Assessment of walleye pollock in the eastern Bering Sea

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1 Executive summary

The last full EBS pollock assessment was completed in 2024 (Ianelli et al. 2024). A catch report was prepared in 2025 (Alaska Fisheries Science Center, National Marine Fisheries Service 2025). Changes in this assessment were described relative to 2024.

This executive summary presents Model 26.0 (Rceattle), the base case model for this assessment and its Tier 3 harvest recommendations. Model 23.0 (ADMB), accepted in 2024, provided the comparison with the previous assessment.

1.1 Changes in assessment inputs

Catch, fishery age compositions, survey indices and age compositions, and weight-at-age schedules were updated since 2024. Section 2.1.1 described the years, sources and data treatments.

1.2 Changes in assessment methods

Model 26.0 implemented the age-structured assessment in Rceattle and used fixed weight-at-age schedules estimated by a separate random-effects model. In contrast, Model 23.0 estimated cohort and year effects on weight-at-age within the assessment. Uncertainty intervals for Model 26.0 exclude uncertainty in the separately estimated weight-at-age schedules. Section 2.1.2 described these changes from Model 23.0.

1.3 Summary of results

The estimated 2026 female spawning biomass (SSB) was 3.057 million t (2.489–3.754 million t, confidence interval).

The estimated spawning stock is therefore above MSST in 2026 and is not approaching an overfished condition (Section 9). All risk categories were Level 1, supporting maximum ABC (Section 8).

Model 26.0 advice from revised fits				
Quantity	As estimated or specified in 2024 for:		Primary baseline Model 26.0 for:	
	2025	2026	2027	2028
Natural mortality (annual rate, ages 3+)	0.300	0.300	0.300	0.300
Tier and sub-tier	3a	3a	3a	3a
Projected total biomass (ages 3+, t)	8,526,000	8,075,000	11,270,000	12,367,000
Projected female spawning biomass (t)	3,118,000	3,342,000	3,198,000	3,394,000
B100% (t)	5,902,000	5,902,000	6,158,000	6,158,000
B40% (t)	2,361,000	2,361,000	2,463,000	2,463,000
B35% (t)	2,066,000	2,066,000	2,155,000	2,155,000
F_OFL (annual rate)	0.513	0.513	0.429	0.429
Maximum F_ABC (annual rate)	0.394	0.394	0.335	0.335
Recommended F_ABC (annual rate)	0.394	0.394	0.335	0.335
OFL (t)	2,957,000	2,496,000	2,328,000	2,422,000
Maximum ABC (t)	2,417,000	2,036,000	1,896,000	1,968,000
Recommended ABC (t)	2,417,000	2,036,000	1,896,000	1,968,000

Historical source: December 2024 SAFE, Executive Summary, Tier 3 version, p. 4; B40% is printed in section 7.2, p. 35.

2027–2028 projections assume catch of 1,375,000 t in each year, mean 2023–2025 selectivity and fixed biological inputs. Total biomass covers ages 3+ at the start of the year. F_OFL and maximum F_ABC are the F35% and F40% rates under mean-one selectivity. Biomass and catch are rounded to the nearest 1,000 t.

Spawning biomass exceeds B40% in both years, placing the stock in Tier 3a. All risk categories are Level 1, supporting the maximum ABC. Recruitment is fixed at the fitted 1978–2023 mean; these projections show point estimates. Adopted catch specifications are reported separately.

Model 26.0 stock-status summary. The 2025–2026 columns report status for 2025 and 2026; historical determinations are from the 2024 assessment.				
Status	As determined in 2024 for:		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

Historical determinations are from the December 2024 EBS pollock SAFE, Executive Summary, p. 4.

Assessment conclusions are separate from final NMFS determinations. Updated 2025 catch (1,326,215.61 t) is below its 2,957,000-t OFL. For Model 26.0, 2026 spawning biomass (3.057 million t) and Alternative 7 biomass in 2028 (3.123 million t) both exceed B35% (2.155 million t), supporting the two 2026 "No" entries. Section 9 describes the status tests. Each two-year column pair reports overfishing for the earlier catch year and stock status for the later assessment year; cells outside those year-specific determinations are marked n/a. NMFS issues the final status determinations.

1.4 SSC and Plan Team requests

The September 2026 Plan Team requested the following work:

- Present Model 26.0 for management use and Model 23.0 for continuity; both were compared in this assessment.
- Examine age-1 BTS selectivity and the influence of BTS variability on retrospective patterns. Additional selectivity and data-influence tests were outside the scope of this assessment.
- Extend the simulation self-test and examine retrospective patterns in time-varying selectivity. The completed simulation experiment and its limitations were described in Section 6.3.1.
- Present retrospective results for Models 23.0 and 26.0 side by side. Matched runs were completed and compared; both models showed similar spawning-biomass retrospective patterns (Appendix A).
- Document age-composition weighting and evaluate residual patterns. Selected sample sizes, one-step-ahead residuals and Francis comparisons were presented in the assessment.

- Continue development of the Ecosystem and Socioeconomic Profile; we developed a draft using AI to compile and coordinate information from disparate sources (Appendix B).

Earlier SSC requests address model development, uncertainty, survey treatment and composition weighting. The individual requests and responses were presented in Appendix A.

2 Introduction

2.1 General

Walleye pollock (*Gadus chalcogrammus*; hereafter referred to as pollock) were broadly distributed throughout the North Pacific with the largest concentrations found in the eastern Bering Sea (EBS). Also known as Alaska pollock, this species continues to play important roles ecologically and economically.

2.1.1 Changes in assessment inputs

The 2026 assessment updates the accepted December 2024 assessment; the 2025 document was a catch report. Updated inputs included annual catches from 1991 onward, fishery age compositions for 2024–2025, BTS indices and age compositions for 2025–2026, the 2026 ATS index and provisional age composition, and AVO indices through 2026. Historical BTS estimates were also revised. Spatiotemporal survey estimation continued the approach adopted in 2024; the current biomass-index and abundance-at-age products used sdmTMB (Anderson et al. 2025) and tinyVAST (Thorson et al. 2025), respectively.

The 2024–2025 fishery age compositions used year-specific FT-NIRS-to-traditional-microscopic-age conversions, with likelihood sample sizes of 578 and 530. The provisional 2026 ATS age composition applied the BTS age–length key to expanded ATS length distributions that extend to 0.5 m above the seafloor. The full 2026 ATS age dataset was expected in 2027.

Fishery weight-at-age retained the fixed 1964–1990 schedule and annual observation means for 1991–2025. A separate random-effects model fitted to fishery and BTS weights through 2025 supplied 2026 predictions and 2027–2028 forecasts; its fit omitted the 2026 BTS observations. Population weights used BTS means through 2026, including revised historical estimates. Spawning weights at ages 3–15+ used fitted 2024–2025 A-season weights and a 2026 projection, retaining the previous ages 1–2 schedule. Section 4 and Appendix G and Appendix H described the data treatments and their uncertainty.

2.1.2 Changes in assessment methods

The main assessment-method change was the transition from the ADMB implementation of Model 23.0 to the Rceattle implementation of Model 26.0. Weight-at-age was estimated in a separate random-effects model and used as fixed schedules, whereas Model 23.0 estimated cohort and year effects within the assessment. Model 26.0 uncertainty therefore conditions on the estimated weights. Natural mortality and catchability assumptions retained the previous treatment. The configuration comparisons, diagnostics and sensitivities evaluate the effects of the data updates and implementation change (Section 5, Section 6 and Appendix I).

2.2 Review of Life History

In the EBS, pollock generally spawn during March–May and in relatively localized regions during specific periods (Bailey 2000). Generally spawning begins nearshore north of Unimak Island in March and April and later near the Pribilof Islands (Bacheler et al. (2010)). Females spawn in batches with up to 10 batches of eggs per female per year (during the peak spawning period). Eggs and larvae of EBS pollock are planktonic for a period of about 90 days and appear to be sensitive to environmental conditions. These conditions likely affect their dispersal into favorable areas (for subsequent separation from predators) and also affect general food requirements for over-wintering survival (Gann et al. (2016), Heintz et al. (2013), Hunt Jr. et al. (2011), Ciannelli et al. (2004)). Duffy-Anderson et al. (2016) provide a review of the early life history of EBS pollock.

Throughout their range juvenile pollock feed on a variety of planktonic crustaceans, including calanoid copepods and euphausiids. In the EBS shelf region, one-year-old pollock are found throughout the water column, but also commonly occur in the NMFS bottom trawl survey. Ages 2 and 3 year old pollock are rarely caught in summer bottom trawl survey gear and are more common in the midwater zone as detected by mid-water acoustic trawl surveys. Younger pollock are generally found in the more northern parts of the survey area and appear to move to the southeast as they aged (Buckley et al. (2009)). Euphausiids, principally *Thysanoessa inermis* and *T. raschii*, are among the most important prey items for pollock in the Bering Sea (Livingston (1991); Lang et al. (2000); Brodeur et al. (2002); Ciannelli et al. (2004); Lang et al. (2005)). Pollock diets become more piscivorous with age, and cannibalism has been commonly observed in this region. Buckley et al. (2016) showed that diet composition varies with pollock size and geographic area. Fish prey became more important with increasing pollock size, especially on the northwestern outer shelf.

2.3 Stock structure

Stock structure for EBS pollock was evaluated in Ianelli et al. (2015). In that review past work on genetics (e.g., Bailey et al. (1999), Canino et al. (2005)) provided insight on genetic differentiation. The investigation also compared synchrony in year-classes and growth patterns by region. Pollock samples from areas including Zhemchug Canyon, Japan, Prince William Sound, Bogoslof, Shelikof, and the northern Bering Sea were processed and results presented in Ianelli et al. (2021). Genetics research at the AFSC (Ianelli et al. 2023) indicated that genetic groups mostly aligned with current stock-management delineations. The Aleutian Islands and Bogoslof stocks showed subtle differentiation from the Gulf of Alaska stocks.

3 Fishery and management history

Directed foreign fishing began in 1964. US vessels entered the fishery in 1980, and it became fully domestic by 1988. The domestic observer program formally began in 1990; later monitoring developments included electronic monitoring on participating catcher vessels and biological sampling during offloading (Ianelli et al. 2024). The directed fishery primarily used pelagic trawl gear, with inshore, catcher/processor and mothership sectors. The historical catch and adopted harvest-limit series was continued through 2026 in Table 1.

Table 1 showed updated annual assessment catches of 1,311,261 t in 2024 and 1,326,216 t in 2025. Excluding Bogoslof (reporting area 518) accounted for the difference from the broader AKFIN Answers totals for these years: 22.76 t in 2024 and 63.43 t in 2025. The October 22 Alaska Region catch report listed 1,297,206 t for the Bering Sea subarea through October 17, 2026 (National Marine Fisheries Service Alaska Region 2026a). Table 1 showed the annual estimate of 1,312,505 t, rounded from the assessment input of 1,312,504.58 t.

For 2026, the adopted ABC and OFL were 2,036,000 and 2,496,000 t. The Bering Sea subarea TAC increased from 1,375,000 to 1,389,500 t after inseason reallocations. The August allocations included 139,400 t for Community Development Quota (CDQ) directed fishing and 46,000 t for incidental catch. Bering Sea catch totals included CDQ directed catch and incidental catch, including incidental CDQ catch. Bogoslof and Aleutian Islands catches were reported separately (National Marine Fisheries Service 2026a, 2026c).

The directed pollock allowance was allocated 45% to the A season (January 20–June 10) and 55% to the B season (June 10–November 1). The non-CDQ allowance was divided among the inshore (50%), catcher/processor (40%) and mothership (10%) sectors. In the Steller sea lion conservation area, each sector may catch up to 28% of its annual directed allowance before noon April 1 (National Marine Fisheries Service 2026a). The Winter Herring Savings Area (58–60° N, 172–175° W) was closed to directed pollock trawling, including CDQ fishing, from September 30, 2026, to March 1, 2027 (National Marine Fisheries Service 2026b).

Area restrictions, allocations, monitoring, and incentives were used to reduce prohibited species catch in the EBS pollock fishery. Table 2 summarized major management changes. Industry cooperatives used rolling-hotspot closures to move fishing away from areas of high salmon bycatch. These voluntary programs began for chum salmon in 2001 and Chinook salmon in 2002. Amendment 84, implemented in 2007, allowed participating vessels to use approved intercooperative bycatch-reduction agreements in place of specified fixed salmon-area closures (National Marine Fisheries Service 2007, 2023).

Amendment 91 established Chinook salmon bycatch limits and incentives to reduce bycatch while allowing the pollock TAC to be harvested. Implemented in the 2011 fishery, it combined a 60,000-fish annual prohibited species catch (PSC) limit with incentive plan agreements and a 47,591-fish performance standard. A sector that exceeds its share of the standard in three of seven consecutive years receives a lower allocation in all subsequent years. Amendment 110, implemented in 2016, strengthened Chinook and chum avoidance and tied Chinook limits to salmon returns in western Alaska. When the State of Alaska's index for the Kuskokwim, Unalakleet and Upper Yukon systems was 250,000 fish or less, the following year's PSC limit and performance standard fall to 45,000 and 33,318 fish, respectively. The index first applied to the 2017 fishery (National Marine Fisheries Service 2010, 2016).

NOAA Fisheries' North Pacific Groundfish and Halibut Observer Program provided the salmon counts used to monitor PSC limits in the Bering Sea pollock fishery. Regulations required vessels to retain salmon until observers can count them at at-sea processors or during offloading. Catcher vessels carry an observer or an electronic monitoring (EM) system, and shoreside observers count salmon in deliveries (National Marine Fisheries Service Alaska Regional Office 2025). The Alaska Fisheries Science Center's Genetics Program analyzes tissue samples collected by observers to identify the salmon stocks caught as bycatch. These stock-composition estimates helped assess impacts on salmon populations and guide avoidance measures (NOAA Fisheries salmon bycatch monitoring). Genetic sampling of the 2015 Chinook bycatch was described by (Guthrie et al. 2017).

3.1 Fishery conditions

The A-season fishery targeted pre-spawning pollock and supported roe production. Fishing had historically concentrated north and west of Unimak Island and along the shelf toward the Pribilof Islands, with access affected by ice, weather and fish distribution. The summer–fall B-season fishery followed changes in fish availability across the shelf. Salmon-avoidance measures and vessel choices also influenced where fishing occurred. Available observer data suggested good fishing conditions in the 2026 A season; later in the B season fishing moved farther north and pollock of desirable sizes were less available.

The weekly reporting-area data in Table 3 sum to 1,267,543 t through October 17, 2026: 604,041 t in the A season and 663,501 t in the B season. This series provided the seasonal and area split used here. The Alaska Region Catch Accounting System reported 1,297,206 t through the same date, 29,663 t more than the reporting-area series. The difference between the two reported totals remains unresolved.

The assessment used an estimated full-year 2026 catch of 1,312,505 t, including 8,997 t discarded (0.7%; Table 4). This estimate is separate from either October 17 catch-to-date total.

Nominal pollock catch per tow-hour was generally higher in the A season than in the B season, with A-season peaks in 2019 and 2023 (Figure 1). Species-specific patterns differ: A-season Chinook rates peaked in 2006–2007, whereas the chum salmon series had its largest B-season rates in 2005 and 2017. Herring and sablefish each had a pronounced peak in 2020, in the A and B seasons respectively. These were nominal rates for available pollock-dominated EBS hauls, calculated from summed catch and valid tow-hours with panel-specific units.

Estimated catch numbers for both sexes decline to a trough in 2009, rise again during the 2010s and reach their largest annual totals in 2021 (Figure 2). B-season numbers generally exceed A-season numbers within each sex, and female annual catch numbers decline from 1,075.8 million fish in 2023 to 916.7 million in 2025, while male catch numbers decline from 1,218.9 million to 952.6 million. Catch numbers were expressed in thousands of fish.

The cumulative monthly depiction showed whether A-season fishing activity shifted toward earlier or later months within the year. Cumulative catch through April stays near 40% of annual specified TAC over much of 2000–2017 and near 44% from 2018 onward (Figure 3). In 2026 the cumulative shares were 6.69%, 23.14%, 39.42% and 43.72% at the end of January, February, March and April, respectively. Monthly totals were based on weekly catch reports and the specified annual TAC before quota transfers. These observations cover the first four months of the year; the A season continued through June 10.

As expected, A-season roe production exceeded B-season production throughout the 2000–2026 series (Figure 4). A-season production peaks in 2006 and again in 2019, declines through 2021 and rose from 2022 to 2026. The latest A-season value was 19,092.9 t of roe. The 2025 B-season total was 1,796 t; the 2026 total of 406 t covers June–October and represented a partial-season estimate. The broader BSAI fishery's catch, vessel participation and market context were summarized in the ESP socioeconomic tables.

3.1.1 Recent spatial catch patterns

The seasonal maps compared 2024–2026 using the available catch-location records (Figure 5; Figure 6). A-season maps cover January 20–June 9. B-season maps used June 10–September 18 in every year, matching the 2026 data cutoff. Vertical bar heights showed catch tons. The rotated, elevated view separated neighboring columns. Each season used a fixed vertical scale across its three years, with a 10,000-t reference column in each panel. The vertical scales differ between seasons.

A-season fishing remained concentrated on the southeastern shelf, with more catch extending westward in 2025. The share of available observed catch west of 170°W increased from 15% in 2024 to 39% in 2025, then returned to 15% in 2026. The catch-weighted mean latitude changed from 56.07°N to 56.43°N and 56.19°N, respectively. The 2026 pattern therefore shifted back toward the southeastern grounds relative to 2025.

The B-season distribution extended farther north and west in 2025–2026 than in 2024. The share of catch north of 58°N increased from 54% in 2024 to 75% in 2025 and 79% in 2026. The share west of 170°W rose from 76% to about 92% in both later years. Catch-weighted mean latitude was 57.66°N in 2024, 58.56°N in 2025 and 58.52°N in 2026. Thus, the recent northward shift persisted in 2026, while the catch-weighted mean longitude moved eastward relative to 2025, from 174.65°W to 173.26°W.

3.1.2 Fleet dispersion

Fleet dispersion described how widely separated fishing locations were within a day (Figure 7). Following the 2024 assessment, we calculated the great-circle distance between each unique pair of tows made on the same day, separately for catcher-processors and observed catcher vessels. Distance sums and pair counts were then pooled by year and season. Days with more tow pairs contribute more to the seasonal average. Larger values indicate a more dispersed pattern of observed fishing locations; smaller values indicated greater concentration.

A-season dispersion increased from 47.8 nautical miles in 2024 to 68.8 in 2025, then declined to 36.5 in 2026. This change was consistent with the 2025 westward extension and the more concentrated southeastern pattern in 2026 shown in the catch maps. For B-season records through September 18 in each year, dispersion declined from 78.5 nautical miles in 2024 to 67.8 in 2025 and 56.5 in 2026. Thus, the observed B-season fishing locations became more concentrated even as much of the catch remained farther north than in 2024. A shift in fishing location and a change in spatial spread described different aspects of fleet behavior.

Changes in the mix of observed vessels, bycatch avoidance and fishing conditions can influence this index, so it should be interpreted together with catch distribution and catch rates.

3.1.3 Seasonal changes in fish size

Mean fish weight was the pollock weight divided by the corresponding fish count. Weight-bin distributions showed how the sizes encountered by the fishery changed over time (Figure 8).

The dominant A-season mean-weight bin increased from 550 g in 2023 to 600 g in 2024–2025 and 700 g in 2026. For the B season, the dominant bin increased from 450 g in 2023 to 550 g in 2024 and 700 g in 2025, then shifted to 450 g in the available 2026 records. This recent contrast was consistent with the reported difficulty finding larger pollock during the 2026 B season. Changes in these distributions can reflect growth, recruitment, the areas fished and the mixture of vessels represented in the observations.

Weekly displays showed how size patterns developed within the A-season and B-season windows (Figure 9; Figure 10).

3.2 Bycatch

Pacific ocean perch (3,995 t) and Pacific cod (3,315 t) were the largest bycatch categories in the pollock fishery in 2025, followed by flathead sole (1,813 t). Preliminary 2026 estimates through October 24 were 2,412 t of Pacific ocean perch, 6,549 t of Pacific cod, and 3,367 t of flathead sole. See Table 6.

Pollock catch in identified non-pollock fisheries declined from 46,996 t in 2024 to 29,263 t in 2025. Rock sole, yellowfin sole, and Pacific cod fisheries accounted for 10,776 t, 8,710 t, and 6,427 t, respectively, in 2025. The preliminary 2026 total through October 31 was 34,729 t; the different cutoffs and partial-year coverage qualify comparisons with the other bycatch tables. See Table 7.

Prohibited-species bycatch in the midwater pollock fishery was summarized in Table 8. Chinook catches increased from 8,034 fish in 2024 to 19,702 in 2025, and non-Chinook catches increased from 34,888 to 142,809 fish. Halibut mortality rose from 22 to 50 t. Preliminary 2026 catches through October 24 were 14,503 Chinook, 145,788 non-Chinook, and 43 t of halibut mortality. The 2024 assessment also included trips classified as bottom pollock, where pollock was the main species in the catch, outside the main directed pollock fishery; the current table was restricted to the midwater pollock trip target.

Jellyfish dominated the selected nontarget-species catch by weight. Estimated jellyfish catch declined from 4,402 t in 2024 to 1,769 t in 2025. Miscellaneous fish contributed 99 t in 2025, with smaller catches in each of the other displayed groups. Preliminary jellyfish catch through October 24, 2026 was 4,418 t. These catch estimates described fishery encounters and should be interpreted with fishing effort, distribution, and reporting coverage. See Table 9.

4. Assessment data

Fishery catch data begin in 1964, whereas the BTS began in 1982 and the ATS in 1994 for the purposes of this assessment (see the table below). Fishery age compositions were available through 2025. The 2026 BTS age estimates and provisional ATS age compositions were described separately below.

Source	Type	Years
Fishery	Catch biomass	1964-2026
Fishery	Catch age composition	1964–2025
Fishery	Historical trawl CPUE	1965–1976
Bottom-trawl survey	Biomass index and age-specific proportions	1982–2019, 2021–2026
Acoustic-trawl survey	Biomass index and age-specific proportions	1994, 1996, 1997, 1999, 2000, 2002, 2004, 2006–2010, 2012, 2014, 2016, 2018, 2020, 2022, 2024, 2026
Acoustic vessels of opportunity (AVO)	Relative backscatter index	2006–2019, 2021–2026

4.1 Fishery data

4.1.1 Catch

Annual catch rose from about 0.175 million t in 1964 to the series maximum of 1.875 million t in 1972 (Figure 11). Catch subsequently fluctuated, fell to 0.811 and 0.810 million t in 2009 and 2010, respectively, and recovered to 1.326 million t in 2025. The 2026 records total 1.268 million t through October 17 and represented a partial year. Records before 1991 provided annual totals; later records distinguished the A-season and northwest and southeast B-season catches.

