Assessment of the pollock stock in the Aleutian Islands

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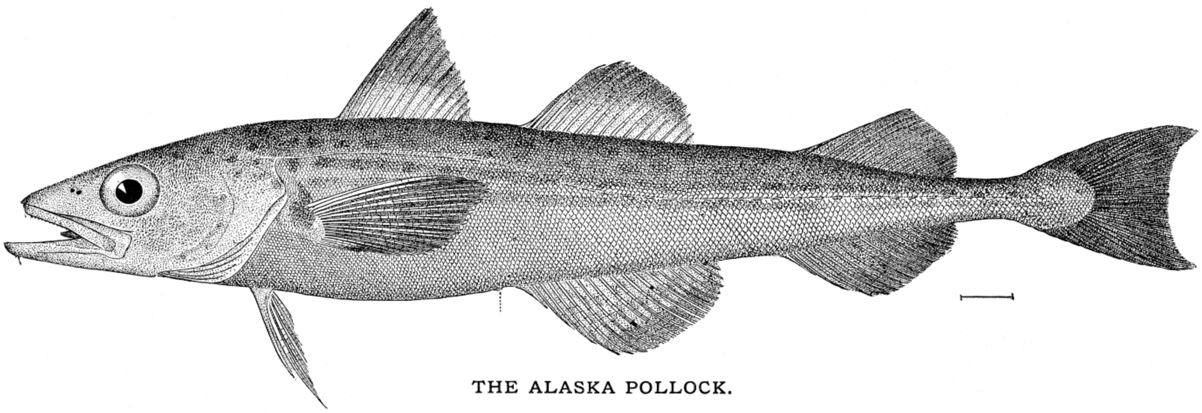

THE ALASKA POLLOCK.

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Executive Summary

The Aleutian Islands (AI) pollock stock assessment is on a biennial cycle with full assessments every other year when we recommend harvest levels for the next two years. The most recent operational assessment was conducted in 2024 and can be found at (https://apps-afsc.fisheries.noaa.gov/Plan_Team/2024/AIpollock.pdf). An operational update stock assessment document with updated assessment and projection model results will be presented in next year's SAFE report.

The AI pollock assessment consists of a population model, which uses survey and fishery data to generate a historical time series of population estimates, and a projection model, which uses results from the population model to predict future population estimates and recommended harvest levels. The Aleutian Islands walleye pollock stock assessment uses the Assessment Model for Alaska (here referred to as AMAK). AMAK is a variation of the "Stock Assessment Toolbox" model presented to the Plan Team in the 2002 Atka mackerel stock assessment (Lowe *et al.* 2002). The data sets used in this assessment include total catch biomass, fishery age compositions, AI bottom trawl survey abundance estimates, and AI bottom trawl survey age compositions. For a partial assessment year, we do not re-run the assessment model, but do update the projection model with new catch data. This incorporates the most current catch information without re-estimating model parameters and biological reference points. The stock remains at tier 3a.

Summary of Changes in Assessment Inputs

Changes in the input data: There were no changes made to the assessment model inputs since this was an off-cycle year. New data added to the projection model included updated 2024 and 2025 catch estimates (4,999 t and 4,528 t) and new catch estimates for 2026. The 2026 catch was estimated at 2,820 t by increasing the official catch as of August 8, 2026 (2,067 t), by an expansion factor of 26.7%, which represents the average fraction of catch taken after August 8 in the last three complete years (2023-2025).

Changes in the assessment methodology: There were no changes in assessment methodology since this was an off-cycle year.

Summary of Results

For the 2027 fishery, we recommend the maximum allowable ABC of 48,763 t from the updated projection model. This ABC is up slightly from the 2026 ABC of 46,437 t. Reference values for AI pollock are summarized in the following table, with the recommended ABC and OFL values for 2027 and 2028.

Quantity	As estimated or *specified last assessment* for: 2025	2026	As estimated or *recommended this* year for: 2027	2028
M (natural mortality rate)	0.21		0.21	
Tier	3a		3a	
Total (age 1+) biomass (t)	288,407	305,528	331,314	356,554
Female spawning biomass (t)				
Projected	82,781	80,639	89,494	96,056
$B_{100\%}$	182,006		182,006	
$B_{40\%}$	78,802		78,802	
$B_{35\%}$	63,702		63,702	
F_{OFL}**	0.406	0.406	0.406	0.406
$maxF_{ABC}$	0.325	0.325	0.325	0.325
F_{ABC}	0.325	0.325	0.325	0.325
OFL (t)	55,728	56,231	59,090	62,952
maxABC (t)	46,051	46,437	48,763	51,917
ABC (t)	46,051	46,437	48,763	51,917
Status	As determined this year for: 2023	2024	2025	2026
Overfishing	no	n/a	no	n/a
Overfished	n/a	no	n/a	no
Approaching overfished	n/a	no	n/a	no

* Projection based on estimated catches of 2,820 t for 2026 and 4,424 t for 2027, the three-year average (2023-2025), used in place of maximum permissible ABC.

** Long-term equilibrium F_{OFL} and F_{ABC} were 0.406 and 0.325, respectively.

The stock is not being subject to overfishing, is not currently overfished, nor is it approaching a condition of being overfished. The tests for evaluating these three statements on status determination require examining the official total catch from the most recent complete year and the current model projections of spawning biomass relative to $B_{35\%}$ for 2024 and 2025. The official total catch for 2025 is 4,528 t which is a small fraction of the 2025 OFL of 56,231 t; therefore, the stock is not subject to overfishing. The estimates of the 2025 and 2026 spawning biomass derived from this year's projection of the assessment model with updated catch are 82,866 t and 84,250 t, respectively. The 2027 estimate from the current year projection is above $B_{35\%}$ at 89,494 t and the 2028 estimate is above ½ $B_{35\%}$ and the stock is expected to be above $B_{35\%}$ in 2037 under projection Scenario 7, therefore, the stock is not currently overfished nor approaching an overfished condition.

Fishery Trends

Updated catch data (t) for AI pollock as of August 08, 2026 (NMFS Alaska Regional Office Catch Accounting System via the Alaska Fisheries Information Network (AKFIN) database, http://www.akfin.org) are summarized in the following table.

Year	Eastern 541	Central 542	Western 543	Aleutians Total	Aleutians ABC	Aleutians TAC
2024	3,757	358	884	4,999	42,654	19,000
2025	3,096	265	1,167	4,528	46,051	19,000
2026[1]	1,455	136	476	2,067	46,437	19,000

[1]Current as of August 08, 2026. Source: NMFS Alaska Regional Office Catch Accounting System via the AKFIN database (http://www.akfin.org).

Although open to fishing, there continues to be very little directed fishing for pollock in the Aleutian Islands. In 2025 there was a total of 5.7 t of pollock landed from pollock targeted fisheries and in 2026 there were no pollock landed in targeted fisheries as of August 8.

