessment: The Alaska weathervane scallop fishery was reviewed in 2024, and it was determined that major changes were necessary to reflect changes in the fisheries' performance against the Seafood Watch Standard for Fisheries, such that the most recent version of the Seafood Watch standard should be used. The reassessment was published on July 7th, 2025.