The annual assessment catch included retained and discarded commercial pollock across gears and targets in the Bering Sea, including CDQ catches but excluding the separately reported Bogoslof and Aleutian Islands catches. The catch update used the catch estimates for 1991–2026, with pre-1991 model inputs retained. The revised totals were 1,311,260.74 t in 2024, 1,326,215.61 t in 2025 and 1,312,504.58 t in 2026. Noncommercial removals remain separately documented in Appendix C.

4.1.2 Age compositions

Fishery catch-at-age estimates for 1964–2025 were summarized in Table 5. Ages 15 and older were pooled as 15+. Where complete annual catch numbers were unavailable, we calculated numbers at age from the assessment proportions, annual fishery weight-at-age and catch biomass.

The fishery catch-at-age history for 1991–2025 (Figure 12) showed strong year classes progressing through successive ages. The 2018 year class was highlighted from age 2 in 2020 through age 7 in 2025. It accounted for the largest catch numbers at age in 2023–2025, shifting from age 5 to age 7 over those years. The display pooled ages 10 and older; the assessment retained ages 1–14 and 15+.

We estimated fishery age compositions from biological samples collected by at-sea observers and during shoreside offloading. The sampling records included fish measured for length frequencies, paired weight–length measurements, and age estimates (Table 10; Table 11; Table 12). The processing kept recent unsexed fish separate rather than assigning them to males or females. Within each sex and sampling stratum, we expand length frequencies to the associated catch biomass using mean weight at length. Age–length keys allocated the expanded numbers to ages; we then sum the numbers across strata and sexes and normalize them to give annual proportions (Kimura 1989; Barbeaux et al. 2005; Ianelli et al. 2024). Earlier assessments provided the pre-1991 age compositions. For the 2026 assessment update, the 2024–2025 fishery samples were processed in strata defined as January–May across Bering Sea areas, followed by June–December split into northwest (NMFS reporting areas 520 and above) and southeast (areas below 520).

A hierarchical bootstrap resampled sampling units within fishery strata and length and age observations within those units, preserving their sampling links. Its composition precision estimates informed the selected likelihood sample sizes: 443, 578 and 530 for 2023, 2024 and 2025, respectively. They represented effective information for fitting the annual proportions, rather than numbers of fish measured or aged (Section 4.3.1). The model fitted annual sex-combined proportions at ages 1–14 and 15+. Fishery age observations ended in 2025.

The 2024–2025 age-estimate data were from pelagic trawl fisheries. For 2025, ages predicted by Fourier-transform near-infrared spectroscopy (FT-NIRS) of otoliths were converted to an independent traditional microscopic-ageing (TMA) basis using 668 paired estimates. The FT-NIRS prediction model was identified as a00-d3 (Appendix G). Within each FT-NIRS age, the paired observations define the proportions assigned to each tester age. These probabilities redistribute the catch-expanded numbers among ages while preserving their total. No paired tester observations were available for fish assigned FT-NIRS age 13, so the conversion probabilities for this age were the averages of those for FT-NIRS ages 12 and 14. The likelihood used the selected input sample size of 530. Uncertainty in the conversion key and the age-13 interpolation was additional to the sampling uncertainty represented by that input weight.

The 2024 fishery age composition was converted to the independent TMA basis using 693 paired reader–tester observations. The conversion for age 13 used age offsets from paired observations at ages 9–12; Appendix G described this year-specific treatment.

4.1.3 Weight-at-age

Mean weight-at-age connected the assessment's estimates of fish numbers to catch biomass and harvest projections. Seasonal and spatial differences in fish condition and fishery distribution affect these means. Fishery sampling was therefore organized by season and area, with stratum estimates combined using the corresponding catch information. Completed-year observations provided the basis for estimating weights for the observation year and forecasting the weights needed for future catches.

For recent fishery samples, Fourier-transform near-infrared spectroscopy (FT-NIR) of otoliths provided predicted ages. Year-specific paired FT-NIR and traditional morphological ageing (TMA) observations align these predictions with the TMA age basis. Estimated abundance and biomass in each FT-NIR age bin were redistributed using the same conditional tester-age key. Mean weight at a target age was then converted biomass divided by converted abundance. For the 15+ group, biomass and abundance were pooled before

taking their ratio. The conversion retained each source bin's mean weight when allocating it among tester ages. Its reported uncertainty conditions on the selected key; the ages with paired observations and the approved tail-allocation rules were documented in Appendix G.

The weight-model approach described in Section 14.5 of the 2024 assessment (Ianelli et al. 2024) linked growth within cohorts to annual changes in condition. A smooth mean age pattern defined the typical weight increments. A cohort's weight in the previous year provided the starting point for the next age, while annual random effects allow variation in starting weight and growth. Observed mean weights and their variances informed this model, separating sampling precision from variability among years. The fitted model supplied predictions for missing observations and forecasts for future years. Model 26.0 used the resulting weight schedules as fixed biological inputs.

The annual fishery weights in Table 28 retained the historical observational inputs through 2025, with fitted values for missing 2025 ages 13 and 14. The 2026 predictions and 2027–2028 forecasts used the standalone WtAgeRE fit. Ages 1–2 retained the 2024 inputs, and the terminal age was 15+. The fixed 1964–1990 schedule matched the historical fishery weight-at-age series in Ianelli et al. (2001), Table 1.9.

Cohort growth and annual changes in condition linked observed weights to the schedules used for catch and spawning projections. Observed fishery and BTS weights and the selected fishery-scale estimates for 2014–2028 were shown in Figure 24. The forecast followed the 2026 age-3 cohort from 0.368 kg to 0.482 kg at age 4 in 2027 and 0.601 kg at age 5 in 2028. The 2026 biological weight schedules were compared with the selected 2027 catch and spawning projection weights in Figure 36.

4.2 Survey data

4.2.1 Bottom-trawl survey

The AFSC bottom-trawl survey provided indices of pollock abundance and population age structure, complementing the acoustic-trawl survey's sampling of the midwater component. Historical and recent sampling effort was summarized in Table 13. Annual surveys began in 1979, with standardized gear and methods from 1982 (Ianelli et al. 2024). The 2025 and 2026 observations extend the 42 survey years available for the 2024 assessment to 44 observed years during 1982–2026. The survey was absent in 2020; that year remained a gap in the observation series. The biomass estimates and assessment CVs were listed in Table 14. Availability to bottom-trawl gear varied with age and vertical distribution. Ages 2–3 were often relatively scarce in the catches because juveniles tend to occupy the water column (Monnahan et al. 2021; O'Leary et al. 2022).

Bottom temperature appears to influence the distribution of pollock available to the bottom-trawl survey. The AKsf survey-mapping example (Ianelli 2026) places annual CPUE distributions alongside the 0, 2 and 4 °C bottom-temperature contours for 2018, 2019 and 2021–2026 (Figure 13). High CPUE was concentrated along parts of the western and southern shelf, with several dense patches near the 2 °C contour in 2022, 2024 and 2026. The more extensive warm-water conditions in 2018–2019 contrast with the broader areas of cold bottom water in later panels, while the locations and extent of the pollock concentrations also change.

These patterns suggested that temperature helped structure near-bottom habitat and survey availability, with concentrations often near the margins of colder shelf water. Depth, prey, age composition and vertical movements can also contribute to the pattern. The maps showed spatial associations between survey distributions and temperature. Other environmental and biological factors may also contribute. They used locally interpolated, density-dependent-corrected CPUE within survey coverage. These maps illustrate survey distributions; they were not the biomass index fitted in the assessment. The example does not identify the version of its density-dependent correction.

The standard EBS survey expanded northwest in 1987. Sampling in the separate NBS region varied among years, while pollock distribution shifted between regions. Model-based estimates integrated station observations, including zero catches, across the EBS and NBS and account for spatial and temporal variation (O'Leary et al. 2020). The biomass index used sdmTMB and abundance at age used tinyVAST, replacing the earlier VAST implementation. The complete selected abundance-at-age series incorporated historical revisions

as well as the recent observations (Table 15). The regional coverage, model specifications, annual covariance and remaining production-source qualifications were described in Appendix H. Estimates for unsampled years were model predictions.

The BTS length distributions showed pronounced changes in the sizes represented in the survey (Figure 14). Peaks among small fish and their progression toward larger lengths illustrate cohort growth, while the relative contribution of small and large fish varied among years. These distributions complemented the age compositions by showing changes in size directly.

The BTS age compositions showed changes in the ages represented in the survey and the progression of cohorts through time (Figure 15). Highlighted bars follow the 1992, 2012 and 2018 year classes through successive ages. The blank 2020 row marks the gap when the survey was absent.

The age compositions combined traditional age readings and FT-NIRS estimates. We converted the 2026 FT-NIRS estimates to traditional ages using 307 screened paired readings (Appendix G). The conversion preserved total survey abundance and pooled ages 15 and older into the 15+ group.

Spatiotemporal estimation of BTS weight-at-age, adopted in 2022, replaces the earlier conversion of mean length to weight (Indivero et al. 2023). The full BTS-derived weight schedules used for population biomass were presented in Table 16; Section 4.3 summarized the fishery and spawning weight schedules and fixed biological assumptions. We applied the screened 2026 age key consistently to BTS weight-at-age means and their delta-method standard errors, retaining the joint covariance treatment. We used the same key for the provisional ATS abundance and biomass-derived weights, including the weights used to predict the 2026 AVO index. We refitted the standalone random-effects weight-at-age model with the revised BTS means and standard errors under the existing equations, likelihood and source-covariance treatment, preserving fishery observations and the 2025 conversion key. These uncertainty calculations exclude empirical age-key uncertainty. The conversion, weight calculations and assessment use were described in Appendix G.

The missing 2020 survey and subsequent 2021 observation affect interpretation of the time series. Retrospective comparisons described changes in population estimates as observations accumulated (Section 6.1.5).

4.2.2 Acoustic-trawl survey

The provisional 2026 core-shelf ATS age estimates applied the BTS age–length key (ALK) to expanded ATS length distributions that extend to 0.5 m above the seafloor. The full 2026 ATS age dataset was expected in 2027.

Acoustic-trawl surveys (ATS) were typically conducted every other year and estimate the off-bottom component of the pollock stock, complementing the annual BTS index of near-bottom pollock. Historical and acoustic-trawl sampling effort was summarized in Table 17.

Estimated pollock biomass for the EBS shelf averaged about 3.202 million t since 1994, when the revised time series began (Table 18). The revised estimates included the water column down to 0.5 m above the seafloor; the historical midwater index extended to 3 m above the seafloor. Low recruitment during the relatively warm early 2000s was subsequently reflected in lower survey biomass during the cold period of 2006–2012 (Honkalehto and McCarthy 2015). With growth of the strong 2012 year class, biomass exceeded 4 million t in 2014 and 2016, another warm period. The 2026 regional estimates included the Steller sea lion conservation area (SCA) and the Northern Extension (Table 19). The SCA was a traditionally reported subset of the survey used to evaluate pollock abundance in areas considered sensitive to Steller sea lions.

Historical abundance at age

The historical series showed strong pulses of age-1 fish in 1997, 2007, 2009, 2014 and 2024 (Table 20). The provisional 2026 estimates were largest at ages 2 and 3: 3.73 and 3.96 billion fish, respectively, compared with 2.03 billion age-1 fish.

The ATS age compositions showed pulses of young fish and the progression of cohorts through successive surveys (Figure 16). The highlighted 2018 year class appears at age 4 in 2022, age 6 in 2024 and age 8 in 2026. Ages 2 and 3 dominated the provisional 2026 composition. Blank years represented gaps in the age-composition series.

2026 survey design and results

The 2026 ATS covered the EBS shelf from approximately 60 m depth to the shelf break between 30 May and 4 August. Core-area transects were spaced at 20 nmi; selected transects extended into the Northern Extension at 40 nmi spacing. Survey timing was similar to 2022, with a longer duration in 2026 because of special projects. The area east of 170° W was surveyed from 30 May to 25 June, and the area west of 170° W from 26 June to 4 August.

The 2026 core-area estimate was 12.7 billion fish and 3.682 million t of biomass (Table 21). Biomass increased by 28% relative to the 2024 estimate of 2.875 million t (11.4 billion fish). The 2026 biomass estimate was 4% below the 2022 estimate of 3.834 million t (9.67 billion fish) and 16% above the 1994–2024 survey mean of 3.176 million t.

We estimated provisional 2026 ATS age compositions by applying the FT-NIRS-based BTS age–length key to ATS abundance in the length bins covered by the key (Appendix G). Midwater pollock were concentrated between the 100 m contour and the shelf break, particularly northwest of Unimak Pass and between Zhemchug and Pervenets canyons. Length distributions suggested that presumed age-1 fish (<20 cm fork length) formed dense schools on the northwestern shelf, with smaller concentrations east of the Pribilof Islands and near Unimak Pass. Presumed age-3+ fish accounted for most biomass, with 74% of their biomass west of 170° W.

Provisional abundance at age from the 2026 BTS keys

We estimated provisional ages by matching ATS lengths to the 2026 BTS FT-NIRS age–length key, then converting those ages to traditional ages using paired readings. Ages 2 and 3 dominated the resulting distribution (Table 22; Figure 17). Fish beyond the key's length range represented less than 0.001% of core-area abundance. The technical appendix described the keys, calibration and allocation assumptions.

Biomass and mean weight-at-age

We applied the same age keys to biomass and divided biomass by abundance to estimate mean weights at age. The resulting mean weights were presented in Table 23 and Figure 18.

Survey uncertainty and assessment treatment

We estimated ATS biomass sampling error with the established one-dimensional geostatistical method, which accounted for spatial patterns along survey transects (Petitgas 1993; Walline 2007; Williamson and Traynor 1996). The 2026 sampling error was 3.4% of estimated biomass, compared with a historical average of 4.4%. Complete core-area coverage at 20 nmi transect spacing likely contributed to the lower error.

For assessment use, we increased the survey errors to allow for additional uncertainty, including target strength and trawl selectivity. We scaled the assessment coefficients of variation to average 20% over 1994–2026 and assigned a value of 45% to 2000 (Table 18).

Spatial and historical patterns

The ATS index used in the assessment covered the water column down to 0.5 m above the seafloor, while the historical heatmap showed biomass from near the surface to 3 m above the bottom (Figure 19). Biomass was low during 2008–2012, especially in 2008–2009, and increased in 2014–2016. The maps also showed shifts in the strength and location of concentrations along the western and southern shelf. The Northern Extension contained an additional 0.078 million t beyond the 3.682 million t core-area estimate (Table 19).

Biomass time series and observation errors

The series contained 20 survey estimates between 1994 and 2026. We plotted approximate 95% sampling intervals around each biomass estimate using the survey standard errors (Figure 20; Table 18). Gaps in the annual series marked years without a survey estimate. These intervals described survey sampling variability;

the assessment used larger errors to allow for additional uncertainty.

Biomass varied strongly along the survey tracks. Concentrations were highest on parts of the western and southern shelf and generally lower in the far north (Figure 21). The map included the Northern Extension and showed GMT contours of mean biomass per sampling interval (tons per EDSU). The map used approximately 10-nautical-mile cell means, with the smoothed surface displayed within 30 km of sampled cell centers.

4.2.3 Acoustic vessel-of-opportunity index

The acoustic vessel-of-opportunity (AVO) index provided a relative-abundance observation for age-1 and older midwater pollock within the U.S. EEZ (Honkalehto et al. 2011; Lauffenburger et al. 2025). The 2026 observations were collected at 38 kHz from 29 May to 5 August aboard the summer bottom-trawl charter vessels. The index covers the water column from 3 m above the seabed to 16 m below the surface.

Annual index

Relative AVO backscatter was lowest at 0.299 in 2009 and highest at 1.55 in 2015 (Table 25; Figure 22). It was 0.863 in 2024, 1.07 in 2025 and 1.12 in 2026, with sampling CVs of 2.72%, 5.26% and 4.55%, respectively. The 2025 and 2026 sampling confidence intervals overlap. The display series covers 2009–2026, excluding 2020, when no bottom-trawl survey took place. The relative AVO index divides each annual area-integrated estimate by the mean of the 17 estimates, producing a series with a mean of one. The table also showed total pollock backscatter, in millions of square meters, with sampling errors and scaled confidence intervals. This was an acoustic backscattering cross section, rather than geographic area (Lauffenburger et al. 2025).

For the nine paired survey years in the 2009–2026 display period, AVO total pollock backscatter and revised ATS biomass had a squared Pearson correlation of 0.89. This association was descriptive: AVO covers 3 m above the seabed to 16 m below the surface, while the revised ATS index extended from 0.5 m above the seabed to 16 m below the surface. The vertical domains differed. The 2026 AVO report gave 0.90 using an ATS 2026 estimate of 3.62 million t; the comparison here used the revised ATS estimate of 3.682 million t (AFSC-RACE MACE 2026).

Spatial distribution and sampling coverage

Strong backscatter occurred along western EBS tracks in the recent maps, with weaker returns interspersed along central and southeastern tracks (Figure 23). The annual panels used a common map extent and color scale while showing differences in track coverage.

The longer series also contained alternating strong and weak returns along the sampled shelf (Figure 23). The year 2020 was omitted because AVO observations were unavailable. Survey coverage and processing vary among years. Inferences about population redistribution require comparable sampling and integration across years.

The number of observed survey intervals ranges from 5,557 in 2009 to 12,229 in 2024 (Table 26). The percentage of sampling intervals with zero pollock backscatter fell from 56.3% in 2009 to 7.8% in 2015 and varied thereafter. It was 14.9%, 5.0% and 14.2% in 2024–2026, respectively.

The maps summarize observed pollock backscatter in approximately 20-nautical-mile cells, including zeros. GMT gridding and contours showed the mean backscatter in m^2 nmi^{-2} on a common color scale. Surfaces extend up to 45 km from sampled cell centers; more distant areas remain masked. The annual AVO index integrated backscatter over the survey area and was reported in million m^2. Survey coverage and processing vary among years, so comparisons of spatial patterns depend on comparable sampling.

Assessment use and observation uncertainty

The AVO assessment index was 2.01 million m^2 in 2024, 2.50 million m^2 in 2025 and 2.60 million m^2 in 2026 (Table 27). Its 20 observations cover 2006–2026, excluding 2020. The assessment used the newly processed 2011 and 2013 estimates and their sampling errors (AFSC-RACE MACE 2026). The 2006–2008 estimates retained the legacy rescaling described in the 2024 assessment (Ianelli et al. 2024).

Survey sampling errors described one-dimensional geostatistical variability. The assessment applied additional observation-error inflation to an arithmetic mean CV of 23% across its 20 observations. The two newly processed years used the existing modern-year error inflation rule, followed by common recalibration of all 20 CVs to that mean. Assessment errors differ from sampling errors and from the ATS mean assessment CV of 20%.

For the Normal index likelihood, arithmetic observation SEs equal the assessment index multiplied by its selected CV. For the display series, let I_t denote the original index, $\bar{I}$ its 17-year mean and $R_t = I_t/\bar{I}$. The same constant rescales its index, SEs and confidence limits, leaving the CV unchanged:

$$\mathrm{SE}(R_t) = R_t\,\mathrm{CV}_t, \qquad [L_t, U_t] = \frac{I_t \pm 1.96\,I_t\mathrm{CV}_t}{\bar{I}}.$$

The approximate 95% interval had half-width $1.96 I_t \mathrm{CV}_t$. The displayed intervals described survey sampling uncertainty with normalization treated as a change of units; assessment error inflation was a separate model input.

4.3 Other data

Model 26.0 fitted 12 annual observations of catch per unit effort (CPUE) from the Japanese trawl fishery, 1965–1976, using fishery selectivity and weight-at-age. The 2024 assessment described the vessel-size restriction in this series (Ianelli et al. 2024).

Fixed biological assumptions

We retained the 2024 biological assumptions (Ianelli et al. 2024). Natural mortality was 0.9 yr^{-1} at age 1, 0.45 yr^{-1} at age 2 and 0.3 yr^{-1} at ages 3–15+. Maturity at ages 1–15+ was 0, .008, .289, .641, .842, .901, .947, .963, .970, 1, 1, 1, 1, 1, 1. The model calculated April spawning biomass one quarter-year after the start of the year and applied a female fraction of 0.5 once to sex-combined abundance. We used a 15-by-15 identity matrix for ageing error, matching the archived ADMB configuration. This likelihood assumption treated ages as exact after data preparation, which used FT-NIRS age conversion and age–length keys.

All weight schedules covered ages 1–15+ for the combined sexes in kg per fish. The model used fishery weights to calculate catch biomass, BTS weights to calculate population biomass and A-season weights to calculate spawning biomass.

Population and spawning weights

Population weights used BTS observations through 2026. For spawning biomass, we replaced the older weights at ages 3–15+ with A-season fitted values for 2024–2025 and projections for 2026. Within the common-year comparison, this update changed the 13 values at ages 3–15+ in 2024. We retained baseline weights at ages 1–2; age-2 maturity was .008.

ATS and AVO weights

We retained each historical schedule through 2024 and carried its weights forward to 2025. After BTS-ALK and conditional TMA preparation, we calculated provisional 2026 ATS weights by dividing biomass by the corresponding abundance. For age 15+, we pooled biomass and abundance before division. Appendix G documents which lengths the BTS key covers and which remain unallocated. We used the 2026 ATS vector as a proxy for AVO weights, although the historical schedules differed.

Section 4.1.3 described the rationale for changing weight estimation. Weight-schedule uncertainty remained separate from the assessment's conditional parameter uncertainty.

4.3.1 Age-composition input sample sizes

The full-data Model 23.0 fit used fishery composition N=443, 578 and 530 for 2023, 2024 and 2025, respectively (Table 24). These likelihood sample sizes were rounded harmonic estimates of composition precision from 10,000 bootstrap replicates per year, scaled for continuity with the historical series. The

bootstrap resampled sampling units within fishery strata and observations within those units, preserving their sampling links. ATS 2026 used N=94, and BTS retained the selected 2026 N, shown as 131. Fishery N was fixed at 10 in each year from 1964–1977. The three composition-likelihood multipliers were 1.

Model 26.0 fitted age compositions with a multinomial model.

One-step-ahead (OSA) residuals compared an observation with its conditional prediction after preceding age categories were considered. The OSA and Francis comparisons document the selected weights and observed-data residual patterns in Section 6.1.6.

5 Analytic approach

5.1 Main and comparison models

Model 26.0 was the base case model used for Tier 3 calculations and harvest recommendations. Models 23.0 and 23.2 provide comparisons with the previous assessment and the transition in model structure. Model 26.1.2 is a sensitivity analysis that separates the early (1964–1990) and modern (1991–2026) fisheries and estimates modern selectivity variation after integrating over annual fishery selectivity effects. Its conditional fits and retrospective comparisons hold both process standard deviations fixed; the modern period's value comes from the marginal model. Model 26.0 uncertainty and retrospective diagnostics are described below. Model equations are given in the model-equations appendix. The projection methodology is described in Section 7.

The cumulative data comparison holds the Model 23.0 formulation fixed; the configuration comparison used matched updated observations to separate changes in model structure from changes in data.