Summaries for Plan Team

Species	Year	Expected Catch	OFL	ABC	Mean SSB	Mean Relative Spawning Biomass
AI pollock	2024	4,999	51,516	42,654	84,731	0.466
	2025	4,528	53,030	43,863	82,866	0.455
	2026	2,820[1]	53,030	43,863	84,250	0.463
	2027	5,432[2]	59,090	48,763	89,494	0.492
	2028	5,770[2]	62,952	51,917	96,056	0.528
	2029	6,272[2]	68,474	56,464	104,078	0.572
	2030	6,853[2]	74,763	61,660	113,230	0.622
	2031		80,980	66,810	117,630	0.646

[1]Projected from 3-year average proportion caught as of August 8, 2026. Source: NMFS Alaska Regional Office Catch Accounting System via the AKFIN database (http://www.akfin.org).
[2]Projected from 5-year average F for 2021-2025.

Responses to SSC and Plan Team Comments on Assessments in General

No applicable comments.

Responses to SSC and Plan Team Comments Specific to this Assessment

No applicable comments.

References

Lowe, S., J.N. Ianelli, H. Zenger, K. and R Rueter 2002. Assessment of Aleutian Islands Atka Mackerel . In: Stock assessment and fishery evaluation report for the groundfish resources of the Bering Sea/Aleutian Islands regions. North Pac. Fish. Mgmt. Council, P.O. Box 103136, Anchorage, AK 99510. Section 14:609-668

Figures

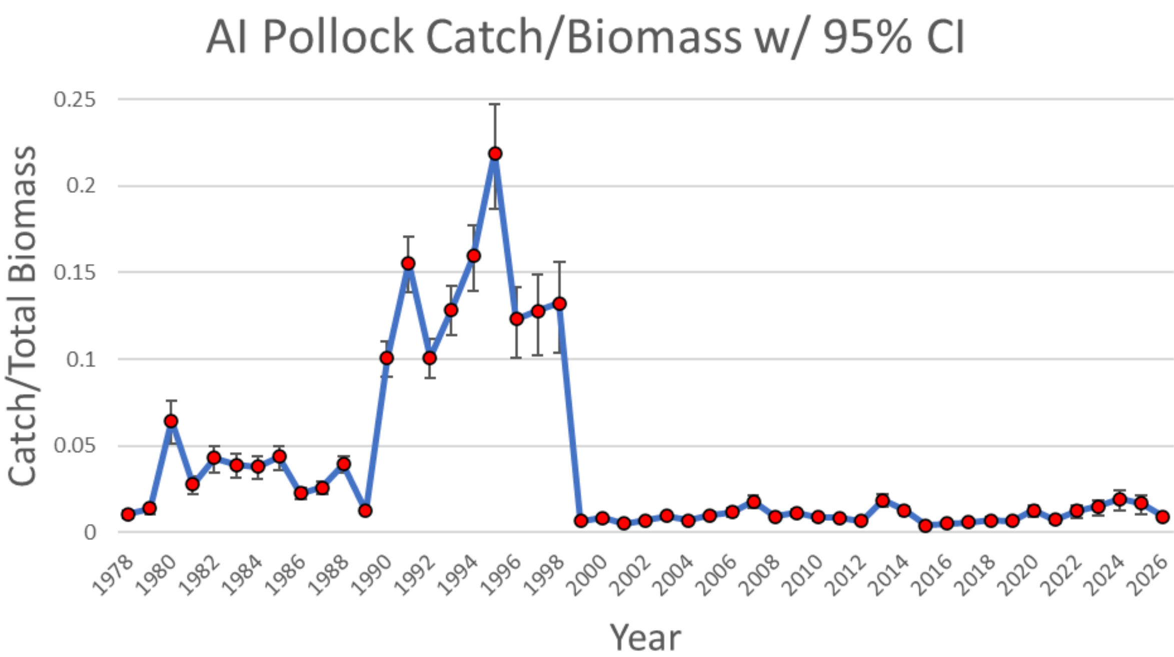

Figure A1:1. Modeled catch over total biomass (point estimates in red circles) with 95% confidence intervals for AI pollock from 1978-2026.

1.B. Assessment of walleye pollock in the Bogoslof Island Region

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Executive Summary

Summary of changes in the assessment

The 2024 acoustic-trawl survey biomass estimates is unchanged as is the Tier 5 calculations based on a random-effects model applied to the available time series of data.

Summary of results

The ABC and OFL levels using Tier 5 values and applying the random-effects model:

Quantity	As estimated or specified last year for: 2025	2026	As estimated or recommended this year for: 2027	2028
M (natural mortality rate)	0.313	0.313	0.313	0.313
Tier	5	5	5	5
Biomass (t)	247,137	247,137	247,137	247,137
F_{OFL}	0.313	0.313	0.313	0.313
maxF_{ABC}	0.23475	0.23475	0.23475	0.23475
F_{ABC}	0.23475	0.23475	0.23475	0.23475
OFL (t)	77,354	77,354	77,354	77,354
maxABC (t)	58,015	58,015	58,015	58,015
ABC (t)	58,015	58,015	58,015	58,015
Status	As determined *last* year for: 2023	2024	As determined *this* year for: 2024	2025
Overfishing	No	n/a	No	No

Response to SSC and Plan Team comments

General and specific comments:

There were no comments pertaining to this Tier 5 assessment

Introduction

Alaska pollock (*Gadus chalcogrammus*) are broadly distributed throughout the North Pacific, with the largest concentrations occurring in the eastern Bering Sea. Within this broader distribution, the Bogoslof region supports a persistent winter spawning aggregation that is distinguishable from spawning aggregations in adjacent areas. The Bogoslof management district, corresponding to INPFC area 518, was established in 1992 following fisheries and surveys in the late 1980s that consistently encountered spawning pollock in the region.

The extent to which the Bogoslof aggregation represents a biologically distinct, self-recruiting stock remains uncertain. Its persistence nevertheless indicates some degree of spawning-site fidelity and provides a practical basis for separate management within the U.S. Exclusive Economic Zone. Pollock observed moving toward the Bogoslof region before spawning have also been associated with the historically large concentrations found in the central Bering Sea, commonly referred to as the Donut Hole (Smith 1981).

By convention, pollock in the Bogoslof region and the Donut Hole are considered components of the Aleutian Basin stock. Under the Central Bering Sea (CBS) management convention, 60% of the Aleutian Basin population is assumed to spawn in the Bogoslof region. This is a management assumption rather than a direct estimate of stock distribution. The proportion spawning near Bogoslof probably varies with environmental conditions, population size, age structure, and movement among the eastern Bering Sea, Aleutian Islands, Aleutian Basin and potentially Gulf of Alaska regions.

The Bogoslof component is one of three pollock management stocks recognized in the BSAI region. The other two are the eastern Bering Sea shelf stock and the Aleutian Islands stock occurring primarily in nearshore waters shallower than 1,000 m (Barbeaux et al. 2004). Pollock from these management areas probably intermingle, but the rates, timing, and magnitude of exchange remain poorly understood. The contribution of spawning near Bogoslof to subsequent recruitment throughout the Aleutian Basin is similarly uncertain.