Model	Data and purpose	Main configuration difference
23.0 (ADMB)	Accepted in 2024; refitted through 2026 to measure the effects of each data update	One fishery; cohort and year effects on weight-at-age are estimated within the assessment.
23.2 (ADMB bridge)	Same updated observations as the full-data 23.0 fit	Brings key features of the Rceattle formulation into ADMB, including mean recruitment and fixed weight-at-age schedules.
26.0 (Rceattle)	Updated observations; basis for the 2026 assessment	Uses one fishery and fixed weight-at-age schedules. Differs from the bridge in the annual fishery-selectivity setup and its penalties.
26.1.0 and 26.1.1 (Rceattle)	Same updated observations; split-fishery sensitivities	Estimate separate selectivity for the early and modern fisheries, with different penalties on declining selectivity.
26.1.2 (Rceattle)	Same updated observations; split-fishery sensitivity	Estimates variation in modern selectivity after integrating over annual fishery selectivity effects.

5.1.1 Model 23.0 and impact of new data

We added the new data to Model 23.0 in steps. First, we updated annual catches for 1991–2026 (the 2026 estimate was 1,312,504.58 t). We then updated weight-at-age and A-season spawning weights, followed by fishery catch-at-age data and their likelihood weights.

We added survey data in the following order: bottom-trawl survey (BTS), acoustic-trawl survey (ATS), and acoustic vessel-of-opportunity (AVO) index. The survey updates included historical revisions and changes to observation errors. The ATS step used the provisional 2026 ages and included all 20 entries in the separate age-1 index likelihood, including the newest year and the inherited 2020 substitute of 350 million fish. The latter was distinct from the observed 2020 uncrewed-surface-vessel biomass estimate. The ATS age-composition likelihood used ages 2–15+ (Section 4.2.2; Section 4.2.3).

Each step included all preceding updates, so its estimated effect depended on the order in which the data were added. The resulting 2026 estimates were summarized in Table 29, and the cumulative annual point estimates were shown in Figure 25. See Appendix F for the model equations.

Figure 26 compared projections of 2027 spawning biomass and abundance at ages 1–3 as each dataset was added. These diagnostics used the earlier assumed 2026 catch of 1,310,000 t. The 2026 estimates in Table 29 use 1,312,504.58 t. The display starts with Catch + 2026 endpoint, followed by + Fishery age data and the subsequent survey updates. The intervening weight-at-age and A-season spawning-weight updates remain incorporated in the fishery-age and later fits. Abundance at ages 1–3 was measured at the start of 2027, before removals; spawning biomass included mortality to spawning time. Projection settings were detailed in the technical supplement. See Section 7 for the management projections.

The input sequence and configuration comparison answer different questions. The former retained the Model 23.0 formulation while adding observations and updating schedules. The latter compared formulations on matched observations and biology (Table 30).

Approximate distributions compared the change in spawning biomass from 2026 to 2027 (Figure 27) and the historical change in total abundance at ages 1–4 from 2025 to 2026 (Figure 28). They showed the same selected cumulative sequence, followed by Models 23.2 and 26.0. Their input and projection settings were documented in the technical supplement. Each distribution retained its matching fitted-parameter covariance between years and, for abundance, among ages. The normal approximations were conditional on the model and biological and projection assumptions.

Adding ATS data produced the largest increase in projected 2027 female spawning biomass: from 2.685 to 2.975 million t, about 290,000 t (10.8%) above the preceding BTS step. Adding AVO data increased it by a further 61,000 t (2.0%), to 3.036 million t. For estimated 2026 spawning biomass, adding fishery ages produced the largest increase, about 213,000 t (8.4%). Adding ATS data reduced the estimate by about 73,000 t (2.6%), and adding AVO data increased it by about 47,000 t (1.7%).

5.1.2 Model 23.2 fitted to the 2026 assessment data

Model 23.2 implemented key features of the Rceattle formulation in ADMB. Compared with Model 23.0, it used mean recruitment, estimated annual fishing mortality without the penalty on annual deviations, and treated weight-at-age as fixed. It predicted ATS and AVO biomass from ages 2–15+; age 1 entered the separate ATS index. With the observations held constant, Figure 29 compared annual trajectories and approximate 95% confidence intervals calculated from each fit's parameter covariance.

5.1.3 Model 26.0 fitted to the 2026 assessment data

Model 26.0 fitted one fishery in Rceattle with fixed weight-at-age schedules. The comparison with Model 23.2 used the same updated observations and biological schedules, but the implementations differed. Model 26.0 estimated a separate 1965 fishery selectivity curve; Model 23.2 used the 1964 curve in both years. The models also differ in the penalties on changes in fishery selectivity and in how future recruitment deviations enter estimation. Figure 30 compared annual estimates and approximate 95% confidence intervals. The base-model fit retained its native working likelihood, parameter bounds, selectivity forms, priors and fixed biological assumptions; outputs were checked against the written inputs and saved native quantities. Population-weight biomass, female spawning biomass, age-1 recruitment and maximum fishing mortality retain distinct definitions.

5.1.4 Model 26.1: Early and modern domestic fisheries

The split-fishery sensitivities estimate separate selectivity curves and annual changes for the early (1964–1990) and modern domestic (1991–2026) periods. The split changed which selectivity curve applied to each year's catch and age composition; it does not divide the stock or reassign catches by vessel nationality. Model 26.1.0 applied the original penalty on declining selectivity at older ages. Model 26.1.1 reduced the penalty, and a separate comparison removed it.

Model 26.1.2 kept the reduced penalty and integrated over the annual fishery selectivity effects when estimating the modern period's process standard deviation (SD). The early period's SD was fixed at 0.1235; the modern period's marginal estimate was 0.582. The conditional fits used for observation diagnostics, projections and retrospective comparisons hold both SDs at those values. Marginal-fit confidence intervals use the curvature of the likelihood after integrating over the selectivity effects. Local uncertainty uses the verified marginal information for Model 26.1.2; its observation diagnostics condition on the fitted annual effects. Section 6.2 described the resulting comparisons.

6 Results

Table 30 compares estimated 2026 total biomass, female spawning biomass, age-1 recruitment and maximum fishing mortality across the 2026 model configurations.

6.1 Model 26.0 assessment

Model 26.0 estimates provided the basis for the Tier 3 catch limits. We described their uncertainty and how they changed when we removed recent years of data. Comparisons with past assessments used each assessment's data and catch assumptions. Results from alternative configurations, including Model 26.1.2, were presented in Section 6.2.

6.1.1 Population estimates and uncertainty

The Model 26.0 base case model estimated 2026 total biomass at 12.162 million t, female spawning biomass at 3.057 million t, age-1 recruitment at 36.3 billion fish, and maximum fishing mortality across ages at 0.299 per year (Table 31).

The approximate 95% confidence intervals, based on parameter uncertainty from the Model 26.0 fit, are shown in Figure 31 and Table 32.

The 2026 posterior medians for total biomass, female spawning biomass and age-1 recruitment were below their corresponding fitted point estimates. The regularized posterior used all 5,000 MCMC draws (Table 33). The female spawning-biomass median was 2.946 million t (central 95% credible interval 2.450–3.584 million t), the total-biomass median was 11.462 million t (9.215–14.719 million t), and median age-1 recruitment was 31.1518 billion fish (12.2880–91.0616 billion fish). The management calculations used the fitted point estimates; the MCMC summaries provided a separate view of uncertainty.

In an effort to illustrate how the population age structure has evolved over time, we provide a color-coded heatmap showing values relative to their mean abundances-at-age from 1964–2026 (Figure 32). This tracks cohorts as they age by showing abundance at each age relative to its long-term mean, alongside the coefficient of variation. Table 34 reports the annual abundance estimates, and Table 35 reports estimates and uncertainty by age in 2026.

Comparison with the 2024 assessment

The 2018 year class remained the largest recruitment point estimate in both assessments (Figure 33). Model 26.0 estimated its age-1 abundance in 2019 at 87.8 billion fish, compared with 81.1 billion in the accepted 2024 assessment, a revision of 8.3%. The revision reflected both updated observations and changes in model structure.

The estimate for the same 2024 female spawning biomass changed from 3.389 million t in the saved 2024 assessment to 3.526 million t in Model 26.0, a revision of 4.0%. Within the trajectory, spawning biomass changed from that 2024 estimate to 3.057 million t in 2026 (-13.3%). Total biomass changed from 10.767 million t to 12.162 million t over the same years (13.0%). These within-trajectory changes differed from shared-year assessment revisions.

As a sensitivity, we compared age-1 recruitment from Models 26.0 and 26.1.2 with the accepted 2024 assessment (Figure 33), using the calendar year each cohort entered at age 1. The two current fits showed a similar pattern of strong and weak year classes. Error bars for the current models are approximate 95%

confidence intervals.

Model 26.0 estimated higher female spawning biomass over the shared fitted years shown in Figure 34 (2002–2024). Its Scenario 2 point projections rise in 2027 and 2028, whereas the 2024 assessment projected a decline from 2025 through 2028. Each assessment used its own Scenario 2 catch assumptions. The Model 26.0 band reflected uncertainty in the fitted assessment parameters under the stated projection assumptions.

Recruitment per unit of spawning biomass

Log recruits-per-spawning biomass compared to spawning biomass shows a linear pattern (Figure 35). For each year of hatching, age-1 recruitment in the following year was divided by female spawning biomass in the year of hatching. Taking the natural logarithm puts proportional changes on a comparable scale: higher values indicated more recruits per unit of spawning biomass. The series showed substantial variation among year classes. The 1978, 2008 and 2018 year classes had particularly high recruits-per-spawner values. Following the strong 2018 year class, the ratio declined through the 2022 year class; estimates for 2023–2025 were higher but remain less certain because fewer observation years were available and the surveys and fishery sample a smaller proportion of younger fish, especially ages 1–3, than older fish. The spawning-biomass panel generally showed lower ratios at higher biomass, with considerable variation among years at similar biomass. This pattern can reflect density dependence, environmental conditions and estimation uncertainty. Spawning biomass appears in both the horizontal axis and the ratio, which can contribute to the apparent relationship.

Biological schedules and selectivity were shown by age, sex and year (Figure 36; Table 36; Table 37). Fishing mortality was also shown by age (Figure 37). Whole-year spawning exploitation compared paired spawning-biomass calculations from the base case model production fit (Figure 38). Spawning exploitation is defined as the percentage reduction in next-spawning female biomass caused by fishing: 100 × (1 − biomass with fishing / biomass without fishing). For the interval from spawning in 2026 to spawning in 2027, its production-point estimate was 13.7%: 3.326 million t with fishing versus 3.853 million t without fishing. The separate MCMC posterior median for this exploitation fraction was 14.5%, with a central 95% credible interval of 11.2–18.4%. These paired-state calculations carry the revised fishery-weight schedule into 2027 and retained the fixed 1.375 million t catch assumption.

6.1.2 Estimated and fixed model parameters

Fixed parameters are shown in Section 4.3 while Table 38 gives the minimum and maximum estimates and the median and maximum asymptotic standard errors for each parameter group, including three log catchability estimates and 63 recruitment deviations. Complete estimates and the largest parameter correlations were retained in the detailed estimates appendix. The summary likelihood contributions are in Table 39.

6.1.3 Fits to the observations

The fitted biomass indices generally follow broad survey trends, including the low ATS biomass in 2006–2009 and its subsequent increase (Figure 39). Annual departures remained. The BTS residuals included negative departures in 2006 and 2009 and positive departures in 2014–2015, each outside the plotted 95% reference range. The AVO observation in 2015 was also higher than fitted, whereas all ATS biomass residuals fall within that range (Figure 40; Table 40). Thus, the broad survey trends were represented more closely than some individual annual observations. BTS residuals account for covariance among survey years.

Fishery selectivity varied among years, with dome-shaped curves in many years and flatter curves at older ages in others (Figure 41). Selectivity also began to rise at younger ages in the early, pre-domestic years than in most later years. BTS selectivity generally increased with age and approached a plateau, while the ATS curve, shared with AVO, was relatively flat at older ages (Figure 42; Figure 43). Recruitment varied strongly among years: the 2018 year class, entering at age 1 in 2019, had the largest positive departure from the fitted recruitment level.

The mean-age comparisons showed that the model followed most of the observed changes in survey age composition and closely tracked fishery mean age in the domestic period. The clearest sustained fishery discrepancy occurs in 1965–1975, when predicted mean ages were higher than observed (Figure 44). The observed bars showed plus or minus two standard errors of mean age; they described sampling uncertainty,

rather than uncertainty in the fitted population. Fishery age observations ended in 2025. The annual composition panels showed how these mean ages arise from the proportions at each age and allow individual cohorts to be followed as they aged (Figure 45; Figure 46; Figure 47; Figure 48).

Aggregate observed and fitted age proportions agree closely, especially for the fishery, but OSA residuals showed patterns by age and year (Figure 49; Stewart and Monnahan (2025); Monnahan et al. (2026)). For example, BTS residuals included extended runs of the same sign at several ages, and the early fishery residuals also showed structured departures. Averaging across years can obscure these differences. The OSA residual standard deviations were below one for all three sources (about 0.76 for the fishery, 0.86 for BTS and 0.64 for ATS), and the QQ plots were generally narrower than the standard-normal reference. Some BTS tail residuals were large, and the ATS QQ plot also departs from the reference. Close aggregate fits therefore need to be considered alongside the annual patterns. These residuals assessed observation fit conditional on the fitted model parameters.

6.1.4 Profile likelihood diagnostics

To examine the conflict among data types and model assumptions and a parameter that affects population scale, we constructed a profile-likelihood over ATS survey catchability (ATS-q) for Model 26.0. We fixed this parameter at 17 values from 0.45 to 0.65, including the freely estimated value of 0.51694, and re-estimated all other active parameters. The grid used eight equal intervals on each side of the estimated value: approximately 0.00837 below it and 0.01663 above it (Figure 50).

The lowest NLL for ATS-q was 0.51694. ATS-q values between 0.4576 and 0.5838 were below 1.92 NLL units.

NLL profiles by likelihood component shows that both the index and composition data inform the ATS-q parameter.

All 17 fits had maximum absolute gradients below 10^{-4} and positive-definite Hessians. Weighted NLL components sum to the total objective at every point. Further evaluation could consider sensitivity to data weighting and selectivity assumptions.

Figure 51 compared the negative log ATS-q marginal density with its optimized NLL profile, showing very similar outcomes for the two methods. The kernel density integrated to one, and each displayed curve was centered at its own minimum over ATS-q. The negative log marginal density integrated over the other parameters and included posterior regularization; the profile optimizes those parameters under the native penalized objective.The final ATS-q posterior median was 0.5093, with a central 95% credible interval of 0.4514–0.5755 Panel B fitted weighted quadratic curves directly to individual-draw native NLL components and compared them with the profile components (the MCMC quadratic method). Here, MCMC curves were centered at the ATS-q parameter's marginal mode and displayed over the central 99% of sampled catchability. Smoothers were used to summarize the broad component trends, with tail coverage limited by the available draws. For the index data, both the MCMC quadratic method and the profile indicate a best value between 0.55 and 0.60 for ATS-q, while results between the two methods are not as clearly aligned for the composition data and selectivity deviates.

The paired MCMC draws show the relationships among ATS-q, summed abundance at ages 2–5 in 2026, age-1 abundance in 2019 (the 2018 year class), and projected 2027 female spawning biomass (Figure 52). Diagonal panels showed their marginal densities. All four quantities were paired within each saved draw.

Projected 2027 female spawning biomass was most strongly associated with the summed abundance of ages 2–5 in 2026 among the quantities shown ($r = 0.84$). This contrasts sharply with the 2024 assessment, in which projected 2025 spawning biomass depended heavily on the estimated magnitude of the 2018 year class (Figure 53 of the 2024 SAFE). The 2018 year-class dependence remained in the projection, as shown by its positive correlation with 2027 spawning biomass ($r = 0.36$), but was less pronounced than the dependence on the younger fish now approaching or contributing to spawning biomass.

In Table 41, we show projected 2027 spawning biomass for a range of fixed ATS q values. These projected spawning biomass values and corresponding approximate 95% confidence intervals were based on fitting the model to the data conditioned on fixed ATS q values (with all other parameters estimated). Estimates of

projected 2027 spawning biomass range from 2,968 kt with ATS q fixed at 0.65 to 3,567 kt with an ATS q fixed at 0.45.

6.1.5 Retrospective patterns

The full Model 26.0 fit estimated lower spawning biomass and higher maximum fishing mortality in much of 2016–2019 than fits ending in 2017–2020 did (Figure 53; Table 43 shows terminal-year comparisons). The full fit also estimated smaller 2008, 2012, and 2013 year classes than the earlier peels.

Model 26.0 and the conditional split-fishery Model 26.1.2 showed broadly similar patterns of spawning-biomass revision. Across the nine peels ending in 2017–2025, spawning-biomass Mohn's rho was +0.121 for Model 26.0 (Table 42) and +0.074 for Model 26.1.2. The corresponding maximum-F values differed (−0.064 and +0.002). Each comparison used the model's own full 2026 fit for the same calendar year. The Model 26.0 simulated-data and posterior-predictive experiments provided separate conditional comparisons (Section 6.3.1).

Figure 54 compares beginning-of-year age-3+ biomass across assessment vintages. Model 26.0 followed the broad historical pattern and estimated higher biomass than the 2024 assessment in many shared years, including 2023–2024. Its estimates fell through 2025 and rose in 2026. Comparisons across assessment vintages reflect changes in data, biological inputs, and methods; comparisons among peels show the effect of truncating data within a model configuration.

6.1.6 Age-composition weighting comparison

The Francis (2011) diagnostic returned lower age-composition sample sizes than those used for the fishery, higher sizes for the BTS, and roughly twice the selected sizes for the ATS (Figure 55). Figure 56 shows the standardized mean-age residuals used in the comparison. The assessment retained the selected input weights for all three sources.

6.2 Model 26.1 split-fishery alternatives

Models 26.1.0 and 26.1.1 separated the Foreign fishery through 1990 from the Modern domestic fishery beginning in 1991. Their annual selectivity standard deviations were fixed at 0.5, while the declining-age penalty was 12.5 in Model 26.1.0 and 3.125 in Model 26.1.1. The zero-penalty case provided a further comparison. The Model 26.1.2 sensitivity shown here retained the 3.125 penalty and fixed the Foreign and Modern annual process standard deviations at 0.1235 and 0.582, respectively. The remaining parameters and annual selectivity effects were estimated conditionally on these values.

The likelihood comparison separated data-likelihood contributions, penalty terms and the marginal fitting criterion (Table 44). The projections used the revised ordinary fits and the Early-late fishery split Model 26.1.2 comparison. The alternatives retained matched observations, likelihood weights and projection assumptions (Table 45).

6.2.1 Selectivity for split fishery alternatives

Separating the Foreign (1964–1990) and Modern domestic (1991–2026) fisheries changed the fitted selectivity most visibly near the boundary between the two periods. Over much of the later period, Models 26.0 and 26.1.0 retained similar annual age patterns, including the peaks and declines at older ages (Figure 57). The split allowed the Foreign curve to differ more freely from the Modern curve, while Model 26.0 represented the history as a single fishery.

Both models estimated a shift from 1990 to 1991 toward lower relative selectivity at younger ages and higher relative selectivity at ages 11 and older. The shift was larger in Model 26.1.0: at age 5, the change was about −0.69 on the native mean-one scale, compared with −0.31 in Model 26.0; at ages 12 and older, the increases were about 0.55 and 0.24, respectively (Figure 58). This comparison showed how the split changed the estimated transition. The fitted curves alone established neither an abrupt change in fishing practices nor an improvement in the population estimates; the observation fits and retrospective results provided the complementary checks below.

The full-history curves were divided by each year's maximum so that their shapes can be compared. The boundary-year display instead retained native mean-one normalization, and its differences referred to that scale. These were fitted point curves. The Model 26.1.2 curves used in subsequent comparisons retained the fitted selectivity states from its fixed-SD conditional fit and remained distinct from the Model 26.1.0 comparison here.

6.2.2 Fishery age-composition fits

We compared Models 26.0 and 26.1.2 using the same 62 annual fishery age compositions and likelihood weights (Figure 59; Figure 60). Model 26.0 fitted one fishery across the full record; Model 26.1.2 separated the Foreign fishery through 1990 from the Modern domestic fishery beginning in 1991. We displayed both models over those same periods to compare their fits directly. Both models reproduced the dominant age groups in the combined compositions, while the annual plots revealed differences that the combined summaries obscured.

Model 26.1.2 fitted the Modern domestic observations more closely. It reduced the sample-weighted root-mean-square difference in age proportions from 0.693 to 0.590 percentage points and the root-mean-square error in annual mean age from 0.123 to 0.0963 years. Both models predicted a younger mean age than the observations showed in 1991, but Model 26.1.2 reduced that discrepancy from 0.510 to 0.339 years. The smaller differences across ages and years showed that the split-fishery configuration improved the modern fit rather than simply matching its combined age distribution.

Model 26.0 fitted the Foreign-period observations more closely. Model 26.1.2 increased the sample-weighted age-proportion error from 2.67 to 3.43 percentage points and the annual mean-age error from 0.655 to 0.696 years. Both models predicted older mean ages than the early observations showed, particularly in 1964–1965 and 1970. The age-by-year panels showed persistent overprediction at several older ages and underprediction at younger ages during much of the early record. Separating the fisheries therefore improved the modern fit while leaving larger discrepancies in the Foreign period.

6.3 Further model evaluations

6.3.1 Observation-error retrospective self-test

In response to Plan Team and SSC requests to investigate retrospective patterns, we developed a new simulation-based retrospective experiment for this assessment (Figure 61). Its distinctive feature was a paired design that examined revisions both at the fitted parameter estimates and across plausible parameter states from the regularized posterior. One set of ten simulated datasets used the fitted parameters; a second set used ten posterior parameter draws. Each dataset had its own full 2026 fit and nine optimization peels ending in 2017–2025. Revisions compared each peel's terminal estimate with its own full fit for the same calendar year. This approach extended the usual retrospective analysis by examining how observation variation and uncertainty in the generating parameters influenced the revisions, providing additional context for interpreting the assessment's retrospective pattern.

Across all nine peels ending in 2017–2025, Model 26.0 assessment Mohn's rho for female spawning biomass was $+0.121$, compared with median values of -0.0117 for datasets generated at the fitted parameters and -0.0574 for datasets generated from posterior draws. The assessment value exceeded every simulated rho in both sets: the fixed-parameter range was -0.115 to $+0.0335$, and the posterior-draw range was -0.0971 to $+0.116$. Thus, the positive average spawning-biomass revision in the assessment was stronger than that reproduced by these simulated datasets.

For age-1 recruitment, the assessment's nine-peel rho was -0.0985, within both simulated ranges. Median recruitment rho was -0.00751 in the fixed-parameter set and $+0.0830$ in the posterior-draw set. The contrast between spawning biomass and recruitment showed that the retrospective pattern depended on the population quantity considered.

The paired design explored how observation variation and uncertainty in generating parameters contributed to the full nine-peel pattern. Ten datasets per branch provided an exploratory comparison. The technical supplement described the fixed process history, data-generation approximations and other conditioning

assumptions. These experiments assessed biomass and recruitment revisions. Confidence bands describing retrospective ABC or OFL patterns were beyond the scope of this work but would be interesting to evaluate.

6.3.2 Posterior diagnostics and predictive checks

The regularized posterior explored parameter uncertainty separately from the production base case model estimates (Figure 62; Figure 63; Figure 64). Four chains each retained 1,250 draws after 1,000 warmup iterations. Combined parameter diagnostics gave maximum R-hat 1.024 and minimum bulk ESS 242, with zero divergences and zero maximum-treedepth events. The reported population quantities mixed more consistently: maximum R-hat was 1.0013 and minimum bulk ESS was 3,914. MCMC standard errors of the 2026 spawning-biomass and biomass means were about 4,110 t and 20,600 t; their first-half versus second-half mean shifts were less than 0.03 posterior standard deviations. These diagnostics described the saved chains and retained the parameter-level qualifications.

Posterior summaries

The posterior mean female spawning biomass in 2026 was 2.965 million t, with a central 95% credible interval of 2.450–3.584 million t (Table 46). These summaries used all 5,000 retained MCMC draws under the regularizing priors and fixed biological inputs. Full-precision results were downloadable as CSV files containing terminal stock and selectivity summaries (CSV), annual population intervals (CSV), summaries of all 1,266 parameters (CSV), and spawning-exploitation intervals (CSV).

Predictive checks asked whether the fitted model can generate data that resemble the observations (Figure 65; Figure 66). We selected 1,000 MCMC draws spanning the four chains. Each draw supplied a possible set of model parameters, from which a new set of observations was simulated. The shaded ranges therefore included both parameter uncertainty and the sampling variation assumed by the model. Points outside these ranges, or repeated patterns of differences, helped identify features the model struggled to reproduce. The ranges applied to each age or year individually; some points outside them were expected even when the assumptions were appropriate.

For the indices, simulated observations used the same error assumptions used in fitting, including the relationships among BTS errors. The overall BTS mismatch measure was as large as the observed measure in only 0.2% of the simulations, indicating that this feature of the BTS data was rarely reproduced. Normal error assumptions also allow some simulated indices to be negative.

For age compositions, simulated fish were randomly assigned to age groups using each draw's predicted proportions and the sample size used in fitting, rounded to a whole number. The simulations approximate the fitting method, which added a small constant (0.001) to age proportions. The figure compared the latest three actual samples for each source with these simulated age proportions. Age conversions, weights and other biological inputs were held fixed. These checks assess how well the model reproduced observations; the retrospective analyses addressed how estimates changed as additional years of data become available.

7 Projections and harvest recommendations

7.1 Proposed Tier 3 configuration and reference points

The proposed fishery selectivity was the mean of the 2023–2025 annual curves, the latest three years with fishery age observations. Each age was averaged before scaling the resulting curve to an arithmetic mean of one over ages 1–14 and 15+, consistent with earlier assessments. The separately inferred 2026 curve was distinguished from directly age-informed years (the projection-input appendix).

The deterministic recruitment level used the arithmetic mean of age-1 entries in 1978–2023, corresponding to birth cohorts 1977–2022. The less precise 2024–2026 entries were excluded. Every entry in the advice tables equaled this selected historical mean. The separate projection figures added future recruitment variation to illustrate a range of possible paths. Reference points and fishing rates were reported in Table 47. The Model 26.1.2 column used the revised Early-late fishery split comparison under the same projection assumptions.

Under the Bering Sea and Aleutian Islands Groundfish Fishery Management Plan, the Tier 3 rule uses spawning-potential reference points. F35% and F40% are the rates that leave 35% and 40% of unfished spawning biomass per recruit, respectively. The biomass reference points in Table 47 are equilibrium female spawning biomasses under the stated mean recruitment and fixed biological inputs. B100% is the unfished equilibrium benchmark, not an observation of biomass before fishing began.

For Tier 3a (spawning biomass above B40%), F35% sets the OFL rate and F40% sets the maximum permissible ABC rate. The FMP scales both rates down when biomass is below B40% and sets both to zero at or below 5% of B40% under the default rule. The F35% and F40% values in Table 47 are annual rates under mean-one selectivity; age-specific rates follow the selectivity curve. The author-rate fraction was one, subject to the risk evaluation and final review.

The previous-year OFL-equivalent fishing mortality was reported in Section 10.

7.2 Standard harvest scenarios

The seven standard harvest scenarios were projected with spmR, starting from each model's fitted 2026 population and using the estimated 2026 catch to project the population to the start of 2027. Table 48 defines the scenario rules. Scenario 2 assumes 1.375 million t of catch in both 2027 and 2028; these are scenario inputs, separate from the ABC and OFL reported for those years in Table 49.

The catch and female spawning-biomass panels compared Alternative 2 with recent-mean-F Alternative 3 (Figure 67; Figure 68). Black lines showed the means of 1,000 future-recruitment simulations, ribbons showed their 5th–95th percentiles, and ten colored trajectories illustrate individual outcomes. Each color followed the same recruitment realization across both alternatives and figures. Recruitment followed the established inverse-Gaussian method, using the arithmetic and harmonic means of the fitted 1978–2023 age-1 entries. Initial age-1 abundance in 2027 equals the historical arithmetic mean; each subsequent entry varied among simulations. The widening bands showed how future recruitment variation accumulated as new cohorts enter the fishery and spawning population. Alternative 2 catch paths coincide in 2027 and 2028 because those catches were prescribed.

The tables report catch, female spawning biomass, and fishing mortality for the starting year (2026) and projections through 2038. Recruitment in all seven scenarios is fixed at the historical arithmetic mean (Table 50; Table 51; Table 52). The historical phase plot places the fitted 1981–2026 trajectory and deterministic Alternative 2 projections for 2027–2028 on common axes (Figure 69). The horizontal axis was female spawning biomass divided by B35%; the vertical axis was mean fishing mortality across model ages divided by F35%. Both denominators were the current primary projection reference points (B35% = 2.155 million t; F35% = 0.429 per year), held constant across the trajectory. This common benchmark showed changes in the fitted stock and fishing mortality through time. The 2024 assessment used annually varying reference points; the historical positions here therefore also reflect the choice of a common current benchmark. F35% was a spawning-per-recruit proxy for FMSY, and B35% was the corresponding spawning-biomass reference point. Solid lines mark ratios of one, and the dashed vertical line marks half B35%. Two-digit year labels trace the trajectory, with the two projection years boxed and shaded yellow. The fitted 2026 position and both projected positions were above B35% and below F35%.

7.2.1 Decision table

The decision table compares eight possible 2027 catches, from 10 to 2,540 kt, using Model 26.0 with the updated AVO data. Table 53 defines the indicators, benchmarks, and years. Table 54 gives the estimated outcomes for fishing mortality, spawning biomass, and age structure and the probabilities of meeting the specified benchmarks.

Each catch column represented a different fishing strategy. Fishing mortality was calculated to achieve that catch in 2027, then held constant through 2031. Catches in subsequent years therefore change with the projected abundance and age composition of the stock. The effort indicator gave the probability that mean

age-specific fishing mortality in 2027 exceeds its 2026 value. Interpreting it as relative effort assumed that catchability and the age pattern of fishery selectivity remain fixed. It provided a comparison among strategies rather than a forecast of vessel numbers, fishing days or operating costs.

Readers can compare columns to examine the trade-off between the initial catch and subsequent stock conditions. The probability rows summarize the chance of crossing the stated biomass, fishing-mortality or age-structure benchmarks. These were conditional comparisons that supported catch decisions alongside the standard harvest projections and risk table.

Entries were approximate chances out of 100. They propagate uncertainty in the fitted population, selectivity, estimated mean recruitment and comparison benchmarks. Future recruitment was held at the estimated 1978–2023 mean, and biological schedules were fixed. These probabilities described uncertainty in the assessment estimates under each catch choice. Additional year-to-year recruitment variation and uncertainty in weights and maturity were outside these calculations. Values displayed as 0 or 100 reflected rounding.

The 1,270-kt column was retained for comparison with the earlier decision-table analysis. The expected-catch scenario elsewhere in this section assumed 1,375 kt in 2027 and 2028. The decision tables provided a broader comparison of catch choices; they used local asymptotic uncertainty rather than MCMC draws.

7.2.2 Reference point sensitivity to fishery selectivity specification

Fishery selectivity determined how fishing mortality was distributed across ages and therefore affects both the reference fishing rates and the catches obtained at those rates. The central projection used the age-specific arithmetic mean of the raw 2023–2025 fishery selectivity curves, rescaled so that its mean over ages 1–14 and 15+ was one. This recent three-year average smooths annual variation while retaining the age pattern from the latest years with fishery age observations. Averaging precedes rescaling because normalizing each annual curve first would give a different average. Figure 70 introduces this recent-average specification and contrasts it with individual annual estimates. The inferred 2026 curve was shown separately because fishery age observations end in 2025. It provided a terminal-year comparison, while the management projections retained the 2023–2025 average.

The recent curves showed that changes in fishery recruitment involve particular ages rather than a uniform shift toward younger fish. The first ascending half-maximum crossing was near age 6 in 2021–2022, compared with approximately 4.5, 5.0 and 5.2 in 2023–2025. Relative selectivity at age 5 was especially high in 2023 and then declined in 2024–2025. Selectivity at ages 1–3 remained low and varied independently. These differences matter because a curve that exposes age-5 fish more strongly can produce a different catch and spawning impact from one that concentrates fishing at older ages, even when both had the same maximum selectivity.

The full annual comparisons showed which parts of each curve differ from the projection assumption (Figure 71). The repeated 2023–2025 reference makes shifts in the ascending limb, peak and older-age tail visible across 2007–2026. For example, the 2019 curve peaks near age 7 and declines substantially at older ages, whereas several earlier curves retained high selectivity across the older ages. Thus, the annual panels provided the age-specific explanation for the management differences in the next figure. The older curves represented alternative fishing patterns for sensitivity analysis. Their relevance as forecasts depended on evidence about current and future fishery conditions.

Annual selectivity alternatives give both higher and lower catch ceilings than the recent-average baseline (Figure 72). Of the twenty curves, 14 produce a higher maximum ABC in 2027 and 12 do so in 2028. Changes range from -8.2% to +12.0% in 2027 and from -5.9% to +8.4% in 2028. These were conditional sensitivities under common population, recruitment, biological and catch assumptions.

The lowest annual-curve maximum ABC occurred with the 2018 curve in 2027 and the 2019 curve in 2028. The 2025 curve changed the ceilings by +1.5% and -4.4%, respectively. The age pattern affected immediate catches and the ages surviving into the following year. F40% and F35% were recalculated for each curve; the assumed catch remained 1.375 million t in each year.

The younger-age summaries explain why a single description such as “younger selection” was insufficient (Figure 73). They separated exposure of ages 1–3, selectivity at ages 4 and 5, the first ascending half-maximum age, and changes across the full curve. For example, from 2022 to 2023 the half-maximum age fell from about 6.0 to 4.5 years, while the curve-weighted mean age changed only from 10.09 to 10.00 years. Conversely, from 2023 to 2025 the half-maximum age rose while the curve-weighted mean age fell. The ascending limb and older-age tail therefore move in different directions. This figure connected the detailed annual panels to the reference-point results: the age at which fish begin entering the fishery and the relative exposure of older fish carry different information. Its mean-age measure weights selectivity equally across model ages 1–15, with age 15 representing the plus group; population abundance and catch composition were excluded from that shape index.

The reference-rate comparison makes the dependence on age selection explicit (Figure 74). Under fixed biology, each curve had its own F35% rate under mean-one selectivity, the fishing-mortality scalar that reduced lifetime spawning output per recruit to 35% of the unfished level. Later exposure can allow more spawning before capture and therefore support a higher reference rate at the same spawning-per-recruit target. However, the full curve, including its older-age tail, determined this response. The high 2019 F35% illustrates how a reference scalar can rise sharply under a particular age pattern. Such an increase described the rate permitted under that pattern; it provided no independent evidence of increased stock productivity or a larger sustainable catch.

Two distinctions were essential when interpreting an FMSY proxy against selected age. First, F35% was a spawning-per-recruit proxy for FMSY, whereas FMSY itself depended on the equilibrium yield and recruitment relationship. The historical FMSY comparison and this F35% diagnostic therefore represented different reference quantities. Second, F was a scalar: fishing mortality at each age equals that scalar multiplied by selectivity at that age. Comparisons among years require the same selectivity normalization and the corresponding age-specific mortality pattern. The scatterplot used a selectivity-weighted age index over ages 1–10, whereas its spawning-per-recruit calculation included ages 1–14 and 15+, fixed natural mortality, maturity and the selected projection spawning weights, and quarter-year spawning timing. Its age index also differed from the ages 1–15 index in the preceding figure and from the abundance-weighted age of selected fish. It was a compact descriptor of curve shape, and a common mean selected age can accompany different reference rates. The complete selectivity curve and resulting catch and spawning effects provided the appropriate basis for interpreting the FMSY proxy and comparing harvest specifications.

8 Risk table and ABC recommendation

The author risk evaluation retained all four categories at **Level 1 – Normal** (Table 55). The ecosystem and fishery observations were summarized below. Working recommendations remain subject to author scientific evaluation and Plan Team, SSC and Council review. The Level 1 evaluation supported no reduction from maximum permissible ABC.

Table 55: 2026 risk-category scores and supporting summaries. Assessment-related and fishery-informed stock evaluations were **Level 1 – Normal**; population dynamics and ecosystem evaluations draw on the synthesis by Elizabeth Siddon and Kalei Shotwell.

Considerations			
Assessment-related	Population Dynamics	Ecosystem	Fishery-informed Stock
Level 1 – Normal	Level 1 – Normal	Level 1 – Normal	Level 1 – Normal
Model developments improved fitting, with minor implications for stock status and projected ABC/OFL.	Egg and larval abundance was low; later prey conditions were favorable. Cannibalism was a small share of observed adult pollock diets.	Cool conditions, abundant prey and improving adult condition indicated favorable ecosystem conditions.	A-season fishing appeared good; later B-season fishing was farther north than normal, with limited desirable sizes.

8.1 Assessment-related considerations

Model 26.0 (Rceattle) was the adopted assessment model and main proposal for Tier 3 calculations and specifications. The alternative models examined how the assessment responded to changes in its structure and treatment of annual selectivity variation. Comparisons with Models 23.0 and 23.2 connect the current assessment to the previous formulation and help distinguish the effects of updated observations from changes in model structure. The split-fishery alternatives test whether separate selectivity patterns for the Foreign fishery in 1964–1990 and the Modern domestic fishery from 1991 onward better represent the fishing history. Further comparisons varied the constraint on declining selectivity and the treatment of year-to-year changes in selectivity.

Model 26.1.2 provided the principal sensitivity to these choices. Its underlying marginal formulation estimated the variability of Modern fishery selectivity while accounting for annual selectivity effects. The conditional comparison presented here fixed the Foreign and Modern process standard deviations at their selected full-data values and estimated the remaining parameters and annual selectivity effects. This configuration fitted the Modern fishery age compositions more closely than Model 26.0, while larger discrepancies remain in the Foreign period. The result identified a potential benefit of separating the fisheries, alongside a trade-off in how the model represented the earlier observations.

The Model 26.1.2 retrospective analysis asked whether estimates changed as the most recent observations were successively removed. Each shortened-data fit holds the process standard deviations fixed and was compared with a full-data fit using the same conditional estimation method. This matching reference makes the retrospective differences interpretable within the fixed-SD configuration. The diagnostic therefore described stability when the assumed magnitude of annual selectivity variation was held constant. Re-estimating that variation in each shortened dataset could change the retrospective pattern, and uncertainty in the process standard deviations remained outside this comparison. Improved fits to the Modern observations consequently provided one part of the model evaluation; broader retrospective reliability required evidence across the relevant estimation choices. Model 26.0 remained the basis for the Tier 3 specifications, with Model 26.1.2 used to assess sensitivity to fishery structure and selectivity assumptions.

8.2 Population dynamics risk summary

Population dynamics risk was **Level 1 – Normal**. Cold spring conditions coincided with low egg and larval abundance; temperature-dependent timing complicates interpretation of these early-life indices. Southeastern Bering Sea (SEBS) age-0 abundance was also low. Above-average late-summer large copepod abundance, lipid-rich copepods and euphausiids, and above-average SEBS age-0 energy density indicate favorable feeding and potential survival through the first winter. Northern Bering Sea (NBS) age-0 energy density was below average. Cannibalism made up a small share of observed adult pollock diets; that diet share does not measure predation mortality of age-1 pollock. The regional contrasts and supporting observations are described in Section 11.1 within Section 11.

8.3 Environmental and ecosystem risk summary

The environmental and ecosystem synthesis supported a **Level 1 – Normal** ecosystem score. Following the warm period of 2014–2021 and near-average thermal conditions in 2022–2025, the EBS shelf shifted to cool conditions in 2026. The expanded cold pool, abundant lipid-rich prey and improving adult condition provide favorable context for juvenile and adult pollock. Increased pollock biomass may increase competition; prey and condition indicators suggested adequate food, while the effects of increasing sablefish abundance remain a research question. Section 11 presents the detailed distribution, environmental, prey, competitor and predator evidence, including conditions for later juveniles and adults in Section 11.2. These category scores supported the recommendation for no reduction from maximum permissible ABC.

8.4 Fishery-informed Stock Considerations

Fishing conditions differed between the two seasons. The observer data indicated that A-season fishing in 2026 appeared good. Later in the B-season, fishing occurred farther north than normal, and pollock of desirable sizes were limited. The late-season observations therefore qualify the favorable A-season picture and identify changes in where fishing occurred and the sizes available to the fishery.

We retained the **Level 1 − Normal** score for fishery-informed stock considerations. This score reflected the author's qualitative assessment of fishing conditions across the year. The observations provided context for interpreting fishery performance; their implications for stock-wide abundance remain uncertain. A standardized comparison of fishing locations, effort and size composition would help distinguish changes in fishery availability from changes in overall stock abundance.

8.5 Ecosystem and Socioeconomic Profile development

Development of the EBS pollock Ecosystem and Socioeconomic Profile (ESP) continued alongside the assessment (Shotwell et al. 2026). The archived September 2026 development report supplied exploratory background, and the AI-assisted draft appeared as Appendix B. The 2026 Eastern Bering Sea Ecosystem Status Report described an external Dynamic Structural Equation Modeling (DSEM) analysis that identified sea ice extent, sea surface temperature (SST) and summer large copepods as indicators with statistically supported relationships to age-1 recruitment (Siddon 2026). The exploratory Rceattle DSEM pilot in the appendix used late-summer SST and cold-pool extent as two environmental proxies. Its scope supported a separate assessment of those proxies. Evaluating all three external relationships within Rceattle required additional testing.

The first application of DSEM was completed as a draft in the ESP draft. Development and implementation of an integrated version within Rceattle continue from the work presented in the September 2026 development document (Ianelli et al. 2026). We see the Ecosystem Status Report (ESR), the ESP, and integration of ecosystem information within the full assessment model as logical applications of ecosystem-based methods for providing informed catch advice to the Council.

Since all four categories are **Level 1 − Normal**, we recommend no reduction from maximum permissible ABC.

9 Status determination

Under the Magnuson–Stevens Fishery Conservation and Management Act, stock status is evaluated for overfishing, an overfished condition, and the risk of approaching an overfished condition.

For Tier 3, B35% is the BMSY proxy. MSST is evaluated using the biomass and projection tests below. Alternative 6 fishes at the OFL rate in every projected year. Alternative 7 fishes at the maximum-ABC rate in 2027–2028 and the OFL rate from 2029 onward.

Overfishing in 2025. Catch of 1,326,215.61 t was below the specified Bering Sea subarea OFL of 2,957,000 t. Thus, the stock was not subjected to overfishing in 2025.

Overfished in 2026. Biomass below half B35% indicated an overfished condition; biomass above B35% indicated the stock was above MSST. Between those levels, status depended on Alternative 6 biomass in 2036: below B35% indicated an overfished condition; otherwise, the stock was above MSST. Current biomass was 3.057 million t for Model 26.0 and 3.065 million t for the Early-late fishery split Model 26.1.2 sensitivity, above their respective B35% values of 2.155 and 2.177 million t. Both therefore indicated the stock was not overfished; the 2036 test was unnecessary.

Approaching an overfished condition. Under Alternative 7, 2028 biomass below half B35% indicated an approaching overfished condition; biomass above B35% indicated it was not approaching that condition. If that biomass fell between half B35% and B35%, use Alternative 7 biomass in 2038 for the long-term test.

Biomass below B35% in that long-term test indicated an approaching overfished condition. Projected 2028 biomass was 3.123 million t for Model 26.0 and 3.179 million t for Model 26.1.2, both above B35%. Neither model indicated an approaching overfished condition; the 2038 test was unnecessary.

These comparisons used deterministic historical-mean recruitment. Assessment conclusions and adopted catch specifications remained separate from final NMFS status determinations.

Comparison of Model 26.0 and the sensitivity analysis			
Quantity	Year / basis	Model 26.0	26.1.2 Early-late fishery split
Estimated female spawning biomass	2026	3,057,000	3,065,000
BMSY proxy: B35%	Reference point	2,155,000	2,177,000
Lower status boundary: half B35%	Reference point	1,078,000	1,088,000
Alternative 6 female spawning biomass	2036	2,263,000	2,288,000
Alternative 7 female spawning biomass	2028	3,123,000	3,179,000
Alternative 7 female spawning biomass	2038	2,263,000	2,288,000
Maximum ABC: expected-catch scenario	2027	1,896,000	1,855,000
OFL: expected-catch scenario	2027	2,328,000	2,269,000
Maximum ABC: expected-catch scenario	2028	1,968,000	1,958,000
OFL: expected-catch scenario	2028	2,422,000	2,399,000

Biomasses are female spawning biomass at April 1, in tons. B35% is the Tier 3 BMSY proxy. The intermediate MSST tests use Alternative 6 in 2036 and Alternative 7 in 2038; they are unnecessary here because current and two-year Alternative 7 biomass exceed B35%.

Future ABC/OFL rows use each model's expected-catch scenario, with 1,375,000 t catch in each of 2027 and 2028. They are model-based maxima, separate from adopted specifications. Model 26.0 (Rceattle) is the adopted assessment model and main proposal for Tier 3 calculations and specifications; Model 26.1.2 is the sensitivity analysis. Values are rounded to the nearest 1,000 t; source exports retain their original precision. Projections condition on the revised fitted population, fixed biology and constant historical-mean recruitment.

10 F limit

Following section 4.15 of the assessment guidelines, F limit was reverse-engineered as the annual fishing mortality that would have produced the previous year's OFL using the recommended model's estimated population for that year. For this 2026 assessment, the calculation therefore used the adopted 2025 Bering Sea pollock OFL of 2.957 million t (National Marine Fisheries Service (2025)) and the Model 26.0 beginning-of-year 2025 numbers at age, fishery weights, natural mortality and realized selectivity.