Eggs and larvae produced near Bogoslof may experience fewer opportunities for retention and survival than those produced over the continental shelf, such as north of Unimak Island. Nevertheless, strong year classes often occur synchronously among the Bogoslof, eastern Bering Sea, and Aleutian Islands management areas. This synchronicity could result from exchange among spawning components, common environmental conditions affecting early survival, or some combination of the two. The biological appropriateness of the present management units therefore depends partly on the degree of exchange and on whether the areas have meaningfully different productivity. Bailey et al. (1999) found little genetic differentiation among adjacent pollock aggregations, although differentiation was evident between samples collected from opposite sides of the North Pacific.

Several observed characteristics distinguish Bogoslof pollock from those in neighboring areas. Mean length at age suggests differences in growth, and the Bogoslof acoustic-trawl surveys historically sampled a relatively old population. During 1988–2012, age-15-and-older pollock represented an average of approximately 18% of the number of fish older than age 6. During 2014–2020, this proportion averaged only about 1%. The more recent age distribution therefore resembles that observed in the eastern Bering Sea more closely than the unusually old age structure recorded during earlier Bogoslof surveys.

Fishery and management

Few pollock were reported from the Donut Hole or Bogoslof region before 1977 (Low and Ikeda 1978). Japanese scientists documented substantial concentrations in the Aleutian Basin during the mid-to-late 1970s, but large-scale fishing in the Donut Hole did not develop until the mid-1980s. By 1987, a substantial portion of the reported catch was attributed to the Bogoslof region, although fishing locations were not always documented precisely. The fishery primarily targeted winter spawning aggregations.

Observer coverage was most extensive in 1991. Fishing that year initially coincided with the eastern Bering Sea and Aleutian Islands pollock seasons. After the eastern Bering Sea fishery closed on March 23, some fishing effort shifted toward the Aleutian Islands and areas near the future Bogoslof management district. The Bogoslof district was formally established through Fishery Management Plan Amendment 17 in 1992, and directed fishing for pollock in the district was closed that year.

Since the directed-fishery closure, pollock removals from the Bogoslof district have occurred principally as bycatch in fisheries targeting other species. Bycatch exceeded 1,000 t in 2016 but has generally been substantially lower; the most recent local peak was 256 t in 2022. Most Bogoslof pollock bycatch has occurred in the non-pelagic trawl fishery targeting arrowtooth flounder. Consequently, recent catches have generally remained well below the allowable biological catch and overfishing level.

Evolution of assessment and harvest specifications

Management of Bogoslof pollock has evolved in response to changes in survey biomass, recruitment, and the scientific understanding of stock productivity. Because the stock is assessed primarily from periodic acoustic-trawl surveys, changes in survey observations can produce substantial changes in estimated biomass and harvest specifications. The Scientific and Statistical Committee has therefore frequently considered whether the standard Tier 5 calculation adequately accounts for uncertainty in stock structure, recruitment, and survey information.

During the early 2000s, the CBS management was anchored to a proxy B_{MSY} target of 2 million t as a proxy . Although Bogoslof pollock was formally classified under Tier 5, the SSC reduced the maximum permissible ABC as estimated biomass declined below this target. The adjustment resembled the proportional reduction used under a Tier 3b harvest control rule and resulted in harvest rates considerably below the standard Tier 5 maximum.

Estimated biomass declined from approximately 301,000 t in 2000 to 198,000 t in 2003. Corresponding ABCs declined from 8,470 t to 2,570 t. The ABC was subsequently set at 5,500 t for 2005 and 5,220 t for 2006, compared with OFLs of 50,600 t and 48,000 t, respectively. These specifications reflected concern about the prolonged absence of substantial recruitment, uncertainty about removals outside the U.S. zone, and the importance of maintaining the Bogoslof spawning component of the Aleutian Basin population.

The 2 million t target was based largely on historical abundance during an earlier and apparently more productive period. As recruitment remained weak, the target became increasingly disconnected from the biomass observed in contemporary surveys. This led the SSC to reconsider whether the historical target remained a useful basis for setting harvest limits.

Transition to a standard Tier 5 approach, 2011–2015

The SSC discontinued use of the 2 million t target in 2011. The 2009 acoustic-trawl survey had estimated biomass at approximately 110,000 t, and there had been little evidence of substantial recruitment since the late 1980s. Under these conditions, rebuilding toward a fixed historical target was no longer considered an appropriate representation of contemporary stock productivity.

Management shifted to the standard Tier 5 framework using a natural mortality rate of (M=0.2). The 2012 specifications included an ABC of 16,500 t and an OFL of 22,000 t. The 2012 acoustic-trawl survey subsequently produced the lowest biomass estimate in the time series, approximately 67,000 t, resulting in an ABC of 10,100 t and an OFL of 13,400 t.

The 2014 survey provided the first clear indication of improvement, with estimated biomass increasing by 67% to approximately 112,000 t. This increase suggested that recruitment had occurred, although the magnitude and persistence of the emerging year classes remained uncertain.

Recruitment-driven increase and staged management response, 2016–2019

The 2016 acoustic-trawl survey estimated a biomass of approximately 508,000 t, nearly five times the 2014 estimate. Subsequent age information indicated that this increase was associated primarily with the 2009, 2010, and 2012 year classes, which had not been fully detected in earlier observations.

The rapid increase created a management challenge because the Tier 5 calculation translated the new survey estimate directly into a much larger maximum permissible ABC. Rather than immediately adopting the maximum permissible value of approximately 97,400 t, the SSC recommended an ABC of 60,800 t. This staged increase limited the response to a single large survey observation while allowing additional surveys and age data to confirm the strength of the contributing cohorts.

The 2018 survey confirmed that biomass (approximately 663,000 t) remained substantially above the low levels observed earlier in the decade. During this period, the SSC also encouraged additional genetic and stock-structure research to clarify the relationship of Bogoslof pollock to the eastern Bering Sea and Aleutian Islands populations. These questions remained important because movement among management areas could affect both interpretation of survey changes and the allocation of Aleutian Basin harvest limits.

Age-structured analyses supported increasing the assumed natural mortality rate from 0.2 to approximately 0.3 (based on survey age-data over a period of no fishing and assumed asymptotic survey selectivity). This compared to an early catch-curve analysis that showed for just the 1992 year-class that for Bogoslof region the *M* estimate was much greater than 0.3 (Ianelli et al. 2004, Fig. 1.43). Subsequent age-structured analyses Because natural mortality directly determines the Tier 5 fishing mortality rate, the revised value increased the nominal harvest rate associated with a given survey biomass.

The 2024 estimated acoustic-trawl survey biomass was about 245,000 t, a decline of 31% from the preceding survey estimate. The resulting ABC and OFL for 2025 and 2026 declined by approximately 33% (due to moderating effect of the survey smoother). No additional assessment-specific buffer was applied because realized catches remained far below the estimated overfishing level.

The management history of Bogoslof pollock reflects two persistent sources of uncertainty. First, the biological relationship among pollock spawning in the Bogoslof region, the Donut Hole, the eastern Bering Sea shelf, and the Aleutian Islands remains unresolved. Second, the assessment is strongly dependent on intermittent acoustic-trawl surveys, making it difficult to distinguish changes in local availability from changes in the abundance of the broader Aleutian Basin population.