Solving the annual Baranov catch equation gave F limit = 0.439 per year under mean-one selectivity, reproducing the adopted 2025 OFL. This calculation holds the fitted population and biological inputs fixed while changing fishing mortality.

The calculation finds the value of F_{limit} satisfying

$$C_{2025}^{\text{OFL}} = \sum_{a=1}^{15+} N_{a,2025}\, w_{a,2025}^{\text{fishery}} \frac{F_{\text{limit}}\, s_{a,2025}^{*}}{M_{a,2025} + F_{\text{limit}}\, s_{a,2025}^{*}} \left[1 - \exp\left\{ - \left(M_{a,2025} + F_{\text{limit}}\, s_{a,2025}^{*} \right) \right\}\right]. \qquad (1)$$

Here N is beginning-of-year abundance, w^{fishery} is fishery weight-at-age, M is annual natural mortality, and s^{*} is the fitted selectivity curve rescaled to a mean of one over ages 1–14 and 15+. Thus F_{limit} is mean annual fishing mortality across model ages. Abundance in millions of fish and weight in kg give catch in thousand tons.

11 Ecosystem considerations

A draft Ecosystem and Socioeconomic Profile (ESP) was presented in Appendix B. It brings together indicators of pollock habitat, food-web conditions and fishery performance to provide context for the assessment. The ESP complemented the population model by organizing evidence about processes that can

affect year-class strength, fish growth and the distribution of fish available to surveys and the fishery. This broader perspective helped interpret changes in abundance and age composition alongside the environmental conditions experienced by successive cohorts.

The draft 2026 Eastern Bering Sea Ecosystem Status Report provided the environmental and food-web evidence summarized here (Siddon 2026). In 2026, cool spring conditions and an extensive cold pool coincided with low egg, larval and southeastern Bering Sea age-0 abundance. At the same time, favorable zooplankton abundance and lipid content, together with above-average southeastern Bering Sea age-0 energy density, indicated good feeding conditions for surviving juveniles. These contrasting signals emphasize the importance of timing, region and life stage: low early abundance and favorable later feeding conditions can occur within the same year. Their implications for recruitment depend on survival through the subsequent winter and later juvenile stages.

The following subsections connect these observations to pollock population processes. The first considers environmental conditions, prey, competitors and predators affecting eggs, larvae and early juveniles. The second addresses the distribution, feeding conditions and condition of later juveniles and adults, including how temperature and vertical habitat use can affect survey availability. Together, these indicators helped distinguish changes in population abundance from changes in where fish occur and how effectively surveys sample them. The synthesis informs interpretation of the assessment and the risk-category evaluation summarized in Section 8; the individual indicators provided complementary evidence rather than a direct forecast of recruitment or an automatic adjustment to catch advice.

11.1 Ecosystem impacts of EBS pollock population dynamics

Environmental Processes

A very weak winter Aleutian Low in 2025/2026 brought cool Arctic air across the EBS (Lemagie and Wang 2026). Sea ice extent remained above average for six weeks during March–April 2026 (Thoman 2026). The resulting 2°C cold pool was approximately 150% larger than in 2025 and the fifth-largest during 1982–2026; the 0°C cold pool was the largest since 2013 (Rohan and Barnett 2026). Sea surface temperatures in the SEBS were colder than in 2025, especially during January–April, and remained below average for most of the year (Lemagie and Callahan 2026). In May 2026, spring winds favored Ekman transport off the shelf, influencing larval dispersal trajectories (Hennon 2026).

Prey

Large diatom anomalies were above average during 2023–2025 (Ostle and Batten 2026), and spring 2026 chlorophyll-a concentrations were average to high across the NBS and SEBS (Gann et al. 2026). These records suggested favorable prey-production conditions in their respective periods. Increased surface phosphate and a deeper mixed layer in 2024 imply wind mixing, larger phytoplankton cells, shorter food chains and more efficient energy transfer to juvenile fish (Gann 2026).

The spring Rapid Zooplankton Assessment indicated adequate small copepod abundance, with above-average large copepod abundance by late summer (Kimmel et al. 2026). Euphausiid abundance increased from 2025 (Levine et al. 2026; Spear et al. 2026). Copepod and euphausiid lipid content in the SEBS were both above average in 2026, indicating good prey quality for pelagic juveniles (Pinger et al. 2026).

Spring larval abundance and egg numbers were low, as was the larval condition ratio. Such observations were typical of cold spring conditions over the shelf, and temperature-dependent seasonal timing complicates their interpretation (Siddon 2026). SEBS age-0 abundance was low (Andrews, Domke, Murphy, Spear, et al. 2026), and age-0 energy density was above average (Page et al. 2026). The suggested increase in age-1 abundance in this juvenile-survey comparison remained unverified. Length–weight residuals for small pollock (100–250 mm) in the EBS survey improved to just below the long-term mean (Prohaska and Rohan 2026). In the NBS, age-0 abundance was average (Andrews, Domke, Murphy, Spear, et al. 2026) and energy density was below average (Page et al. 2026).

Competitors

Pelagic forager biomass increased from 2025 to 2026 to above its long-term mean, largely driven by a 58% increase in pollock biomass (Siddon 2026, 7–9). Above-average zooplankton quantity and quality moderate concerns about competition for prey among young pollock. SEBS jellyfish biomass remained average (Buser 2026) to below average (Domke et al. 2026). NBS jellyfish biomass continued its slow decline since 2023 and remained just above the time-series mean (Domke et al. 2026).

Pacific herring and capelin biomass were below average in both the NBS and SEBS (Andrews, Domke, Murphy, Dimond, et al. 2026). Bristol Bay sockeye salmon continued to decline from peak 2021/2022 levels (Cunningham et al. 2026). Strong 2020 and 2022 sablefish year classes contributed to a growing, aging population that could compete for pelagic juvenile prey; direct evidence for that competition remained unavailable (Siddon 2026).

Predators

Adult pollock diets consisted primarily of copepods and euphausiids, with a low overall proportion of cannibalism in 2026 (Aydin 2026). CNRG estimates indicated that overall predation mortality of age-1 pollock declined from 2025 to 2026 (Holsman et al. 2026). Adult Bristol Bay sockeye salmon, which prey on juvenile pollock, decreased from 2025 (Cunningham et al. 2026).

Northern fur seal pup weights at St. Paul Island exceeded the average by more than one standard deviation, and maternal trip durations were the shortest in the time series. These indicators suggested high foraging success near the island. Age-0 pollock and herring had the highest frequency of occurrence in the September 2025 fur-seal diet samples; analysis of September 2026 samples was ongoing in the draft (McHuron et al. 2026). The apex predator guild increased from 2025, driven by a 17% increase in Pacific cod, and remained below its long-term mean (Siddon 2026, 7–9). This guild level suggested low predation pressure on juvenile pollock (Siddon 2026).

11.2 Ecosystem considerations for later juveniles and adults

Distribution

Pollock biomass estimated by the standard bottom-trawl survey increased approximately 50% from 2025 to 2026, alongside a pronounced spatial pattern associated with the extensive cold pool. Adult pollock occurred primarily outside bottom waters colder than 2°C, with concentrations along the northwestern outer shelf (Siddon 2026). The cold pool therefore delineated the near-bottom habitat occupied by much of the adult population during the survey. This pattern is relevant to interpreting the biomass increase because survey catches reflected both the number and size of fish present and their availability to bottom-trawl gear. The higher survey estimate and the concentration of adults along the cold-pool margin should be considered together when comparing years. The spatial association supports a role for temperature in shaping survey availability, while the contribution of redistribution to the biomass increase remains unresolved.

Environmental Processes

Bottom temperatures in 2026 were comparable to the historical cool years 1986, 1992, 2006 and 2010 (Siddon 2026). The large cold pool provided further evidence of cool bottom conditions (Rohan and Barnett 2026). Below-average SSTs characterized the SEBS, particularly during spring (Lemagie and Callahan 2026). Adult pollock condition was above its long-term mean (Prohaska and Rohan 2026). These temperature and condition patterns described concurrent conditions; their causal relationship remained an interpretation.

Prey

Adult pollock diets continued to be dominated by copepods and euphausiids (Aydin 2026). Summer and late-summer euphausiid abundance increased from 2025 to 2026 (Levine et al. 2026; Spear et al. 2026), and above-average SEBS copepod and euphausiid lipid content provided lipid-rich prey (Pinger et al. 2026). Cannibalism formed a low proportion of adult pollock diets (Aydin 2026).

Morphometric condition, measured as length–weight residuals, for large adult pollock (>250 mm) in the EBS survey increased from 2023 to 2026 to above the long-term mean. The NBS condition series extended through 2025, when large-pollock condition remained positive and continued the increasing trend observed since 2021 (Prohaska and Rohan 2026).

Competitors

The increase in pelagic forager biomass from 2025 to 2026 was primarily driven by pollock (Siddon 2026, 7–9), suggesting a potential increase in competition within the pollock population. Above-average prey quantity, prey quality and pollock length–weight residuals indicated adequate food resources. Increasing sablefish abundance represented potential competition for pelagic prey, with direct evidence still pending (Siddon 2026).

Predators

The apex predator guild, driven by Pacific cod, increased from 2025 and remained below its long-term mean (Siddon 2026, 7–9). This pattern suggested low predation pressure on pollock (Siddon 2026). These associations provided context for the stock; independent evidence was needed to establish the underlying mechanisms. The Plan Team requested further examination of ecosystem contributions to retrospective behavior alongside the direct data-influence tests.

12 Data gaps and research priorities

The 2026 assessment compared the separately fitted configurations and the Model 26.1.2 marginal-estimation sensitivity using their matching observations and conditional observation diagnostics. Model 26.0 posterior uncertainty, predictive observation checks and nine retrospective fits were complete. The Model 26.1.2 retrospective diagnostic used fixed full-model process SDs and a conditional full 2026 reference. The two Model 26.0 simulation-retrospective experiments compared conditional biomass and recruitment revisions with the observed-data results (Section 6.3.1). Each experiment used ten simulated datasets to examine biomass and recruitment revisions.

Additional age-1 BTS selectivity and BTS data-influence tests were outside the scope of this assessment (PT-02 and PT-05). The comparisons described differences in retrospective patterns. The weight-at-age comparison in Section 4.1.3 retained the distinction between estimated schedules and uncertainty carried into population and projection outputs.

A high research priority is to refine the statistical treatment of length compositions and age observations from the fishery, bottom-trawl survey (BTS), and acoustic-trawl survey (ATS), together with paired Fourier-transform near-infrared spectroscopy (FT-NIR) and traditional morphological ageing (TMA) observations. A more statistically rigorous framework should account for sampling structure, ageing error, uncertainty in conversions between ageing methods, and dependence among observations derived from the same samples. This work should guide composition weighting and the integration of length and age information, with the resulting methods and uncertainty treatment carried into future model specifications.

The treatment of early fishery data should also be refined relative to more recent observations. Research should evaluate changes in sampling coverage, age and length information, and fishing practices across periods, and use those differences to inform selectivity assumptions and observation weights. Comparisons should assess how alternative treatments affect recruitment, biomass trends, and retrospective behavior.

Further development of random-effects models should address temporal variation in selectivity and other population or observation processes. Priorities include identifying which sources of variability the data can resolve, evaluating correlation across ages and years, and estimating process variation within a coherent framework. Simulation tests, retrospective analyses, and predictive checks should evaluate model performance and the propagation of uncertainty into stock status and catch projections.

Future assessments could explore alternative weighting methods for age composition data, such as the Dirichlet-multinomial distribution coupled with more complete random-effects specifications. Such an approach may refine historical process-error penalty weights and would help assess whether estimating this additional

variation within the model improves the treatment of age-composition data and changes the resulting stock estimates. In the process of adopting new data weighting practices, we encourage checking that the resulting data weights remain sensible and robust.

The Ecosystem and Socioeconomic Profile (ESP) provides a basis for fuller implementation and use of dynamic structural equation models (DSEM). This work should develop and test hypothesized links among environmental conditions, prey, pollock condition, and recruitment, while accounting for observation uncertainty, missing years, and time lags. Evaluation should establish the stability and predictive value of these relationships and how ESP results can inform assessment interpretation, recruitment scenarios, and future model specifications.

Additional research questions include AVO uncertainty, the 2018 recruitment profile, and stock boundaries and connectivity.

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Tables

Table 1: Catch and adopted harvest limits for EBS pollock, 1964–2026 (round-weight metric tons). Catch from 1991 onward used the catch estimates; the highlighted 2026 value was the selected annual model input, with the catch-data cutoff unspecified.

EBS catch and adopted harvest limits				
Year	OFL (t)	ABC (t)	TAC (t)	Catch (t)
1964	—	—	—	174,792
1965	—	—	—	230,551
1966	—	—	—	261,678
1967	—	—	—	550,362
1968	—	—	—	702,181
1969	—	—	—	862,789
1970	—	—	—	1,256,565
1971	—	—	—	1,743,763
1972	—	—	—	1,874,534
1973	—	—	—	1,758,919
1974	—	—	—	1,588,390
1975	—	—	—	1,356,736
1976	—	—	—	1,177,822
1977	—	950,000	950,000	978,370
1978	—	950,000	950,000	979,431
1979	—	1,100,000	950,000	935,714
1980	—	1,300,000	1,000,000	958,280
1981	—	1,300,000	1,000,000	973,502
1982	—	1,300,000	1,000,000	955,964
1983	—	1,300,000	1,000,000	981,450
1984	—	1,300,000	1,200,000	1,092,055
1985	—	1,300,000	1,200,000	1,139,676
1986	—	1,300,000	1,200,000	1,141,993
1987	—	1,300,000	1,200,000	859,416
1988	—	1,500,000	1,300,000	1,228,721
1989	—	1,340,000	1,340,000	1,229,600
1990	—	1,450,000	1,280,000	1,455,193
1991	—	1,676,000	1,300,000	1,195,644
1992	1,770,000	1,490,000	1,300,000	1,390,299
1993	1,340,000	1,340,000	1,300,000	1,326,602
1994	1,590,000	1,330,000	1,330,000	1,329,352
1995	1,500,000	1,250,000	1,250,000	1,264,247
1996	1,460,000	1,190,000	1,190,000	1,192,781
1997	1,980,000	1,130,000	1,130,000	1,124,433
1998	2,060,000	1,110,000	1,110,000	1,102,159
1999	1,720,000	992,000	992,000	989,680
2000	1,680,000	1,139,000	1,139,000	1,132,710
2001	3,536,000	1,842,000	1,400,000	1,387,197
2002	3,530,000	2,110,000	1,485,000	1,480,774
2003	3,530,000	2,330,000	1,491,760	1,490,779
2004	2,740,000	2,560,000	1,492,000	1,480,552
2005	2,100,000	1,960,000	1,478,500	1,483,022
2006	2,090,000	1,930,000	1,485,000	1,488,031
2007	1,640,000	1,394,000	1,394,000	1,354,502

EBS catch and adopted harvest limits				
Year	OFL (t)	ABC (t)	TAC (t)	Catch (t)
2008	1,440,000	1,000,000	1,000,000	990,578
2009	977,000	815,000	815,000	810,784
2010	918,000	813,000	813,000	810,186
2011	2,450,000	1,270,000	1,252,000	1,199,031
2012	2,474,000	1,220,000	1,200,000	1,205,214
2013	2,550,000	1,375,000	1,247,000	1,270,760
2014	2,795,000	1,369,000	1,267,000	1,297,417
2015	3,330,000	1,637,000	1,310,000	1,321,574
2016	3,910,000	2,090,000	1,340,000	1,352,681
2017	3,640,000	2,800,000	1,345,000	1,359,181
2018	4,797,000	2,592,000	1,364,341	1,379,288
2019	3,914,000	2,163,000	1,397,000	1,409,346
2020	4,085,000	2,043,000	1,425,000	1,367,236
2021	2,594,000	1,626,000	1,375,000	1,376,258
2022	1,469,000	1,111,000	1,111,000	1,105,419
2023	3,381,000	1,910,000	1,300,000	1,310,592
2024	3,162,000	2,313,000	1,313,580	1,311,261
2025	2,957,000	2,417,000	1,389,000	1,326,216
2026	2,496,000	2,036,000	1,389,500	1,312,505

Catch for 1991–2026 uses the revised annual estimates. Model inputs use the same totals at full precision, converted to thousand tons. Pre-1991 catch and adopted harvest limits retain their previous sources. Dashes mean unavailable.

All Bering Sea pollock retained/discarded, gear and sector records are summed once. Explicit Bogoslof (518) and outside-stock area codes are excluded. The 23 records with blank reporting-area codes in 1998 retain their Bering Sea classification and contribute 83,077.58 t. The year-by-year reconciliation is in the catch-revision table.

The 2026 CSV total is 1,312,504.580845496 t and is used as the annual input under the author's instruction. The CSV supplies no within-year catch cutoff; the author has confirmed this CSV as the correct annual input version. The previous 1,310,000-t forecast and October 17 catch-to-date are archived in the revision record. Annual source totals.

Table 2: Selected management and monitoring milestones affecting the EBS pollock fishery, 1977–2017. Dates distinguish Council recommendations, enactment, voluntary programs and regulatory implementation. BSAI- or GOA-wide scope was stated where applicable; the table was selective rather than a complete regulatory history.

Historical pollock management and monitoring measures		
Year	Measure and scope	Sources
1977	Preliminary BSAI fishery management plan (FMP), including closure areas.	SAFE 2024; History 1997
1982	BSAI groundfish FMP implemented; Chinook salmon bycatch limits established for foreign trawlers.	SAFE 2024; History 1997
1984	BSAI groundfish optimum yield capped at 2 million t; Chinook salmon bycatch limits for foreign trawling reduced.	SAFE 2024; History 1997
1990	Domestic observer program and associated data reporting began.	SAFE 2024; NOAA history
1992	Pollock allocations under the Western Alaska Community Development Quota (CDQ) program began.	SAFE 2024
1993–1994	Prohibited Species Donation Program established in 1993; voluntary salmon donations in 1994 are reported in the accepted assessment history.	Council overview; SAFE 2024
1994	Council recommended minimum codend mesh/design standards; an implemented NMFS mesh rule is not established by the reviewed sources.	History 1997; Gear review
1994	NMFS began publishing individual-vessel bycatch rates online.	SAFE 2024; History 1997
1994–1995	Emergency Chum Salmon Savings Area in 1994; permanent chum savings-area provisions under Amendment 35 in 1995, alongside the historical Chinook closure/trigger regime.	2023 notice history; SAFE 2024
1998	Amendment 49 improved retention/utilization requirements for pollock and Pacific cod took effect January 3.	Amendment 49
1998	American Fisheries Act (AFA) enacted, establishing the framework for sector allocations and fishery cooperatives.	SAFE 2024; AFA rule
1999	AFA provisions implemented for catcher/processors.	SAFE 2024; AFA rule
1999	Emergency rule introduced temporal and spatial pollock dispersal measures and trawl exclusion zones around selected Steller sea lion rookeries and haulouts in the BSAI and GOA.	1999 emergency rule
2000	AFA provisions implemented for the remaining catcher-vessel and mothership sectors.	SAFE 2024; AFA rule
2001	Pollock industry began the voluntary chum salmon rolling-hotspot program.	2023 notice history; SAFE 2024
2002	Pollock industry began the voluntary Chinook salmon rolling-hotspot program.	2023 notice history; SAFE 2024
2005	Council selected Amendment 84 in October to provide a salmon bycatch intercooperative agreement (ICA) alternative to fixed savings-area closures.	Amendment 84
2006	The B-season exempted fishing permit tested the ICA/rolling-hotspot approach before general regulatory implementation.	Amendment 84
2007	Amendment 84 regulations, effective November 28, exempted pollock vessels participating in an approved salmon bycatch ICA from specified savings-area closures.	Amendment 84
2010–2011	Amendment 91 final rule effective September 29, 2010; Chinook PSC limits, incentive plan agreements (IPAs), performance standards and enhanced monitoring operated in the 2011 fishery.	Amendment 91
2015	Council took final action on Amendment 110 in April, recommending linked Chinook/chum avoidance measures and abundance-based Chinook limits.	Amendment 110
2016	Amendment 110 final rule published June 10, effective July 11. It strengthened IPAs and changed pollock seasonal allocations to 45% A season / 55% B season.	Amendment 110
2017	First fishing year informed by the Amendment 110 three-system abundance index in 2016. Low-abundance limits apply when the index is at or below 250,000 Chinook salmon.	Amendment 110

Historical source table (CSV); historical source table (Markdown).

Table 3: EBS pollock catch by reporting area and season, 1991–2026 (tons). Northwest (NW) comprises NMFS areas 520–539; Southeast (SE) comprises areas 500–517 and 519. Area 518 (Bogoslof) was excluded. A and B group records with week-ending dates before June 1 and from June 1 onward, respectively. The catch data extend through October 17, 2026. Only the 1998 records included catch without an area; this catch was allocated between NW and SE in proportion to reported catch within each season. Totals include retained and discarded catch; values were rounded to whole tons.