The history also illustrates the value of adjusting harvest limits gradually when survey observations change abruptly. The additional reduction applied during the early 2000s reflected concern about sustained recruitment failure, whereas the staged increase following the 2016 biomass estimate allowed the new cohorts to be confirmed before and be reflected in ABC/OFL estimates. More recently, revisions to natural mortality have shifted the assessment toward biological assumptions supported by age-structured analyses rather than historical biomass proxies.

The continued management of the Bogoslof region as a separate stock remains appropriate because of the persistent spawning aggregation, its role under the Central Bering Sea convention, and the uncertainty surrounding its contribution to the broader Aleutian Basin population. That said, we think that Bogoslof pollock likely share some aspects of adjacent stocks including environmentally-driven synchrony in recruitment and some mixing. Continued work on movement, genetics, recruitment sources, natural mortality, and survey availability is needed to determine how closely the management unit corresponds to population structure and whether future changes to the assessment or harvest control rule are warranted.

Data

Survey

NMFS acoustic-trawl (AT) survey biomass estimates are the primary data source used in this assessment and are conducted in February and March time frames (Lauffenburger, et al. *In progress*, McKelvey and Levine, 2023). Since 2000, the values have varied between a low 67,000 t to a high of over 660 kt estimated in 2018. The 2024 AT survey estimate was 245 kt, a 31% decrease from the 2020 estimate (Table 1B.4). The area covered by surveys 2018, 2020, and 2024 including tow locations, and relative pollock densities are depicted in Fig. 1B.1. The time series of age composition data from this survey is provided in Table 1B.5 and in Fig. 1B.2. Note that ages from 2024 were unavailable in time for this assessment.

Analytical approach

Model Structure

Survey biomass averaging
The model for harvest recommendations is based on using a Tier-5 approach, which requires survey estimates of biomass (B_t). In Ianelli et al. (2015), the SSC accepted application of a random effects model of the form:

$$B_t = B_{t-1}e^{\varepsilon_t} \qquad \varepsilon_t \sim N\left(0,\sigma_\varepsilon^2\right)$$

with process errors ε_t estimated as random effects and σ_ε^2 also estimated with the observations and errors from Table 1B.3 included in the likelihood. The model was fit using REMA (Sullivan et al. 2022) and the script is provided in Appendix 1 below. This model provides an alternative estimate of survey biomass in 2024 that weights the relative influence of past survey estimates between estimated process error and specified observation errors.

Results

The random-effects model resulted in a 2025 biomass estimate of 247,137 t (Fig. 1B.3; Tables 1B.6 and 1.B7).

Harvest recommendations

Maximum permissible ABC and OFL estimates for 2025 and 2026 under Tier 5 relies exclusively on the NMFS biennial acoustic trawl survey biomass estimate. The biomass estimate based on the random-effects model gives:

Description	M	Biomass	ABC	OFL
Status quo, estimated M	0.313	247,137	58,015	77,354

A table of biomass estimates and uncertainties is provided in Table 1B.3

Risk table summary

Assessment considerations
Risk level 1: Normal

- The Bogoslof pollock assessment has been managed under Tier 5 of the FMP and is based on survey trends. In addition, a Tier-3 type age-structured model had been applied to track spawning biomass trends and consider survey age composition data to estimate natural mortality (Ianelli et al. 2004) since fishing mortality has been near zero since

1992 due to directed fishing closures in this region. Subsequent more complete analyses across several cohorts (and selectivity assumptions) resulted in updated estimates of natural mortality (e.g., Ianelli et al. 2005, Ianelli et al. 2015). Genetic studies are underway which may require reconsidering the stock structure assumptions; however, we consider this assessment adequate given the limited fishing (level 1).

Population dynamics considerations
Risk level 1: Normal

- As with the assessment considerations, there are questions about the stock structure for this region. However, it appears that the spawning characteristics in this area continue to be consistent and until more details on the interactions with other areas are understood, we consider issues related to uncertainty in the population dynamics to be risk averse given there is no directed fishing in this region (level 1).

Ecosystem indicators are organized into several categories to capture the scope of considerations available in the Ecosystem Status Report for theAleutian Islands. Due to the earlier review of this stock assessment, bottom trawl survey-based indicators for 2026 are not yet available. The information presented below is a combination of the ESRs for 2024 and the environmental indicators for 2026.

Environmental/Ecosystem considerations
Risk level 1: Normal

Distribution:

- No information available

Environmental processes:

- Satellite sea surface temperatures (SST) show a step increase in 2014 with higher temperatures both in summer and winter (Xiao and Ren, 2023). Satellite SST has remained above the long term mean since 2015, and while heatwave conditions have persisted, SST has remained below the higher temperatures observed between 2025-2020 (Lemagie and Callahan 2026; in Ortiz and Zador 2026). This year has been very similar to 2024 with a reprieve from MHW conditions starting in April and average temperatures through July. SST started increasing above the 1985-2014 average in August (Otiz and Zador 2026).
- Preliminary results from the 2026 bottom trawl survey show temperatures in the Southern Bering Sea may be slightly cooler than in 2024 when pollock were found in temperatures ranging from 2.9 7.3°C. The average bottom temperature from the 2024 Aleutian Islands bottom trawl survey (AIBTS, (165°W – 170°W) in the Southern Bering Sea was ~4.3˚C, cooler than 2022 and cooler than the highest observed in 2016 but still above the 1991-2012 mean (Howard and Laman 2024; in Ortiz and Zador, 2024).
- In 2026, the mean March SST in the eastern Aleutians was 3.8°C (compared to the 1985-2014 mean of 3.5°C) and the mean June SST was 6.7°C (close to the 6.6 °C mean for June during 1985-2014). Pollock spawn March through June and their larvae stay in surface waters (top 40 m) before they shift to deeper waters (Smart et al., 2013). This timing means the eggs are vulnerable to MHW penetrating the top of the water column; however, this was not the case for 2026 *but might be the case for 2027. The current ENSO forecast for January to March shows SST anomalies of 0.5°C in the Bogoslof area.*

Prey:

- The potential effects of the biennial cycle and cascading effects of pink salmon predation on copepods has been documented across multiple trophic elevels (Springer and van Vliet 2014; Batten et al. 2018; Matta et al. 2020; Ruggerone et al. 2023).Based on these effects, we infered that copepods experienced lower predation pressure given the lower abundance of Kamchatka pink salmon during 2024. The increase in copepod community size and lower abundance of large diatoms supports this effect, however the meso-zooplankton biomass decreased (Ostle and Batten 2026; in Ortiz and Zador 2026). Time-series of the abundance of either only young or all pollock do not show alternating years of high numbers of pollock.
- Reproductive success above the mean for seabirds in Aiktak, particularly for Leach's storm petrels which feed on zooplankton as well as invertebrates in 2024, suggests that both zooplankton and forage fish were sufficiently abundant during 2024 to support successful production of chicks. The similarity of 2026 and 2024 in terms of environmental conditions may be indicative of similar availability of zooplankton and forage fish prey in that area for 2026.
- Likewise, the fish condition of small pollock in 2024 was average around the Bogoslof area and two standard deviations above the long-term mean in the Eatsern Aleutians. The cooler temperatures in 2026, similar to 2024, may favor improved condition in small pollock as well as the availability of zooplankton prey.

Competitors and predators:

- The trends in fish condition and seabird reproductive success suggest potential favorable foraging conditions Pacific ocean perch (particularly juvenile POP <20 cm), Kamchatka pink salmon, and Atka mackerel are primary consumers of copepods, with the first two showing biennial signals in their abundance. increased consumption of copepods by the increasing POP population might be limiting the availability of prey for adult pollock through competitive pressure. Additionally while this is a low abundance year for eastern Kamchatka pink salmon, all salmon except for sockeye salmon have significantly lower harvest projections compared to other years (Gleason and Munro 2026). Some fishery-related evidence of increased competitive overlap may be the increased bycatch of pollock in rockfish fisheries.
- Walleye pollock are a key prey for northern fur seals, which are increasing in Bogoslof. Pollock in this area is also consumed by Steller sea lions (increasing in the eastern Aleutians, Rookery Cluster Area 6, Sweeney and Gelatt 2026; in Ortiz and Zador, 2026) and Pacific cod (increasing, Ortiz 2024; in Ortiz and Zador, 2024). Offsetting this potential increase in predation, arrowtooth flounder decreased compared to 2022 as have harbor seals in past years (London et al. 2021; in Ortiz and Zador, 2021). Overall, these trends suggest no large changes in predation pressure on AI pollock in the Bogoslof area. The increase of pollock in tufted puffin chick diets in 2024, along with the increased condition of small pollock might also signal an increased recruitment in Bogoslof pollock in 2024. The sustained high biomass of POP, which may be outcompeting pollock in other areas, may signal a return to conditions before POP was heavily fished by the foreign fleet during the 1960s and 70s.

Taken together, these indicators suggest that the current level of concern is level 1—no apparent environmental/ecosystem concerns.

Fishery Informed Stock Consideration

- None

Status determination

For Tier 5 stocks, status determinations on if overfished are unavailable. However, the stock is caught at levels well below overfishing rates (F_{limit} of 0.313).

Ecosystem Considerations

Effects on the Ecosystem and ecosystem effects on the fishery

There are no directed fisheries for this species. For a discussion of the contribution to discards and offal production or to bycatch of prohibited species, forage fish, HAPC biota, marine mammals, seabirds, sensitive species or non-target species from these fisheries, the reader should refer to the EBS pollock, Pacific cod, and rockfish assessments.

Data Gaps and Research Priorities

Genetic work should be developed further to distinguish this spawning aggregation from other studies. In particular, samples from the spawning grounds should be compared with nearby areas in other periods.

Other

Acknowledgments

We acknowledge the observer program and the NMFS regional office for collecting and compiling the bycatch data on pollock from this region. Also, we thank the crew for diligence in conducting the survey effort.

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Tables

Table 1B.1 Catch in tons from the Donut Hole and the Bogoslof Island area, 1977-2024.

Year	Donut Hole (t)	Bogoslof Island (t)	Total (t)
1977		11,500	11,500
1978		9,600	9,600
1979		16,100	16,100
1980		13,100	13,100
1981		22,600	22,600
1982		14,700	14,700
1983		21,500	21,500
1984	181,200	22,900	204,100
1985	363,400	13,700	377,100
1986	1,039,800	34,600	1,074,400
1987	1,326,300	377,436	1,703,736
1988	1,395,900	87,813	1,483,713
1989	1,447,600	36,073	1,483,673
1990	917,400	151,672	1,069,072
1991	293,400	316,038	609,438
1992	10,000	241	10,241
1993	1,957	886	2,843
1994		556	556
1995		334	334
1996		499	499
1997		163	163
1998		8	8
1999		29	29
2000		29	29
2001		258	258
2002		1,042	1,042
2003		24	24
2004		<1	<1
2005		<1	<1
2006		<1	<1
2007		<1	<1
2008		9	9
2009		73	73
2010		176	176
2011		173	173
2012		79	79
2013		57	57
2014		428	428
2015		733	733
2016		1,005	1,005
2017		186	186
2018		133	133
2019		8	8
2020		8	8
2021		9	9
2022		259	259
2023		125	125
2024		22	22
2025		63	63
2026		75*	75*

Table 1B.2. Estimated retained, discarded, and total pollock catch (t) from the Bogoslof region. Source: NMFS Regional office Blend database and Catch Accounting System. Source: NMFS AKRO BLEND/Catch Accounting System; 9/15/2026.

Year	Discarded	Retained	Total
1991	20,327	295,711	316,038
1992	240	1	241
1993	308	578	886
1994	11	545	556
1995	267	67	334
1996	7	492	499
1997	13	150	163
1998	3	5	8
1999	11	18	29
2000	20	10	29
2001	28	231	259
2002	12	1,031	1,043
2003	19	5	24
2004	< 1		< 1
2005	< 1	< 1	< 1
2006	< 1	< 1	< 1
2007	< 1	< 1	< 1
2008	< 1	9	9
2009	6	67	73
2010	53	124	177
2011	23	150	173
2012	0	71	71
2013	0	56	57
2014	54	373	427
2015	138	595	733
2016	7	997	1,004
2017	1	184	185
2018	2	11	14
2019	0	8	8
2020	2	7	9
2021	4	4	8
2022	26	232	259
2023	5	120	125
2024	0	21	22
2025	0	63	63
2026	0	89	89

Table 1B.3. ABC, OFL, and TAC by year for Bogoslof region pollock, 1992—2024.

Year	ABC	OFL	TAC	Catch
1992	25,000	25,000	1,000	241
1993	42,000	42,000	1,000	886
1994	31,750	31,750	1,000	556
1995	22,100	22,100	1,000	334
1996	121,000	121,000	1,000	499
1997	32,100	43,800	1,000	163
1998	6,410	8,750	1,000	8
1999	15,300	21,000	1,000	29
2000	22,300	30,400	1,000	29
2001	8,470	60,200	1,000	258
2002	4,310	46,400	100	1,042
2003	4,070	45,300	50	24
2004	2,570	39,600	50	0
2005	2,570	39,600	10	0
2006	5,500	50,600	10	0
2007	5,220	48,000	10	0
2008	7,970	58,400	10	9
2009	7,970	58,400	50	73
2010	156	22,000	50	176
2011	156	22,000	150	173
2012	16,500	22,000	500	71
2013	10,100	13,400	100	57
2014	10,059	13,413	75	427
2015	15,900	21,200	100	733
2016	23,850	31,906	500	1,005
2017	60,800	130,428	500	185
2018	60,800	130,428	450	14
2019	137,310	183,080	75	8
2020	137,310	183,080	75	8
2021	85,109	113,479	250	9
2022	85,109	113,479	250	259
2023	86,360	115,146	300	125
2024	86,360	115,146	250	22
2025	58,015	77,354	250	
2026	58,015	77,354	250	

Table 1B.4. Biomass (tons) of pollock as surveyed in the Bogoslof region, 1988-2024. For additional details see Lauffenburger et al. (In progress) and McKelvey and Levine (2023). The source of the relative errors specified for 1988, 1989, and 1999 are unclear.