Year	SE A	SE B	NW A	NW B	SE	NW	A	B	Total
1991	297,202	356,353	12,191	529,917	653,555	542,109	309,393	886,271	1,195,664
1992	454,947	375,612	101,597	458,143	830,559	559,741	556,544	833,755	1,390,299
1993	475,143	619,287	93,013	139,160	1,094,429	232,173	568,156	758,446	1,326,602
1994	586,105	566,470	11,026	165,751	1,152,575	176,777	597,131	732,221	1,329,352
1995	600,499	571,807	3,631	88,310	1,172,306	91,941	604,129	660,117	1,264,247
1996	549,297	537,545	1,804	104,135	1,086,843	105,939	551,101	641,680	1,192,781
1997	557,106	262,784	2,363	302,180	819,889	304,544	559,469	564,964	1,124,433
1998	515,420	443,514	1,632	141,593	958,934	143,226	517,052	585,107	1,102,159
1999	414,030	368,953	4,139	202,558	782,983	206,698	418,169	571,511	989,680
2000	439,023	400,154	19,363	274,170	839,177	293,532	458,386	674,324	1,132,710
2001	444,565	517,412	108,013	317,207	961,977	425,220	552,578	834,619	1,387,197
2002	561,061	599,272	36,693	283,749	1,160,334	320,442	597,754	883,022	1,480,776
2003	446,152	487,039	151,465	406,123	933,191	557,588	597,617	893,162	1,490,779
2004	556,469	533,538	50,661	339,883	1,090,008	390,544	607,130	873,422	1,480,552
2005	476,970	325,184	120,320	560,548	802,154	680,868	597,290	885,732	1,483,022
2006	585,507	241,700	18,789	642,034	827,207	660,824	604,297	883,734	1,488,031
2007	505,306	222,943	62,504	563,748	728,249	626,253	567,811	786,691	1,354,502
2008	358,936	123,762	44,801	463,079	482,698	507,880	403,738	586,840	990,578
2009	247,944	110,307	81,575	370,957	358,252	452,532	329,520	481,264	810,784
2010	124,670	130,443	199,011	356,061	255,114	555,072	323,681	486,505	810,186
2011	401,755	346,128	102,252	348,897	747,882	451,149	504,007	695,024	1,199,031
2012	380,373	238,497	104,926	481,418	618,870	586,344	485,299	719,915	1,205,214
2013	415,014	280,652	94,763	480,331	695,667	575,094	509,777	760,983	1,270,760
2014	469,973	388,267	50,465	388,712	858,240	439,177	520,438	776,979	1,297,417
2015	267,095	429,153	258,574	366,752	696,248	625,326	525,669	795,905	1,321,574
2016	458,044	709,028	81,531	104,078	1,167,072	185,609	539,576	813,106	1,352,681
2017	544,028	633,993	37,730	143,430	1,178,021	181,159	581,758	777,423	1,359,181
2018	598,533	450,160	3,842	326,753	1,048,692	330,595	602,375	776,913	1,379,288
2019	614,949	487,217	2,649	304,532	1,102,166	307,181	617,598	791,749	1,409,346
2020	560,438	299,978	85,717	421,102	860,416	506,820	646,156	721,080	1,367,236
2021	554,774	469,234	56,779	295,470	1,024,009	352,249	611,554	764,704	1,376,258
2022	487,216	411,573	9,018	197,610	898,790	206,629	496,235	609,184	1,105,419
2023	568,455	319,251	11,335	411,552	887,705	422,887	579,789	730,803	1,310,592
2024	530,902	347,432	55,087	377,840	878,334	432,927	585,989	725,272	1,311,261
2025	445,959	270,015	157,475	452,767	715,974	610,242	603,434	722,782	1,326,216
2026	528,440	205,467	75,601	458,034	733,908	533,635	604,041	663,501	1,267,543

Table 4: Retained and discarded EBS pollock catch by reporting area, 1991–2026 (tons), from annual catch-accounting data. Northwest (NW) comprises NMFS areas 520–539; Southeast (SE) comprises areas 500–517 and 519. Area 518 (Bogoslof) was excluded. Discarded percentage equals discarded catch divided by total catch. Values were rounded to whole tons. The 2026 row gives the estimated full-year catch used in the assessment, not an observed year-end total.

Year	SE Discarded	NW Discarded	SE Retained	NW Retained	Total	Discarded %
1991	66,792	48,257	586,763	493,852	1,195,664	9.6
1992	71,194	57,578	759,365	502,163	1,390,299	9.3
1993	83,986	26,100	1,010,443	206,073	1,326,602	8.3
1994	88,098	16,084	1,064,476	160,693	1,329,352	7.8
1995	87,492	9,715	1,084,813	82,226	1,264,247	7.7
1996	71,368	4,838	1,015,474	101,100	1,192,781	6.4
1997	71,032	22,557	748,858	281,986	1,124,433	8.3
1998	14,291	1,581	944,511	141,777	1,102,159	1.4
1999	26,912	1,912	756,071	204,786	989,680	2.9
2000	19,678	1,942	819,499	291,591	1,132,710	1.9
2001	14,874	2,450	947,103	422,770	1,387,197	1.2
2002	19,430	1,441	1,140,904	319,002	1,480,776	1.4
2003	13,795	2,959	919,397	554,629	1,490,779	1.1
2004	20,380	2,781	1,069,628	387,763	1,480,552	1.6
2005	14,838	2,586	787,316	678,282	1,483,022	1.2
2006	11,877	3,677	815,330	657,147	1,488,031	1.0
2007	12,334	3,769	715,915	622,484	1,354,502	1.2
2008	5,968	1,643	476,730	506,237	990,578	0.8
2009	4,014	1,936	354,238	450,596	810,784	0.7
2010	2,490	1,270	252,623	553,802	810,186	0.5
2011	3,444	1,376	744,438	449,773	1,199,031	0.4
2012	4,080	1,190	614,791	585,154	1,205,214	0.4
2013	4,084	1,225	691,582	573,869	1,270,760	0.4
2014	12,556	1,786	845,684	437,391	1,297,417	1.1
2015	7,055	2,418	689,193	622,907	1,321,574	0.7
2016	8,124	1,036	1,158,948	184,574	1,352,681	0.7
2017	6,848	1,356	1,171,173	179,803	1,359,181	0.6
2018	9,170	2,005	1,039,523	328,590	1,379,288	0.8
2019	7,126	1,979	1,095,040	305,202	1,409,346	0.6
2020	9,363	2,450	851,053	504,370	1,367,236	0.9
2021	12,379	1,534	1,011,629	350,715	1,376,258	1.0
2022	9,898	3,538	888,891	203,091	1,105,419	1.2
2023	10,219	4,685	877,486	418,201	1,310,592	1.1
2024	12,935	4,131	865,399	428,796	1,311,261	1.3
2025	6,355	899	709,618	609,343	1,326,216	0.5
2026	5,815	3,182	769,440	534,068	1,312,505	0.7

Table 5: EBS pollock fishery catch-at-age estimates, 1964–2025 (million fish). Ages 15 and older were pooled as 15+. Catch numbers were calculated from assessment proportions, annual fishery weights at age and catch biomass where complete annual numbers were unavailable. Age-specific values were rounded to 0.1 million fish; All ages totals were rounded to the nearest million fish.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	All ages
1964	8.3	34.8	54.6	63.8	31.5	88.5	39.8	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	330
1965	7.2	7.8	103.3	278.4	68.2	17.0	16.4	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	506
1966	16.9	100.2	34.2	250.2	157.8	14.4	15.7	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	596
1967	14.1	164.0	859.9	130.6	238.2	56.6	17.1	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,489
1968	57.3	310.9	244.1	815.5	186.9	53.2	63.7	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,741
1969	33.6	182.6	1051.1	722.5	248.2	5.3	27.8	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,289
1970	730.1	1109.2	1743.2	823.0	159.5	51.9	25.9	14.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4,658
1971	766.6	229.0	1278.9	858.5	1272.7	123.6	81.2	22.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4,633
1972	155.0	747.6	1724.5	1381.2	578.7	227.0	86.2	31.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4,931
1973	36.3	327.2	396.1	861.1	659.1	450.3	250.5	181.5	81.4	14.7	1.8	0.5	0.1	0.5	0.0	3,261
1974	117.7	2558.9	945.7	269.0	361.3	195.1	124.9	105.3	103.3	43.5	17.7	4.6	4.6	0.8	0.7	4,853
1975	34.3	602.7	2774.6	213.3	56.7	106.6	102.1	55.6	32.7	23.0	5.7	2.3	0.4	0.5	0.0	4,010
1976	0.6	357.3	1351.8	909.8	89.7	41.4	57.3	66.5	51.7	25.5	11.8	8.0	2.1	0.0	0.0	2,973
1977	104.3	685.8	916.8	664.3	238.5	53.0	19.5	28.1	22.5	18.0	9.3	4.6	3.4	0.7	0.2	2,769
1978	29.4	455.2	752.9	638.6	368.2	99.7	28.8	17.3	19.7	15.8	11.1	4.3	1.8	0.5	0.2	2,444
1979	89.6	479.6	635.7	371.0	346.6	190.3	49.7	22.7	31.7	24.3	15.6	7.0	2.6	0.5	0.5	2,267
1980	9.0	424.0	754.9	406.7	231.2	193.5	76.8	34.5	19.9	21.9	23.3	14.6	7.1	2.3	1.1	2,221
1981	0.6	75.8	1062.5	669.3	238.2	107.9	54.2	31.1	16.9	9.8	7.9	4.8	1.6	0.7	0.3	2,282
1982	4.5	24.0	152.6	1108.4	399.3	98.1	34.0	34.1	20.4	8.6	5.1	3.0	1.8	0.7	0.3	1,895
1983	5.2	121.3	161.4	320.2	835.8	223.3	42.4	25.3	20.3	11.4	7.8	5.0	3.6	1.8	0.4	1,785
1984	1.9	41.8	80.8	392.7	448.3	596.3	122.0	32.4	22.9	14.3	6.5	2.3	2.7	1.5	1.8	1,768
1985	2.4	50.9	351.3	112.2	337.0	296.3	408.4	103.6	33.7	23.8	22.9	9.8	8.7	3.7	4.7	1,770
1986	2.8	78.5	84.2	683.0	195.4	345.0	202.5	195.5	54.5	13.9	3.0	2.4	0.2	1.1	0.0	1,862
1987	0.0	16.3	91.9	63.9	340.5	114.4	100.9	74.7	203.6	44.5	31.9	17.7	23.8	5.0	6.6	1,136
1988	0.0	9.7	410.9	381.6	228.2	492.7	203.4	95.0	35.5	87.6	16.5	9.2	3.4	5.0	5.6	1,984
1989	0.0	4.3	49.7	134.4	406.8	150.4	516.1	86.9	93.6	29.2	116.4	9.8	3.6	2.3	5.3	1,609
1990	1.4	36.1	62.2	239.8	219.3	522.1	141.2	402.6	71.8	111.4	9.9	65.6	9.3	5.1	10.1	1,908
1991	0.7	112.9	43.8	90.3	153.9	184.4	497.5	78.1	288.0	28.9	144.1	18.7	91.2	22.8	53.3	1,808
1992	1.1	84.7	675.8	130.1	79.6	108.7	133.8	253.6	102.3	147.0	58.0	46.3	13.4	43.8	34.5	1,913
1993	0.1	7.4	260.5	1146.7	103.0	66.2	66.4	56.5	86.2	21.2	32.7	12.4	13.5	6.8	16.1	1,895
1994	0.7	30.2	55.1	361.2	1059.7	175.7	53.5	19.1	13.1	20.2	9.7	9.4	7.6	4.0	8.3	1,827
1995	0.0	0.5	72.9	146.8	395.5	761.1	136.3	34.6	12.3	7.5	17.5	5.0	5.8	1.7	8.9	1,606
1996	0.0	21.7	48.1	71.8	161.0	361.9	481.7	184.6	33.6	13.4	7.9	8.8	4.3	5.8	5.3	1,410
1997	1.0	77.7	40.3	119.0	455.1	289.0	256.4	198.6	64.0	13.3	6.0	4.6	2.9	4.8	9.1	1,542
1998	0.3	42.0	84.5	70.5	153.4	702.8	199.6	131.7	110.7	27.8	6.1	5.6	2.6	2.5	4.5	1,545
1999	0.2	10.3	298.7	225.0	103.0	157.0	469.7	131.0	56.5	33.2	4.0	2.2	0.9	0.5	2.1	1,494
2000	0.0	16.1	82.4	428.5	346.5	106.7	168.4	357.7	84.9	29.7	22.0	5.2	1.4	0.6	1.0	1,651
2001	0.0	3.2	42.8	154.5	581.0	415.0	137.2	129.0	157.2	57.9	33.6	16.2	5.5	3.1	1.9	1,738
2002	0.8	47.0	108.1	217.8	287.6	606.3	268.0	98.5	85.9	93.9	34.6	14.4	11.0	3.0	1.8	1,879
2003	0.0	14.5	411.8	324.1	360.4	301.5	337.6	158.6	49.4	39.3	35.7	22.9	6.6	3.6	3.2	2,069
2004	0.0	0.5	89.6	831.1	480.6	236.8	169.3	156.3	65.0	16.1	17.1	25.3	9.4	5.9	6.9	2,110
2005	0.0	4.8	52.2	392.9	863.8	484.6	159.5	68.1	66.6	30.1	10.0	9.1	3.2	2.5	3.4	2,151
2006	0.0	9.9	84.2	295.8	619.6	597.6	278.6	107.3	48.0	38.4	17.7	8.2	8.3	5.3	7.2	2,126
2007	1.7	15.7	59.2	139.2	389.4	512.0	300.8	137.1	47.6	27.5	21.9	8.9	6.5	3.4	10.8	1,682
2008	0.0	25.2	58.8	79.2	147.0	309.7	242.3	148.7	84.3	22.2	17.6	14.4	8.6	2.8	12.7	1,173
2009	0.0	1.3	175.5	200.6	82.6	114.4	124.3	104.3	66.6	40.2	23.5	7.6	7.5	2.7	8.7	960

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	All ages
2010	1.1	26.5	31.8	559.4	220.5	54.7	43.0	57.7	51.8	31.8	16.0	8.6	6.0	4.4	5.1	1,118
2011	0.4	10.4	193.3	115.4	809.2	284.7	63.6	37.5	38.5	41.4	25.8	12.5	1.8	4.0	4.3	1,643
2012	0.0	22.3	116.7	946.7	172.8	432.6	141.6	36.7	17.4	14.6	15.9	13.5	7.4	6.1	3.3	1,948
2013	1.8	1.0	64.0	342.4	955.9	194.4	156.5	70.0	20.7	12.8	12.8	10.9	7.8	4.8	5.7	1,861
2014	0.0	39.2	31.0	167.8	399.3	751.8	210.2	86.2	29.8	9.0	4.5	4.5	4.6	2.8	6.0	1,747
2015	0.0	15.5	632.4	196.4	228.6	384.3	510.1	88.8	42.1	17.7	2.9	2.1	3.1	2.7	1.2	2,128
2016	0.0	0.5	90.6	1390.3	159.9	174.5	174.8	224.7	34.1	13.8	8.0	0.5	1.2	0.7	1.0	2,274
2017	0.0	2.2	28.2	549.1	899.0	215.5	147.6	122.1	97.3	21.8	7.2	5.6	0.5	0.2	0.1	2,096
2018	0.0	1.3	13.8	115.0	1216.1	506.6	104.8	82.0	60.6	25.9	4.3	1.1	0.4	0.6	0.5	2,133
2019	0.7	10.9	12.3	18.4	157.6	916.8	422.5	93.2	52.1	53.0	10.1	2.9	0.8	0.0	0.0	1,751
2020	3.5	247.7	85.5	101.1	135.2	551.1	597.8	124.0	52.8	38.6	27.3	6.8	1.8	1.1	0.0	1,974
2021	0.0	111.5	1297.0	144.2	110.1	107.2	309.6	296.0	72.1	26.5	16.2	8.5	2.1	0.0	0.4	2,501
2022	0.0	62.3	174.5	1035.4	183.7	70.4	79.5	141.9	81.1	16.3	11.3	4.1	6.0	1.0	0.0	1,867
2023	0.0	25.2	86.6	263.0	1473.1	227.2	29.4	45.4	63.6	42.6	18.8	5.4	8.6	2.6	0.4	2,292
2024	0.7	2.9	104.8	131.5	362.9	1277.6	113.7	22.3	32.9	22.8	25.3	10.2	3.4	1.9	0.1	2,113
2025	0.0	28.8	50.7	100.3	129.5	526.2	852.1	92.5	29.3	26.0	8.0	19.7	0.0	0.0	6.2	1,869

Table 6:Bycatch estimates (t) of other species caught in the Bering Sea directed pollock fishery, 1991-2026.

Year	P.cod	Rock.Sole	Flathead	Arrowtooth	POP	Yellowfin	Sablefish	Shark	Atka.Mkrl	Skates	Other
1991	24,310	5,121	NA	5,719	418	418	10	NA	24	NA	10,973
1992	24,005	7,234	3	4,311	173	892	8	NA	261	NA	15,552
1993	20,931	8,714	NA	1,223	283	1,102	2	NA	40	NA	8,127
1994	14,409	3,010	NA	2,011	171	1,208	2	NA	44	NA	4,435
1995	19,777	2,180	2,175	1,177	142	675	12	NA	211	NA	1,897
1996	15,174	2,042	3,208	1,844	303	1,798	7	NA	384	NA	3,718
1997	8,263	1,523	2,350	985	428	606	2	NA	83	NA	3,187
1998	6,255	770	2,048	1,713	617	1,745	2	NA	10	NA	2,449
1999	3,220	1,059	1,885	273	121	350	7	NA	158	NA	1,740
2000	3,433	2,688	2,510	979	21	1,466	12	NA	2	NA	1,859
2001	3,880	1,673	2,199	530	574	594	21	NA	41	NA	3,226
2002	5,887	1,886	1,845	607	543	768	34	NA	221	NA	2,775
2003	5,968	1,419	1,501	618	935	210	48	NA	762	NA	1,992
2004	6,437	2,554	2,104	557	394	841	17	NA	1,053	NA	2,649
2005	7,413	1,125	2,352	651	652	63	11	NA	678	NA	2,759
2006	7,291	1,361	2,862	1,089	736	256	9	NA	789	NA	4,094
2007	5,630	510	4,226	2,795	625	86	12	NA	315	NA	3,731
2008	6,971	2,150	4,315	1,715	336	552	5	NA	15	NA	5,217
2009	7,875	7,591	4,666	2,202	114	271	3	NA	25	NA	4,969
2010	6,908	2,240	4,357	1,454	231	1,057	2	NA	55	NA	2,877
2011	10,043	8,481	4,886	1,602	658	1,083	1	66	900	2,352	1,156
2012	10,066	6,702	3,968	749	706	1,517	1	55	263	2,018	1,483
2013	8,955	6,379	3,146	966	611	2,097	0	43	70	1,750	746
2014	5,242	4,360	2,554	758	1,301	1,954	1	75	117	813	2,526
2015	8,303	1,709	2,260	403	2,525	863	0	52	202	824	2,875
2016	4,980	1,095	1,554	291	3,191	870	18	60	68	423	1,716
2017	6,151	1,708	908	204	4,438	578	96	91	61	448	2,120
2018	4,271	1,077	974	271	3,804	743	396	62	543	508	2,048
2019	6,213	1,117	1,087	422	7,972	444	1,237	101	367	509	790
2020	9,184	866	1,971	688	5,970	1,211	3,453	132	569	827	1,465
2021	9,104	830	1,531	413	2,468	754	1,105	173	545	912	566
2022	3,785	677	948	242	1,445	887	321	55	157	561	357
2023	3,821	549	844	245	1,345	750	487	271	40	400	458
2024	2,923	888	961	332	1,811	523	103	130	45	371	518
2025	3,315	557	1,813	293	3,995	231	51	155	12	438	873
2026	6,549	1,586	3,367	489	2,412	566	125	194	13	823	636

Source: AKFIN / NMFS Alaska Regional Office FMP catch export. Estimates sum retained and discarded catch across both pollock target categories and all reported gears in the BS subarea. Pollock, salmon, halibut, Non TAC Species, and records without a species group are excluded. Other combines remaining named source groups, including other flatfish and rockfish, Greenland turbot, Alaska plaice, squid, octopus, sculpins, and historical Other / Other Species groups; definitions follow the source export rather than a fixed modern FMP list. NA means no records for that category and year, rather than a measured zero. Source group names and the complete column map are available with the annual CSV. Values are summed before rounding; units are metric tons. The 2026 estimates are preliminary through the week ending October 24. Download annual estimates (CSV) · Column definitions (CSV).

Table 7:Pollock bycatch (t) in identified non-pollock directed Bering Sea fisheries, 1991-2026.

Year	Rock.sole	Other.flats	Other.spp	P.cod	Yellowfin.sole	Total
1991	9,711	7,992	756	10,695	NA	29,155
1992	9,825	1,372	568	20,778	13,101	45,644
1993	18,583	2,581	524	31,299	15,253	68,240
1994	15,784	6,770	89	26,594	33,200	82,438
1995	7,766	5,211	58	25,691	27,041	65,768
1996	7,699	5,457	205	22,382	22,255	57,997
1997	9,123	3,480	13	33,658	24,101	70,375
1998	3,960	3,011	61	10,469	15,339	32,840
1999	5,207	4,772	258	21,131	8,701	40,070
2000	5,481	7,068	43	14,509	13,425	40,526
2001	4,578	4,740	488	11,571	16,503	37,879
2002	9,942	2,220	52	15,256	14,490	41,960
2003	4,925	3,672	261	15,926	11,579	36,362
2004	8,976	6,396	194	18,650	10,384	44,600
2005	7,235	5,058	202	14,110	10,313	36,917
2006	6,986	3,826	143	15,168	5,967	32,091
2007	3,245	4,353	276	20,320	4,021	32,215
2008	4,931	4,822	17	9,534	9,828	29,132
2009	6,172	3,505	14	7,876	7,037	24,603
2010	6,074	3,317	86	6,576	5,179	21,232
2011	6,931	2,302	301	8,981	8,674	27,189
2012	6,704	1,751	413	8,377	11,198	28,443
2013	7,327	4,048	238	9,801	20,172	41,586
2014	11,259	6,404	203	11,502	24,713	54,080
2015	9,387	4,994	430	9,062	21,282	45,154
2016	11,850	3,687	450	9,071	22,306	47,365
2017	5,616	3,612	508	8,319	23,414	41,471
2018	5,182	3,525	957	8,008	28,235	45,908
2019	3,176	7,972	1,367	7,594	23,153	43,262
2020	6,401	2,373	728	5,512	31,651	46,666
2021	2,399	5,098	1,415	4,316	24,845	38,073
2022	2,977	5,505	2,627	6,260	26,515	43,884
2023	11,048	4,586	3,076	7,182	22,348	48,239
2024	15,126	4,356	1,929	6,690	18,895	46,996
2025	10,776	2,070	1,279	6,427	8,710	29,263
2026	13,847	7,040	1,345	6,599	5,898	34,729

Source: AKFIN / NMFS Alaska Regional Office FMP catch export, BS subarea. Estimates include retained and discarded pollock catch and all reported gears. Pollock-directed trips, blank trip targets, and No retained catch targets are excluded. Other.flats combines flathead sole, arrowtooth flounder, other flatfish, Alaska plaice, Kamchatka flounder, and Greenland turbot targets. Other.spp combines the remaining identified targets: rockfish, sablefish, Atka mackerel, Other Species, and halibut. Rock.sole is the source Rock Sole - BSAI target; it is not restricted to a separately identified northern rock sole target. NA means no records for that target group and year. Total sums the included unrounded values; displayed columns may differ from Total by rounding. Units are metric tons. The 2026 estimates are preliminary through the week ending October 31. The complete target map and exclusion totals accompany the annual CSV. Download annual estimates (CSV) · Column definitions (CSV).

Table 8:Bycatch estimates of prohibited species in the BSAI midwater pollock fishery, 1991–2026.