Year	Survey biomass estimates (t)	Survey area (nmi^2)	Relative error
1988	2,395,737	NA	22%
1989	2,125,851	NA	22%
1990		No survey	
1991	1,289,006	8,411	12%
1992	940,198	8,794	20%
1993	635,405	7,743	9%
1994	490,077	6,412	12%
1995	1,104,118	7,781	11%
1996	682,277	7,898	20%
1997	392,402	8,321	14%
1998	492,396	8,796	19%
1999	475,311	NA	22%
2000	301,390	7,863	14%
2001	232,170	5,573	10%
2002	225,712	2,903	12%
2003	197,851	2,993	22%
2004		No survey	
2005	253,459	3,112	17%
2006	240,059	1,803	12%
2007	291,580	1,871	12%
2008		No survey	
2009	110,191	1,803	19%
2010		No survey	
2011		No survey	
2012	67,063	3,656	10%
2013		No survey	
2014	112,070	1,150	12%
2015		No survey	
2016	508,051	1,400	11%
2017		No survey	
2018	663,070	1,500	43%
2019		No survey	
2020	353,069	1,449	16%
2021		No survey	
2022		No survey	
2023		No survey	
2024	244,800	1,271	13%

Table 1B.5. Estimated survey numbers at age (millions) from the acoustic-trawl surveys used in the age-structured model for Bogoslof pollock (from McKelvey and Levine 2023). *Note, age data from the 2024 survey were unavailable at this time.*

	Age											
Year	4	5	6	7	8	9	10	11	12	13	14	15+
1988	-	27.94	326.71	246.84	163.68	350.07	1,200.88	287.82	287.33	201.95	89.24	53.89
1989	6.00	15.00	58.00	363.00	147.00	194.00	91.00	1,105.00	222.00	223.00	82.00	180.00
1991	2.00	12.00	46.00	213.00	93.00	160.00	44.00	92.00	60.00	373.00	119.00	202.00
1992	2.00	27.00	54.00	97.00	74.00	71.00	55.00	57.00	33.00	34.00	142.00	327.00
1993	33.00	17.00	44.00	46.00	48.00	42.00	28.00	51.00	25.00	27.00	42.00	209.00
1994	21.00	86.00	26.00	38.00	36.00	36.00	17.00	27.00	23.00	13.00	9.00	146.00
1995	6.00	75.00	278.00	105.00	68.00	80.00	53.00	54.00	19.00	59.00	32.00	248.00
1996	0.50	6.00	96.00	187.00	85.00	40.00	37.00	24.00	24.00	12.00	36.00	117.00
1997	0.50	4.00	16.00	55.00	88.00	38.00	28.00	16.00	16.00	13.00	7.00	57.00
1998	0.50	11.00	61.00	34.00	70.00	77.00	32.00	25.00	21.00	19.00	18.00	67.00
1999	2.00	5.00	29.00	77.00	34.00	50.00	75.00	29.00	27.00	25.00	16.00	48.00
2000	1.00	6.00	4.00	14.00	30.00	16.00	28.00	45.00	21.00	16.00	11.00	36.00
2001	1.00	14.00	12.00	10.00	10.00	14.00	12.00	18.00	31.00	13.00	7.00	27.00
2002	5.00	3.00	41.00	11.00	8.00	6.00	7.00	8.00	14.00	30.00	9.00	29.00
2003	8.00	6.00	7.00	25.00	11.00	4.00	5.00	4.00	10.00	8.00	26.00	21.00
2005	5.00	81.00	31.00	13.00	11.00	22.00	7.00	3.00	5.00	4.00	5.00	37.00
2006	4.00	55.00	104.00	18.00	6.00	6.00	9.00	3.00	2.00	4.00	5.00	25.00
2007	1.00	8.00	92.00	70.00	17.00	3.00	3.00	8.00	4.00	1.00	5.00	24.00
2009	-	1.00	1.00	7.00	23.00	26.00	8.00	1.00	1.00	1.00	0.44	4.78
2012	0.14	1.38	14.96	9.65	2.24	0.89	2.36	6.74	7.85	1.12	0.20	1.06
2014	1.00	34.00	31.00	11.00	14.00	7.00	3.00	0.50	1.00	5.00	4.00	2.5
2016	170.25	40.69	161.41	366.88	98.69	16.84	9.30	0.00	1.03	0.00	0.00	0.00
2018	0.00	58.93	152.37	80.74	381.08	247.39	27.42	13.77	2.67	0.00	0.00	0.00
2020	3.31	0.39	4.04	14.29	27.19	56.40	107.44	88.56	21.00	4.60	0.39	0.00
2024							NA					

Table 1B.6. Estimated survey biomass and observation error estimates based on the ***acoustic-trawl survey data*** for Bogoslof pollock.

Year	Survey	Survey LCI	Survey UCI
1988	2,395,737	1,564,527	3,668,556
1989	2,125,851	1,388,279	3,255,283
1991	1,289,006	1,019,708	1,629,425
1992	940,198	637,743	1,386,095
1993	635,405	532,840	757,712
1994	490,077	387,690	619,503
1995	1,104,118	890,563	1,368,883
1996	682,277	462,793	1,005,853
1997	392,402	298,635	515,610
1998	492,396	340,422	712,215
1999	475,311	310,400	727,837
2000	301,390	229,371	396,022
2001	232,170	190,940	282,302
2002	225,712	178,556	285,321
2003	197,851	129,206	302,966
2005	253,459	182,068	352,844
2006	240,059	189,906	303,457
2007	291,580	230,663	368,584
2009	110,191	76,182	159,383
2012	67,063	55,154	81,544
2014	112,070	88,656	141,667
2016	508,051	409,785	629,880
2018	663,070	295,769	1,486,504
2020	353,068	258,539	482,160
2024	244,800	189,941	315,504

Table 1B.7. Estimated survey biomass and uncertainties (LCI, UCI) based on the ***random-effects model*** for Bogoslof pollock.

Year	Biomass prediction	LCI	UCI
1988	2,314,812	1,575,451	3,401,156
1989	2,054,876	1,425,634	2,961,852
1990	1,621,575	887,638	2,962,364
1991	1,279,642	1,024,581	1,598,199
1992	928,872	672,852	1,282,307
1993	640,967	541,304	758,980
1994	527,945	423,506	658,140
1995	1,020,368	829,907	1,254,540
1996	673,369	487,244	930,593
1997	420,637	327,068	540,973
1998	472,352	344,464	647,721
1999	437,766	308,727	620,741
2000	305,033	237,928	391,063
2001	235,228	195,373	283,215
2002	225,016	180,880	279,923
2003	207,765	144,866	297,975
2004	227,267	123,322	418,828
2005	248,600	184,663	334,675
2006	243,292	195,626	302,571
2007	277,538	222,065	346,869
2008	179,841	98,848	327,196
2009	116,534	82,799	164,014
2010	97,795	49,027	195,075
2011	82,069	41,957	160,529
2012	68,872	56,854	83,430
2013	89,591	50,110	160,178
2014	116,543	92,953	146,119
2015	237,401	132,611	424,999
2016	483,593	391,641	597,135
2017	503,034	263,805	959,207
2018	523,257	293,193	933,845
2019	433,028	224,425	835,527
2020	358,357	266,059	482,675
2021	326,567	158,049	674,766
2022	297,596	131,393	674,035
2023	271,196	132,431	555,362
2024	247,137	192,331	317,561
2025	247,137	107,548	567,904
2026	247,137	78,283	780,207
2027	247,137	61,140	998,968
2028	247,137	49,580	1,231,878

Figures

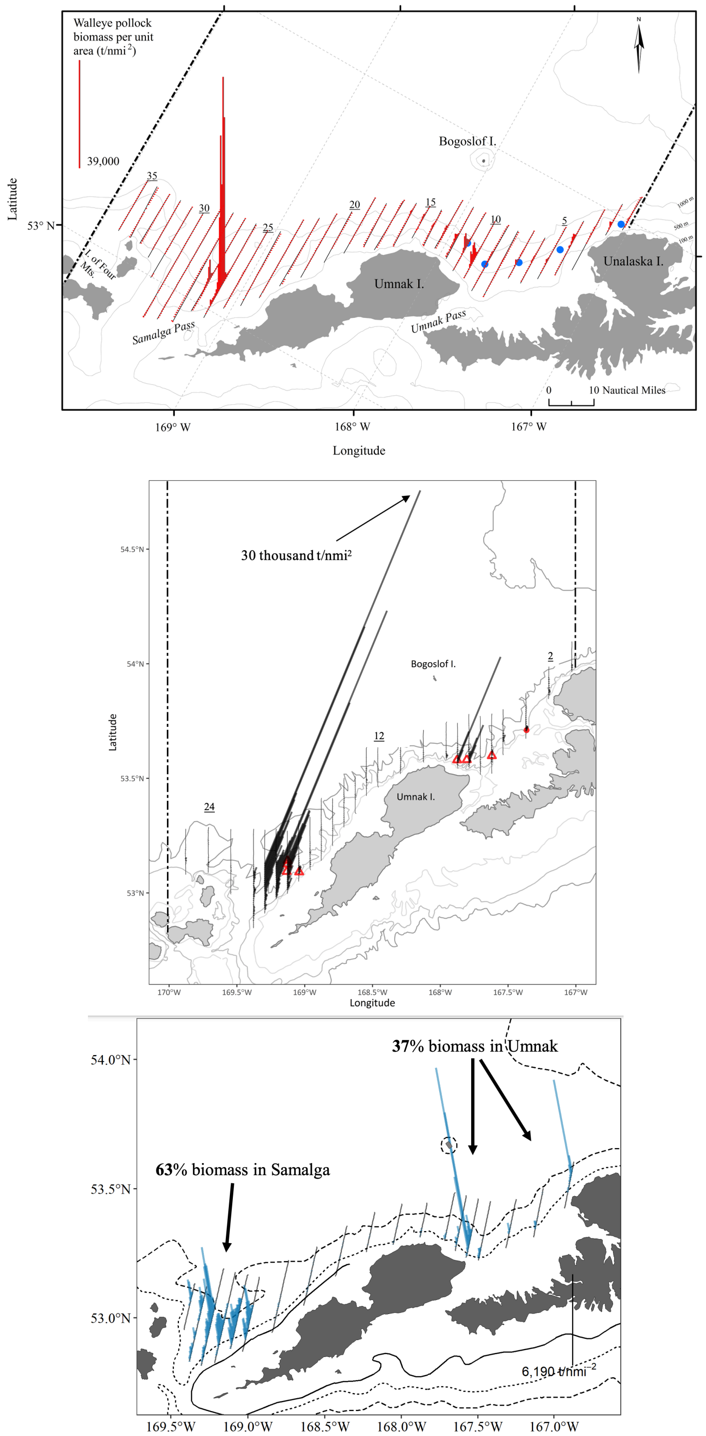

Figure 1B.1. Distribution of pollock biomass (t/nmi^2) observed along transects during the winter 2018 (top), 2020 (middle), and 2024 (bottom) acoustic-trawl survey. Transect numbers are underlined; trawl haul locations are indicated by circles or triangles.