Year	Bairdi	Chinook	Halib	Halib.M	Herring	NonChin	Snow Crab	Red King	Blue King	Golden King
1991	250,106	34,409	526	NA	3,096	23,356	1,683,683	535	NA	NA
1992	1,042,484	28,760	1,651	NA	631	39,742	3,558,922	7,885	NA	NA
1993	387,375	32,537	634	NA	520	239,393	215,743	9,343	NA	NA
1994	149,066	29,827	612	479	1,529	84,718	302,281	667	NA	NA
1995	46,287	8,800	157	140	798	14,509	59,936	2,013	NA	NA
1996	18,555	50,287	229	202	1,168	74,423	42,329	2,572	NA	NA
1997	6,525	43,337	160	127	1,089	61,504	88,589	NA	NA	NA
1998	38,100	50,836	200	162	750	59,571	55,197	9,560	NA	NA
1999	1,088	11,883	85	72	785	45,117	12,831	1	NA	NA
2000	186	4,615	92	80	482	58,409	1,834	NA	NA	NA
2001	122	32,588	196	164	224	55,943	2,229	39	NA	NA
2002	700	34,344	151	127	108	80,572	1,879	9	NA	NA
2003	763	44,712	86	73	948	186,564	749	52	9	0
2004	1,126	51,115	94	90	1,065	440,055	704	10	4	2
2005	623	65,827	101	96	421	695,010	2,157	0	0	1
2006	1,020	79,614	119	111	220	290,862	2,775	25	0	0
2007	859	109,704	275	262	345	82,410	2,845	7	0	3
2008	814	19,121	253	245	125	13,175	4,756	33	8	3
2009	898	8,579	254	239	65	41,833	3,079	34	0	0
2010	886	7,301	135	120	186	12,779	5,182	16	35	0
2011	2,943	24,106	258	230	346	185,307	4,495	4	26	0
2012	1,137	9,853	313	279	2,167	20,022	2,913	3	0	0
2013	1,577	11,436	130	114	959	123,792	3,873	0	6	4
2014	886	14,429	135	119	151	218,129	3,331	7	0	0
2015	1,180	17,583	118	104	1,386	236,212	2,942	0	0	0
2016	468	21,222	98	86	1,425	338,818	833	6	0	0
2017	363	29,520	78	77	956	466,485	303	39	0	3
2018	908	13,567	48	48	307	281,463	277	14	0	0
2019	121	24,006	91	91	1,080	332,049	69	25	0	0
2020	1,390	30,519	77	77	3,720	323,153	1,713	10	1	4
2021	473	13,541	84	84	1,698	544,918	502	12	0	0
2022	114	6,278	120	120	1,678	241,955	42	14	5	0
2023	855	11,816	37	37	3,059	111,881	64	15	0	2
2024	790	8,034	22	22	1,276	34,888	110	108	1	4
2025	505	19,702	50	50	3,017	142,809	744	45	1	2
2026	1,119	14,503	43	43	3,158	145,788	2,741	93	0	5

Source: author-provided AKFIN / NMFS Alaska Regional Office export, received from AKR October 27, 2026 and loaded November 7, 2026 (earlier source dates remain in some historical records). Only trips classified as Pollock - midwater are included, with no additional gear or vessel-sector filter. Herring, halibut catch (Halib), and halibut mortality (Halib.M) are metric tons; other columns are estimated numbers of individuals. Values are summed before rounding. NA denotes unavailable estimates; zero denotes a reported zero. Sums use available values when individual records are missing; halibut mortality is unavailable for 1991–1993 and has some missing records in 1998–2003. The 2026 values are preliminary, through the week ending October 24. Other King Crab is outside the species columns of the example table. Download annual PSC estimates (CSV) · Column definitions (CSV).

Table 9:Estimated catch (t) of selected nontarget-species groups in the BSAI directed pollock fishery, 2003-2026.

Year	Jellies	MiscFish	SeaStar	Osmerid	Grenadier	Eelpouts	Sea.pen	Anemone	Snails	Other
2003	5,644	101	89	10	21	7	1	0	1	2
2004	6,590	90	7	22	14	1	1	0	1	1
2005	5,198	158	10	13	14	1	2	0	7	3
2006	2,718	154	11	102	16	21	2	1	0	14
2007	2,403	203	5	140	28	119	4	0	0	13
2008	4,185	121	20	4	28	9	1	1	2	9
2009	8,118	135	10	6	5	4	3	1	1	3
2010	2,518	150	12	1	2	1	3	2	1	10
2011	8,233	277	27	2	2	1	3	2	1	8
2012	3,519	143	7	2	2	1	3	1	1	4
2013	5,294	121	15	1	2	2	2	2	1	10
2014	12,767	45	30	2	10	8	3	2	2	9
2015	4,951	90	42	24	4	11	2	2	1	5
2016	2,203	75	55	5	4	23	1	1	0	4
2017	6,153	48	12	3	3	18	1	1	1	2
2018	8,252	52	25	1	9	4	1	1	0	4
2019	3,889	73	51	1	9	2	1	0	0	6
2020	3,150	94	61	1	43	6	1	6	1	26
2021	7,831	35	20	0	55	1	2	3	1	3
2022	7,609	23	185	1	11	0	1	1	1	11
2023	7,088	38	28	0	86	1	2	3	1	6
2024	4,402	43	16	3	18	3	1	4	0	3
2025	1,769	99	8	4	6	14	2	1	1	3
2026	4,418	68	5	3	1	1	2	0	1	2

Source: AKFIN / NMFS Alaska Regional Office nontarget catch-accounting export. BSAI records (BS and AI) are included; GOA and inside-water records are excluded. Both pollock target categories, all reported gears, and retained and discarded records are combined using Nontarget Estimate (mt), not the species-count field. Squid, sculpins, and seabirds are outside the selected groups of this table and are excluded. MiscFish is the source Misc fish group. Osmerid combines capelin, eulachon, other osmerids, family Osmeridae smelts, and surf smelt; Grenadier combines all named grenadier groups. Other contains the remaining selected fish and invertebrate groups; the complete mapping accompanies the annual CSV. NA means no records for a group-year; a displayed zero may be a positive estimate below 0.5 t. Values are summed before rounding to whole metric tons. The 2026 estimates are preliminary through the week ending October 24. The November 2024 summary approximately doubled the 2019-2022 Jellies, MiscFish, SeaStar, Osmerid, Grenadier, and Eelpouts columns relative to September. Sea pen, Anemone, Snails, and Other changed non-uniformly, with cross-column numerical matches indicating changed alignment or allocation. These are comparisons of historical headers. The current table uses explicit source species names and both catch dispositions, with no scaling adjustment. The upstream preparation step remains unconfirmed. View the jellyfish source-history and filter audit. Download annual estimates (CSV) · Column definitions (CSV).

Table 10: Numbers of EBS pollock measured for fishery length frequencies, by sex and processing stratum, 1977–2025.

Year	A		B southeast		B northwest		Total
	Male	Female	Male	Female	Male	Female	
1977	26,411	25,923	4,301	4,511	29,075	31,219	121,440
1978	25,110	31,653	9,829	9,524	46,349	46,072	168,537
1979	59,782	62,512	3,461	3,113	62,298	61,402	252,568
1980	42,726	42,577	3,380	3,464	47,030	49,037	188,214
1981	64,718	57,936	2,401	2,147	53,161	53,570	233,933
1982	74,172	70,073	16,265	14,885	181,606	163,272	520,273
1983	94,118	90,778	16,604	16,826	193,031	174,589	585,946
1984	158,329	161,876	106,654	105,234	243,877	217,362	993,332
1985	119,384	109,230	96,684	97,841	284,850	256,091	964,080
1986	186,505	189,497	135,444	123,413	164,546	131,322	930,727
1987	373,163	399,072	14,170	21,162	24,038	22,117	853,722
1988	NA	NA	NA	NA	NA	NA	NA
1989	NA	NA	NA	NA	NA	NA	NA
1990	NA	NA	NA	NA	NA	NA	NA
1991	155,876	143,625	148,385	132,539	123,516	122,241	826,182
1992	152,566	148,024	150,829	152,003	93,073	94,701	791,196
1993	136,211	126,635	145,280	137,384	24,797	26,057	596,364
1994	138,179	146,067	154,311	148,497	26,431	26,380	639,865
1995	128,719	125,847	175,115	150,323	16,142	16,327	612,473
1996	147,992	139,905	193,493	149,814	18,101	18,288	667,593
1997	123,454	102,619	114,846	106,001	58,492	51,498	556,910
1998	135,136	109,119	205,282	174,676	31,968	39,475	695,656
1999	36,035	32,407	38,229	35,084	16,258	18,321	176,334
2000	64,430	58,030	63,746	41,027	40,839	39,105	307,177
2001	79,190	75,491	54,037	51,179	44,232	45,766	349,895
2002	71,502	69,467	65,299	64,243	37,661	39,285	347,457
2003	74,902	77,533	49,307	52,899	51,764	53,435	359,840
2004	75,208	75,811	63,146	61,957	47,261	44,220	367,603
2005	75,784	68,665	43,271	33,917	68,831	63,022	353,490
2006	72,543	63,349	35,378	27,939	77,620	67,219	344,048
2007	66,533	63,969	38,104	29,558	76,755	70,504	345,423
2008	51,303	46,296	23,467	20,462	64,126	60,678	266,332
2009	43,476	41,540	17,343	16,148	45,418	47,926	211,851
2010	41,019	39,495	20,577	19,194	40,914	40,449	201,648
2011	62,295	58,481	65,057	60,208	48,055	50,927	345,023
2012	57,946	53,557	46,942	45,024	53,243	49,968	306,680
2013	62,148	51,984	44,582	37,307	49,649	49,161	294,831
2014	58,066	55,954	51,743	46,568	46,067	46,642	305,040
2015	56,419	55,646	43,601	46,853	41,183	45,117	288,819
2016	58,915	57,478	69,654	72,973	9,015	10,264	278,299
2017	64,693	55,965	65,982	70,285	14,125	15,871	286,921
2018	64,628	57,156	49,653	56,243	32,796	35,811	296,287
2019	64,665	49,191	54,927	59,416	27,753	34,955	290,907
2020	65,609	60,018	47,791	53,161	48,459	53,985	329,023
2021	75,561	59,580	53,205	61,208	27,641	30,833	308,028
2022	114,918	93,686	86,598	94,900	33,622	36,012	459,736
2023	73,284	54,056	38,537	42,259	38,222	37,101	283,459
2024	72,356	60,933	47,300	53,442	33,511	33,693	301,397
2025	78,854	65,020	39,796	42,845	43,374	48,084	319,026

Table 11: Numbers of EBS pollock with paired fish-weight and length measurements, by sex and processing stratum, 1977–2025.

Year	A		B southeast		B northwest		Total
	Male	Female	Male	Female	Male	Female	
1977	1,222	1,338	137	166	1,461	1,664	5,988
1978	1,991	2,686	409	516	2,200	2,623	10,425
1979	2,709	3,151	152	209	1,469	1,566	9,256
1980	1,849	2,156	99	144	612	681	5,541
1981	1,821	2,045	51	52	1,623	1,810	7,402
1982	2,030	2,208	181	176	2,852	3,043	10,490
1983	1,199	1,200	144	122	3,268	3,447	9,380
1984	980	1,046	117	136	1,273	1,378	4,930
1985	520	499	46	55	426	488	2,034
1986	689	794	518	501	286	286	3,074
1987	1,351	1,466	25	33	72	63	3,010
1988	NA	NA	NA	NA	NA	NA	NA
1989	NA	NA	NA	NA	NA	NA	NA
1990	NA	NA	NA	NA	NA	NA	NA
1991	2,893	2,791	1,209	1,116	2,536	2,408	12,953
1992	1,605	1,537	556	600	2,003	1,940	8,241
1993	1,278	1,205	451	437	1,412	1,459	6,242
1994	1,638	1,553	174	166	1,591	1,584	6,706
1995	1,258	1,220	232	223	1,352	1,331	5,616
1996	2,165	2,117	NA	NA	1,393	1,421	7,096
1997	629	630	552	536	674	620	3,641
1998	1,958	1,865	357	335	936	982	6,433
1999	4,813	5,337	3,767	3,546	7,182	7,954	32,599
2000	11,346	12,457	7,736	7,991	7,800	12,463	59,793
2001	14,411	14,965	9,064	8,803	10,460	10,871	68,574
2002	13,564	14,098	7,648	7,213	13,004	12,988	68,515
2003	15,535	14,857	10,272	10,031	10,111	9,437	70,243
2004	7,924	7,742	4,318	4,617	6,868	6,850	38,319
2005	7,039	7,428	6,426	6,947	4,114	5,139	37,093
2006	6,566	7,381	6,442	7,406	3,045	4,006	34,846
2007	6,640	6,695	7,081	7,798	3,202	4,305	35,721
2008	4,501	4,865	5,855	6,264	2,236	2,624	26,345
2009	4,033	4,382	4,655	4,511	1,723	1,934	21,238
2010	4,258	4,536	3,883	4,125	2,012	2,261	21,075
2011	5,845	6,388	4,954	4,647	5,929	6,456	34,219
2012	5,494	5,979	4,923	5,346	4,507	4,774	31,023
2013	5,689	6,525	4,844	4,920	3,599	4,313	29,890
2014	5,675	5,871	4,785	4,652	4,753	5,180	30,916
2015	5,310	5,323	4,648	4,194	4,365	4,064	27,904
2016	5,312	5,725	1,077	909	6,872	6,635	26,530
2017	5,238	6,047	1,586	1,343	6,575	6,254	27,043
2018	5,583	6,174	3,430	3,172	5,506	4,850	28,715
2019	4,513	6,086	3,594	2,953	5,809	5,499	28,454
2020	6,116	6,846	5,325	4,815	5,376	4,900	33,378
2021	5,852	7,368	6,247	5,468	2,886	2,698	30,519
2022	4,890	5,847	1,705	1,566	4,899	4,364	23,271
2023	10,676	14,487	6,171	6,173	5,911	5,436	48,854
2024	7,253	6,276	5,027	5,679	3,298	3,421	30,958
2025	7,391	6,333	4,257	4,597	4,379	4,922	31,927

Table 12: Numbers of EBS pollock contributing age estimates, by sex and processing stratum, 1977–2025. The 2024–2025 entries were released FT-NIRS age predictions. Stratified sample counts were unavailable in this series for 1988–1990; historical catch-at-age estimates for those years were reported in Ianelli et al. (2001), Table 1.3.

Year	A		B southeast		B northwest		Total
	Male	Female	Male	Female	Male	Female	
1977	1,229	1,344	137	166	1,415	1,613	5,904
1978	1,992	2,686	407	514	2,188	2,611	10,398
1979	2,647	3,088	152	209	1,464	1,561	9,121
1980	1,854	2,158	93	138	606	675	5,524
1981	1,819	2,042	51	52	1,620	1,807	7,391
1982	2,030	2,210	181	176	2,865	3,062	10,524
1983	1,200	1,200	144	122	3,249	3,420	9,335
1984	980	1,046	117	136	1,272	1,379	4,930
1985	520	499	46	55	426	488	2,034
1986	689	794	518	501	286	286	3,074
1987	1,351	1,466	25	33	72	63	3,010
1988	NA	NA	NA	NA	NA	NA	NA
1989	NA	NA	NA	NA	NA	NA	NA
1990	NA	NA	NA	NA	NA	NA	NA
1991	439	431	367	349	263	289	2,138
1992	399	396	178	180	391	375	1,919
1993	476	445	122	124	496	507	2,170
1994	201	200	142	132	574	571	1,820
1995	313	299	131	123	420	439	1,725
1996	465	479	NA	NA	436	443	1,823
1997	437	434	343	341	313	286	2,154
1998	663	595	237	222	311	316	2,344
1999	506	541	298	308	748	750	3,151
2000	629	667	293	254	596	847	3,286
2001	563	603	205	178	697	736	2,982
2002	672	663	247	202	890	839	3,513
2003	653	588	274	262	701	671	3,149
2004	547	561	221	245	698	600	2,872
2005	599	617	420	422	490	614	3,162
2006	528	609	507	568	367	459	3,038
2007	627	642	552	568	485	594	3,468
2008	513	497	538	650	342	368	2,908
2009	404	484	440	432	240	299	2,299
2010	545	624	413	466	418	505	2,971
2011	581	808	404	396	582	660	3,431
2012	517	571	485	579	480	533	3,165
2013	666	703	525	568	401	518	3,381
2014	609	629	413	407	475	553	3,086
2015	653	642	511	493	508	513	3,320
2016	488	599	157	125	929	969	3,267
2017	604	778	179	163	777	753	3,254
2018	569	662	366	358	621	591	3,167
2019	552	778	387	332	558	531	3,138
2020	757	899	405	420	450	408	3,339
2021	760	910	588	542	270	256	3,326
2022	609	777	209	212	616	563	2,986
2023	452	633	350	313	399	342	2,489
2024	700	616	493	534	291	350	2,985
2025	697	562	401	433	439	456	2,992

Table 13: Pollock sampling effort from the NMFS bottom-trawl survey, 1982–2026 (counts). Historical values were as reported; recent haul counts use the survey records and recent ages were released EBS assignments, including FT-NIRS ages.

Year	Hauls	Lengths	Aged / age assigned
1982	329	40,001	1,611
1983	354	78,033	1,931
1984	355	40,530	1,806
1985	434	48,642	1,913
1986	354	41,101	1,344
1987	356	40,144	1,607
1988	373	40,408	1,173
1989	373	38,926	1,227
1990	371	34,814	1,257
1991	371	43,406	1,083
1992	356	34,024	1,263
1993	375	43,278	1,385
1994	375	38,901	1,141
1995	376	25,673	1,156
1996	375	40,789	1,387
1997	376	35,536	1,193
1998	375	37,673	1,261
1999	373	32,532	1,385
2000	372	41,762	1,545
2001	375	47,335	1,641
2002	375	43,361	1,695
2003	376	46,480	1,638
2004	375	44,102	1,660
2005	373	35,976	1,676
2006	376	39,211	1,573
2007	376	29,679	1,484
2008	375	24,635	1,251
2009	376	24,819	1,342
2010	517	23,142	1,385
2011	376	36,227	1,734
2012	376	35,782	1,785
2013	376	35,908	1,847
2014	376	43,042	2,099
2015	376	54,241	2,320
2016	376	50,857	1,766
2017	519	47,873	1,623
2018	376	48,673	1,486
2019	520	42,382	1,519
2020	NA	NA	NA
2021	520	53,545	2,050
2022	520	36,687	1,980
2023	492	38,618	1,677
2024	350	36,137	1,526
2025	487	30,862	1,619
2026	350	31,296	1,582

NA denotes an unavailable count; the survey was absent in 2020. The 2025 haul count includes 350 EBS and 137 NBS records; the 2026 count includes 350 EBS records. Historical coverage varies among years.

The 2025 and 2026 length counts use the EBS production summaries. Recent length and age counts cover EBS; haul counts include NBS where stated.

Recent age assignments are distinct from traditional tester-pair counts; historical age counts retain their published definitions.

Table 14: Bottom-trawl survey (BTS) pollock biomass for the combined eastern and northern Bering Sea, 1982–2026, with assessment standard errors (SE) and coefficients of variation (CV).

Year	Biomass (million t)	SE (thousand t)	CV (%)
1982	4.064	732	18.0%
1983	10.457	1,174	11.2%
1984	6.777	977	14.4%
1985	7.794	1,008	12.9%
1986	7.459	1,078	14.5%
1987	8.131	1,399	17.2%
1988	12.000	1,896	15.8%
1989	10.554	1,435	13.6%
1990	11.449	2,352	20.5%
1991	7.472	1,427	19.1%
1992	6.961	1,121	16.1%
1993	8.275	1,060	12.8%
1994	7.385	1,159	15.7%
1995	7.631	2,335	30.6%
1996	4.179	551	13.2%
1997	4.842	890	18.4%
1998	3.665	565	15.4%
1999	5.732	1,020	17.8%
2000	7.778	1,350	17.4%
2001	6.271	705	11.2%
2002	7.117	971	13.6%
2003	12.148	4,671	38.5%
2004	6.063	739	12.2%
2005	6.867	952	13.9%
2006	4.181	513	12.3%
2007	6.511	992	15.2%
2008	4.271	633	14.8%
2009	2.860	482	16.8%
2010	5.174	839	16.2%
2011	4.524	520	11.5%
2012	5.063	681	13.5%
2013	6.739	790	11.7%
2014	11.838	1,266	10.7%
2015	11.145	982	8.8%
2016	8.825	1,006	11.4%
2017	8.781	709	8.1%
2018	5.119	813	15.9%
2019	9.026	967	10.7%
2021	4.706	338	7.2%
2022	6.348	649	10.2%
2023	4.754	429	9.0%
2024	8.354	1,196	14.3%
2025	5.801	792	13.7%
2026	9.034	956	10.6%

CV is the annual standard error divided by biomass. These are the uncertainties used in the assessment, which also accounts for correlations among years. The survey was absent in 2020.