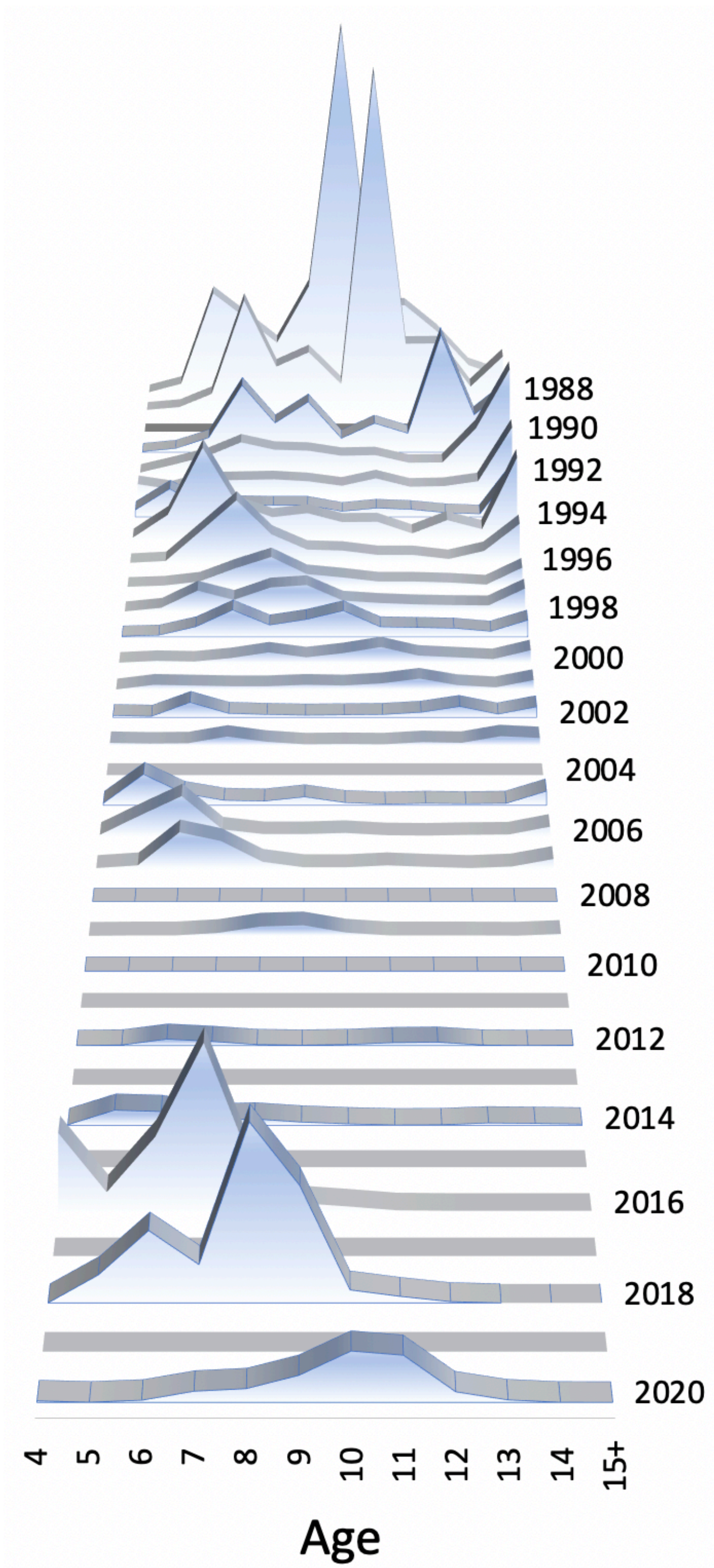

Figure 1B.2. Age composition estimates (numbers) during the winter surveys for Bogoslof region pollock, 1988-2020. *Note, age data from the 2024 survey were unavailable at this time.*

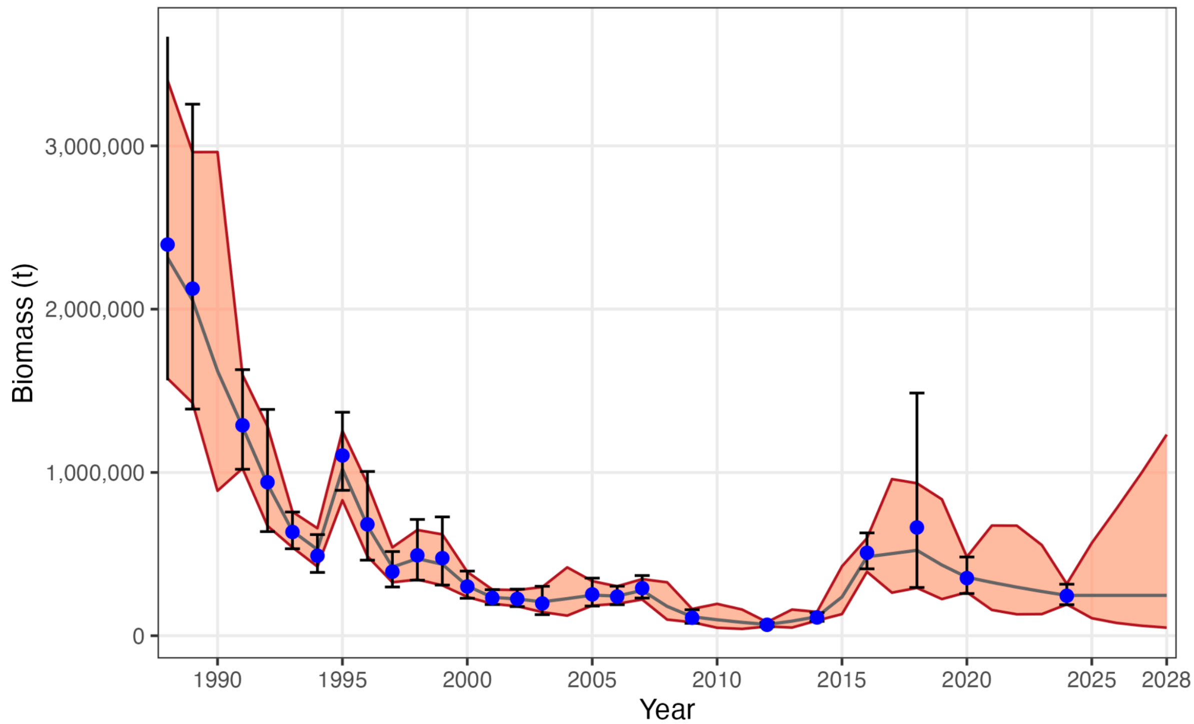

Figure 1B.3. Bogoslof Island pollock survey estimates fit to a process error model for averaging biomass. The shade represents the approximate 90% confidence interval from the model. Error bars and dots represent the data and estimated observation errors, grey line are model predictions.

Appendix 1. REMA script

The script and data below were used to accomplish the survey-trend model fit.

```
library(tidyverse)
library(scales)
library(patchwork)
library(rema)

bog<-prepare_rema_input(
  model_name = "Bogoslof",
  biomass_dat = read_csv("bog.csv"),
  end_year = 2028,
)
m <- fit_rema(bog)
(bog$data$biomass_obs)
names(bog$data)
names(bog$data$biomass_obs)

mo <- tidy_rema(rema_model = m)
names(mo$total_predicted_biomass)
names(mo)
obdf<-mo$biomass_by_strata[c(4,10,14:15)] |> filter(!is.na(obs))
obdf
predf <- mo$total_predicted_biomass
glimpse(predf)
glimpse(obdf)
p1<- ggplot( data=predf, aes(x=year,y=pred,ymin=pred_lci,ymax=pred_uci)) +
  geom_ribbon(  fill="coral",color="brown",alpha=.5 ) + geom_line(color="grey") +
  geom_errorbar(data=obdf,
                aes(x=year, y=obs, ymin = obs_lci, ymax = obs_uci),
                width=.6) +
  geom_point(data=obdf,
                aes(x=year, y=obs, ymin = obs_lci, ymax = obs_uci),
             size=2, color="blue")+
  ggthemes::theme_few() + scale_x_continuous(breaks = seq(1990, 2028, by = 5)) +
  scale_y_continuous(labels = scales::comma) + labs(x="Year",y="Biomass (t)")

write_csv(p1$data,"bog_out.csv")
write_csv(obdf,"Bog_in.csv"
```

File contents of "bog.csv":

strata	year	biomass	cv
"Bogoslof"	1988	2395737	0.22
"Bogoslof"	1989	2125851	0.22
"Bogoslof"	1991	1289006	0.12
"Bogoslof"	1992	940198	0.2
"Bogoslof"	1993	635405	0.09
"Bogoslof"	1994	490077	0.12
"Bogoslof"	1995	1104118	0.11
"Bogoslof"	1996	682277	0.2
"Bogoslof"	1997	392402	0.14
"Bogoslof"	1998	492396	0.19
"Bogoslof"	1999	475311	0.22
"Bogoslof"	2000	301390	0.14
"Bogoslof"	2001	232170	0.1
"Bogoslof"	2002	225712	0.12
"Bogoslof"	2003	197851	0.22
"Bogoslof"	2005	253459	0.17
"Bogoslof"	2006	240059	0.12
"Bogoslof"	2007	291580	0.12
"Bogoslof"	2009	110191	0.19
"Bogoslof"	2012	67063	0.1
"Bogoslof"	2014	112070	0.12
"Bogoslof"	2016	508051	0.11
"Bogoslof"	2018	663070	0.43
"Bogoslof"	2020	353068.4588	0.16
"Bogoslof"	2024	244800	0.13