Table 15: Combined eastern and northern Bering Sea model-based pollock abundance at age used for the assessment, 1982–2026 (million fish). Ages 15 and older were pooled as 15+.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	Total
1982	1220.6	2780.1	3221.8	4394.2	1481.2	196.2	126.3	60.7	37.7	23.7	14.8	8.8	3.3	1.4	1.4	13572.2
1983	4548.2	1080.4	2880.1	4538.0	9238.2	2681.1	458.1	210.7	97.6	87.7	62.5	22.9	8.3	7.7	3.6	25925.1
1984	494.0	404.5	803.7	2218.2	2460.1	5226.9	929.5	201.8	92.6	31.1	21.3	8.0	4.9	6.1	3.1	12905.9
1985	5028.8	787.5	3999.5	1409.8	4629.4	2808.1	1856.2	353.5	86.3	73.3	25.6	8.0	8.6	0.7	0.7	21075.9
1986	3061.3	918.2	793.9	3276.1	1686.3	2542.1	2103.4	1790.2	534.1	83.7	37.4	16.5	1.5	4.6	1.6	16850.8
1987	495.7	706.6	1227.4	956.9	5641.8	1477.3	1356.5	522.5	1628.6	256.8	79.2	30.0	5.9	2.9	2.6	14390.8
1988	1588.1	769.9	2287.4	4488.9	1959.7	6093.4	1659.9	1198.1	666.8	1611.9	155.7	91.5	20.6	24.6	14.8	22631.4
1989	944.5	576.1	979.3	2967.0	6523.0	1245.0	4451.9	628.4	703.5	263.0	825.0	141.4	126.8	59.2	95.4	20529.5
1990	2285.0	272.5	107.0	1089.6	2485.0	8094.0	1492.5	3554.8	337.0	587.7	89.3	832.7	71.8	52.6	73.2	21424.7
1991	3250.4	947.9	368.5	134.1	952.9	836.1	2526.4	881.9	1708.2	430.0	576.7	117.6	346.1	52.7	60.4	13189.9
1992	1617.8	418.5	2737.7	428.0	520.3	836.6	731.6	1010.7	438.8	810.1	281.6	355.1	153.0	121.0	97.3	10558.3
1993	2776.9	444.9	1162.3	5158.9	1074.2	819.5	409.8	538.4	681.7	416.6	359.3	261.2	209.2	115.1	140.3	14568.1
1994	1722.8	695.5	525.9	2019.7	5779.3	950.8	229.2	178.9	196.0	361.9	221.7	308.3	118.8	117.1	198.7	13624.6
1995	1631.4	204.8	456.2	1978.6	2724.3	4580.8	1714.5	388.3	229.3	147.8	272.0	112.0	206.2	84.3	134.9	14865.5
1996	2000.9	437.8	198.4	408.0	1127.1	1494.9	1288.5	423.6	102.1	111.4	74.7	142.5	48.6	87.4	128.8	8074.7
1997	2338.7	398.5	216.5	265.8	3005.0	1397.2	817.3	1038.9	178.6	90.3	66.3	71.4	124.0	40.3	152.6	10201.3
1998	902.8	708.6	371.2	262.0	548.3	3044.7	782.6	476.6	364.3	94.0	41.5	14.1	32.9	35.1	86.7	7765.4
1999	1000.6	1041.4	1090.9	1116.1	634.3	1180.5	2883.0	751.1	362.3	337.0	126.5	54.0	22.4	33.6	123.5	10757.3
2000	1053.0	376.4	703.0	2187.0	2206.2	1225.8	970.7	2977.1	1110.5	573.6	246.2	158.1	50.3	23.0	103.9	13964.7
2001	1985.9	1224.0	712.7	713.1	1687.0	1656.8	688.4	335.0	987.1	704.8	269.8	212.6	82.1	30.2	87.2	11376.7
2002	1319.8	393.9	794.7	1211.9	1379.5	1789.1	892.4	430.4	575.4	1076.3	538.2	249.8	149.1	48.0	57.8	10906.2
2003	565.2	170.1	1149.5	1885.8	2127.9	1800.1	2248.6	1153.8	477.1	626.8	1226.1	562.9	236.1	98.8	109.5	14438.2
2004	401.3	266.2	191.1	1614.3	1597.9	1188.0	665.2	702.3	346.8	219.4	220.1	406.2	181.4	48.1	40.8	8089.1
2005	397.3	153.0	251.1	1214.6	3364.3	2117.6	1068.1	485.3	369.1	269.1	75.0	156.8	261.1	108.4	123.4	10414.1
2006	822.5	76.0	113.3	525.4	1405.2	1644.7	972.2	442.0	245.2	204.2	98.3	61.0	87.9	119.3	123.5	6940.6
2007	2730.3	65.0	224.4	719.4	2148.5	2411.1	1628.2	1147.3	449.4	195.6	180.2	154.0	71.7	88.1	178.4	12391.4
2008	501.3	122.5	141.0	269.9	777.1	1573.6	1152.4	734.2	437.9	158.4	129.9	97.2	44.2	24.6	159.1	6323.3
2009	863.4	210.1	435.1	497.8	325.1	488.6	690.0	521.6	371.6	171.0	107.8	35.1	35.2	18.3	80.1	4850.6
2010	480.0	136.6	315.5	4277.0	1722.7	479.2	379.3	389.4	391.1	268.4	227.6	82.8	49.9	29.5	68.1	9296.8
2011	1331.7	136.3	359.0	431.6	2165.5	1048.1	294.4	160.1	244.1	240.6	205.5	158.0	69.4	33.1	98.2	6975.5
2012	1341.7	211.1	485.1	4164.0	951.6	1431.6	456.1	171.2	115.0	158.5	127.7	110.9	96.5	34.9	67.6	9923.3
2013	1257.5	134.9	273.7	1127.2	5422.6	1228.5	750.4	262.1	88.5	79.4	105.0	79.8	77.2	44.9	63.6	10995.3
2014	2531.9	477.4	279.9	497.3	2312.4	7741.2	3820.1	797.9	435.3	157.6	62.1	89.1	93.0	46.9	141.4	19483.5
2015	1460.1	947.2	2835.6	767.6	1528.6	2738.5	5150.1	1522.0	385.3	192.1	27.0	25.2	49.9	30.5	70.4	17730.0
2016	782.9	507.3	744.5	4155.6	1720.4	1196.9	1767.8	2703.3	547.2	224.0	79.7	17.8	18.7	6.8	14.1	14486.9
2017	789.3	312.7	526.1	2619.5	3497.6	1602.5	1236.2	1161.9	1488.5	425.9	163.7	55.1	8.4	4.8	16.2	13908.4
2018	1179.6	474.1	251.5	376.6	2531.9	1556.8	541.1	393.9	405.0	333.0	93.2	14.6	1.9	0.3	5.8	8159.1
2019	2685.3	712.4	584.7	619.6	1763.6	6308.4	2520.5	597.1	431.0	254.9	133.9	60.8	24.1	6.9	2.7	16705.9
2020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2021	1027.6	827.5	1953.4	765.3	703.6	508.1	1291.4	1479.8	391.6	152.5	127.5	82.6	18.2	12.9	4.4	9346.2
2022	821.4	348.4	595.5	4025.4	1888.9	733.5	815.5	1143.0	855.9	271.4	116.2	96.7	37.6	21.3	2.2	11773.0
2023	1152.8	388.7	341.0	630.2	2710.5	804.7	436.7	424.2	702.6	503.9	126.4	68.4	38.1	11.7	10.6	8350.8
2024	1683.9	957.6	893.4	610.1	1944.1	6404.9	1426.1	447.7	424.6	389.1	275.1	107.7	33.5	14.6	5.4	15617.7
2025	1534.2	344.2	318.5	504.0	491.9	1366.7	3303.4	827.7	327.6	208.0	299.8	162.0	81.4	50.4	26.5	9846.2
2026	3466.8	608.7	1637.4	948.4	1034.1	1390.7	2587.6	2390.8	738.5	253.8	442.7	369.9	114.1	11.4	69.8	16064.7
Mean	1615.3	549.5	921.3	1692.5	2315.4	2225.9	1444.8	863.9	495.2	321.1	205.4	142.5	80.1	41.2	69.3	12983.4

The full current revised series is shown; historical values differ from the earlier published VAST series. Northern survey coverage varies among years. These survey-expansion estimates are distinct from model population numbers at age.

The 2025 and 2026 FT-NIRS products use their year-specific traditional-age keys; the 2026 key retains 307 pairs after excluding 22 flagged pairs. Exact traditional ages 1–18 are converted before 15+ pooling, conserving total abundance. Empirical-key uncertainty is excluded. NA in 2020 denotes no survey observation; the mean uses the 44 observed-year estimates. Values are rounded to 0.1 million fish.

Table 16: Annual BTS-derived population weight-at-age inputs used in Model 26.0, 1982–2026 (kg per fish). Ages 15 and older were pooled as 15+.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
1982	0.027	0.076	0.180	0.369	0.550	0.862	1.151	1.326	1.463	1.648	1.790	1.778	2.142	1.770	2.633
1983	0.017	0.091	0.179	0.341	0.491	0.691	0.988	1.304	1.494	1.539	1.634	1.600	1.807	1.555	1.961
1984	0.017	0.062	0.187	0.293	0.465	0.605	0.955	1.375	1.520	1.710	1.957	1.829	1.880	1.675	2.091
1985	0.017	0.070	0.183	0.333	0.485	0.753	0.941	1.238	1.667	1.648	1.779	2.062	2.135	1.817	2.505
1986	0.014	0.066	0.137	0.356	0.433	0.657	0.829	1.025	1.270	1.635	1.714	1.952	2.051	2.212	* 2.191
1987	0.028	0.105	0.239	0.291	0.424	0.555	0.705	0.861	0.993	1.224	1.506	1.539	1.931	2.215	2.339
1988	0.019	0.079	0.246	0.331	0.444	0.527	0.661	0.883	0.910	1.101	1.366	1.390	1.872	1.169	1.715
1989	0.022	0.085	0.166	0.293	0.384	0.509	0.710	0.802	1.088	1.072	1.201	1.268	1.303	1.290	1.400
1990	0.019	0.101	0.145	0.337	0.441	0.536	0.633	0.741	0.916	1.134	1.256	1.313	1.393	1.498	1.692
1991	0.025	0.109	0.202	0.339	0.549	0.629	0.714	0.809	0.986	1.108	1.364	1.400	1.552	1.824	1.930
1992	0.018	0.096	0.270	0.381	0.510	0.575	0.774	0.916	0.969	1.083	1.262	1.455	1.601	1.662	1.630
1993	0.015	0.087	0.271	0.470	0.524	0.646	0.757	0.895	1.101	1.112	1.318	1.406	1.561	1.673	1.786
1994	0.019	0.083	0.209	0.388	0.559	0.675	0.719	1.053	1.239	1.199	1.322	1.413	1.525	1.680	1.758
1995	0.016	0.057	0.139	0.339	0.485	0.657	0.693	0.912	1.079	1.328	1.314	1.373	1.501	1.481	1.747
1996	0.021	0.077	0.137	0.297	0.500	0.632	0.797	0.903	1.043	1.176	1.386	1.511	1.680	1.682	1.789
1997	0.018	0.078	0.193	0.299	0.380	0.623	0.754	0.899	1.122	1.185	1.319	1.529	1.583	1.645	1.764
1998	0.018	0.070	0.185	0.323	0.460	0.524	0.801	0.895	1.012	1.082	1.286	1.349	1.485	1.886	1.886
1999	0.016	0.078	0.219	0.347	0.407	0.561	0.700	0.897	1.087	1.152	1.292	1.323	1.754	1.756	1.982
2000	0.014	0.079	0.236	0.400	0.477	0.562	0.704	0.786	0.946	1.164	1.364	1.476	1.720	1.752	2.001
2001	0.018	0.078	0.172	0.359	0.530	0.669	0.797	0.881	0.996	1.118	1.337	1.499	1.589	1.794	1.880
2002	0.017	0.094	0.244	0.389	0.521	0.674	0.760	0.935	1.033	1.121	1.127	1.401	1.563	1.741	1.934
2003	0.027	0.113	0.279	0.461	0.621	0.735	0.815	0.968	1.045	1.201	1.250	1.371	1.548	1.550	1.744
2004	0.023	0.107	0.275	0.421	0.567	0.689	0.819	0.928	1.041	1.152	1.210	1.304	1.456	1.748	1.746
2005	0.022	0.088	0.217	0.395	0.510	0.630	0.809	0.942	1.020	1.108	1.361	1.314	1.299	1.480	1.599
2006	0.011	0.087	0.170	0.421	0.598	0.696	0.815	0.894	1.042	1.164	1.275	1.390	1.467	1.434	1.489
2007	0.014	0.102	0.263	0.497	0.637	0.802	0.907	1.039	1.146	1.406	1.372	1.411	1.723	1.636	1.689
2008	0.014	0.056	0.221	0.455	0.585	0.717	0.846	0.997	1.058	1.237	1.537	1.509	1.726	1.850	1.894
2009	0.012	0.074	0.224	0.499	0.675	0.791	0.999	1.135	1.174	1.481	1.568	1.759	2.049	2.277	2.360
2010	0.020	0.077	0.249	0.510	0.675	0.875	1.094	1.188	1.245	1.352	1.453	1.651	1.876	2.213	2.443
2011	0.017	0.085	0.209	0.499	0.663	0.773	0.938	1.118	1.247	1.296	1.455	1.530	1.638	1.727	2.015
2012	0.015	0.075	0.195	0.420	0.606	0.784	0.933	1.137	1.333	1.401	1.432	1.529	1.558	1.845	2.015
2013	0.018	0.079	0.213	0.501	0.582	0.744	0.993	1.166	1.354	1.409	1.542	1.582	1.710	1.860	1.923
2014	0.019	0.109	0.257	0.438	0.571	0.716	0.791	1.106	1.231	1.423	1.676	1.606	1.672	1.847	1.903
2015	0.020	0.090	0.327	0.445	0.588	0.686	0.784	0.905	1.166	1.229	1.496	1.550	1.432	1.492	1.750
2016	0.023	0.080	0.279	0.531	0.595	0.697	0.779	0.828	0.904	1.004	1.137	1.554	1.351	1.536	1.421
2017	0.021	0.092	0.231	0.472	0.625	0.673	0.755	0.814	0.892	0.919	1.057	0.993	1.289	1.123	1.485
2018	0.023	0.092	0.215	0.421	0.591	0.684	0.777	0.816	0.896	0.933	1.036	0.944	1.410	* 1.720	1.540
2019	0.022	0.105	0.286	0.487	0.634	0.731	0.822	0.925	0.937	1.035	0.965	1.066	1.038	1.063	* 1.910
2020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2021	0.022	0.101	0.245	0.442	0.585	0.713	0.803	0.857	0.977	1.118	1.040	1.117	1.298	0.999	1.361
2022	0.018	0.112	0.270	0.447	0.590	0.697	0.771	0.873	0.969	1.034	1.254	1.251	1.324	1.205	1.812
2023	0.015	0.106	0.283	0.416	0.536	0.657	0.812	0.955	0.968	1.013	1.179	1.200	1.414	1.759	1.487
2024	0.017	0.090	0.309	0.454	0.560	0.607	0.693	0.923	0.997	1.020	1.126	1.137	1.259	1.406	1.754
2025	0.020	0.079	0.226	0.526	0.587	0.676	0.734	0.812	0.903	1.087	1.066	1.150	1.258	1.399	1.547
2026	0.020	0.066	0.397	0.544	0.640	0.725	0.809	0.874	0.949	1.027	1.048	1.192	1.416	1.449	1.360
Mean	0.019	0.086	0.227	0.409	0.542	0.673	0.815	0.967	1.101	1.218	1.351	1.431	1.587	1.645	1.838

* The selected value is retained. Its current treatment has not been reconciled with an older preparation record identifying these historical cells for filling; the technical supplement preserves that provenance qualification.

The table reproduces the selected schedules, including historical revisions, rather than labeling every cell as an unmodified survey measurement. NA in 2020 marks absence of a survey observation; the model retains its separate annual schedule. The mean uses the 44 displayed annual schedules. Values are rounded to 0.001 kg.

Table 17: Sampling effort and biological collections from eastern Bering Sea acoustic-trawl surveys, 1979–2026 (counts). E and W denote collections east and west of 170°W within the US EEZ; US was the reported US subtotal and RU was the Russian-region count. The 2024 US aged-fish count was 2,260 (McCarthy et al. 2026, p. 15).

Year	Hauls				Length records				Otoliths				Number aged			
	E	W	US	RU	E	W	US	RU	E	W	US	RU	E	W	US	RU
1979	NA	NA	25	NA	NA	NA	7722	NA	NA	NA	0	NA	NA	NA	2610	NA
1982	13	31	48	NA	1725	6689	8687	NA	840	2324	3164	NA	783	1958	2741	NA
1985	NA	NA	73	NA	NA	NA	19872	NA	NA	NA	2739	NA	NA	NA	2739	NA
1988	NA	NA	25	NA	NA	NA	6619	NA	NA	NA	1471	NA	NA	NA	1471	NA
1991	NA	NA	62	NA	NA	NA	16343	NA	NA	NA	2062	NA	NA	NA	1663	NA
1994	25	51	76	19	4553	21011	25564	8930	1560	3694	4966	1270	612	932	1770	455
1996	15	42	57	NA	3551	13273	16824	NA	669	1280	1949	NA	815	1111	1926	NA
1997	25	61	86	NA	6493	23043	29536	NA	966	2669	3635	NA	936	1349	2285	NA
1999	41	77	118	NA	13841	28521	42362	NA	1945	3001	4946	NA	946	1500	2446	NA
2000	29	95	124	NA	7721	36008	43729	NA	850	2609	3459	NA	850	1403	2253	NA
2002	47	79	126	NA	14601	25633	40234	NA	1424	1883	3307	NA	1000	1200	2200	NA
2004	33	57	90	15	8896	18262	27158	5893	1167	2002	3169	461	798	1192	2351	461
2006	27	56	83	NA	4939	19326	24265	NA	822	1871	2693	NA	822	1870	2692	NA
2007	23	46	69	4	5492	14863	20355	1407	871	1961	2832	319	823	1737	2560	315
2008	9	53	62	6	2394	15354	17748	1754	341	1698	2039	177	338	1381	1719	176
2009	13	33	46	3	1576	9257	10833	282	308	1210	1518	54	306	1205	1511	54
2010	11	48	59	9	2432	20263	22695	3502	653	1868	2521	381	652	1598	2250	379
2012	17	60	77	14	4422	23929	28351	5620	650	2045	2695	418	646	1483	2129	416
2014	52	87	139	3	28857	8645	37502	747	1739	849	2588	72	845	1735	2580	72
2016	37	71	108	NA	10912	24134	35046	NA	880	1514	2394	NA	876	1513	2388	NA
2018	36	64	100	NA	11031	21173	32204	NA	1105	1750	2855	NA	1100	1743	2843	NA
2020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2022	26	36	62	NA	4954	11994	16948	NA	671	1691	2362	NA	668	1688	2356	NA
2024	14	41	55	NA	4535	14472	19007	NA	725	1561	2286	NA	NA	NA	2260	NA
2026	36	62	99	NA	11916	23031	35128	NA	1051	1571	2642	NA	NA	NA	NA	NA

Table 18: Midwater pollock biomass by area from summer ATS surveys of the U.S. EEZ Bering Sea shelf, 1994–2026 (million tons; near surface to 0.5 m above the seafloor). The core shelf excluded the Northern Extension. Assessment CVs average 20%, with 45% assigned to 2000; SE equals biomass × CV. The 2020 survey used uncrewed sailing vessels; 2026 estimates were preliminary.

Year	Date	Area (nmi^2)	Biomass (million t)				Rel. error	Assessment CV	Assessment SE (kt)
			SCA	E170–SCA	W170	0.5 m total			
1994	9 Jul - 7 Sept	78,251	0.382	0.652	2.594	3.628	0.040	17.0%	618.4
1996	20 Jul - 30 Aug	93,810	0.275	0.492	2.185	2.952	0.032	13.6%	402.5
1997	17 Jul - 5 Sept	102,770	0.272	0.703	2.470	3.446	0.029	12.4%	425.8
1999	12 Jun - 29 Jul	103,670	0.383	0.757	3.060	4.200	0.044	18.8%	787.5
2000	12 Jun - 1 Aug	106,140	0.458	0.715	2.441	3.615	0.028	45.0%	1,626.6
2002	9 Jun - 21 Jul	99,526	0.762	0.938	2.601	4.301	0.027	11.5%	494.9
2004	4 Jun -29 Jul	99,659	0.550	0.918	2.528	3.996	0.031	13.2%	527.9
2006	3 Jun -25 Jul	89,550	0.147	0.340	1.387	1.874	0.033	14.1%	263.6
2007	2 Jun -30 Jul	92,944	0.136	0.245	1.902	2.283	0.038	16.2%	369.7
2008	2 Jun -31 Jul	95,374	0.122	0.087	1.196	1.404	0.056	23.9%	335.2
2009	9 Jun -7 Aug	91,414	0.156	0.058	1.117	1.331	0.069	29.4%	391.5
2010	5 Jun -7 Aug	92,849	0.098	0.193	2.345	2.636	0.054	23.0%	606.6
2012	7 Jun -10 Aug	96,852	0.196	0.319	1.764	2.279	0.034	14.5%	330.3
2014	12 Jun -13 Aug	94,361	0.571	1.458	2.714	4.743	0.034	14.5%	687.2
2016	12 Jun -17 Aug	100,674	0.542	1.268	3.028	4.838	0.019	8.1%	391.7
2018	12 Jun -22 Aug	92,283	0.234	0.510	1.753	2.497	0.039	16.6%	415.1
2020	4 Jul - 20 Aug	102,320	0.398	0.531	2.688	3.617	0.096	40.9%	1,479.8
2022	1 Jun -5 Aug	103,942	0.538	0.823	2.473	3.834	0.068	29.0%	1,111.1
2024	5 Jun - 22 Jul	100,365	0.497	0.593	1.785	2.875	0.056	23.9%	686.1
2026	28 May - 12 Aug	95,091	0.239	0.706	2.738	3.682	0.034	14.5%	533.6

Table 19: Biomass and abundance summed across the 2026 survey intervals, including the below-3 m analysis and northern extension. The three core-shelf regions sum to the historical EBS estimate; the Northern Extension was additional.

Region	EDSU records	Biomass (t)	Abundance (million fish)
SCA	1,079	238,999.6	720.50
East of 170	3,232	705,748.5	1,396.55
West of 170	5,137	2,737,718.7	10,545.58
EBS Northern Extension	1,476	78,311.1	104.29

Table 20: ATS estimates of EBS pollock abundance at age, 1979–2026 (million fish). Ages 10 and older were pooled as 10+. The provisional 2026 estimates apply the BTS age–length key to expanded ATS length distributions that extend to 0.5 m above the seafloor. Mean and median summarize surveys with age compositions during 1994–2026; 1979–1991 provided historical context.

Year	Age										Age 2+	Total at age
	1	2	3	4	5	6	7	8	9	10+		
1979	69,110	41,132	3,884	413	534	128	30	4	28	161	46,314	115,424
1982	108	3,401	4,108	7,637	1,790	283	141	178	90	177	17,805	17,913
1985	2,076	929	8,149	898	2,186	1,510	1,127	130	21	15	14,965	17,041
1988	11	1,112	3,586	3,864	739	1,882	403	151	130	414	12,280	12,292
1991	639	5,942	967	215	224	133	120	39	37	53	7,730	8,369
1994	1,140	4,969	1,424	1,819	2,252	389	109	96	56	221	11,335	12,475
1996	1,800	567	552	2,741	915	634	585	142	39	165	6,338	8,139
1997	13,227	2,881	440	536	2,330	546	313	290	75	220	7,633	20,860
1999	607	1,780	3,717	1,810	652	398	1,548	526	180	249	10,859	11,466
2000	460	1,322	1,230	2,588	1,012	327	308	950	278	252	8,266	8,726
2002	796	4,944	3,385	1,295	661	935	538	140	162	493	12,554	13,351
2004	83	313	1,217	3,123	1,634	567	288	283	121	265	7,811	7,894
2006	525	217	291	654	783	659	390	145	75	171	3,386	3,910
2007	5,775	1,041	345	478	794	729	407	241	98	135	4,267	10,042
2008	71	2,915	1,047	166	161	288	235	136	102	120	5,169	5,240
2009	5,197	816	1,734	281	77	94	129	111	77	114	3,433	8,630
2010	2,568	6,404	984	2,295	446	73	33	37	38	91	10,400	12,968
2012	177	1,989	1,693	2,710	280	367	113	36	25	103	7,315	7,492
2014	4,751	8,655	969	1,161	1,119	1,770	740	170	79	99	14,762	19,513
2016	174	1,038	4,496	4,476	715	348	392	420	96	64	12,046	12,220
2018	450	517	249	621	2,268	944	198	112	107	104	5,120	5,570
2022	142	332	975	6,578	819	211	133	239	166	79	9,533	9,674
2024	5,075	1,146	681	379	820	2,485	450	110	86	127	6,284	11,359
2026	2,026	3,729	3,958	375	319	403	714	656	198	285	10,637	12,663
Mean 1994–2026	2,371	2,399	1,547	1,794	950	640	401	255	108	177	8,271	10,642
Median 1994–2026	796	1,322	1,047	1,295	794	403	313	145	96	135	7,811	10,042

Table 21: Recent core-area ATS pollock biomass and abundance estimates. The 2026 estimates were preliminary.

Recent core-area ATS estimates		
Survey year	Biomass (million t)	Abundance (billion fish)
2022	3.8	9.67
2024	2.87	11.4
2026 (preliminary)	3.68	12.7

Table 22: Provisional core-area 2026 ATS abundance by age, in million fish, restricted to length bins covered by the BTS age–length key. FT-NIRS source age 15 retained its released label; the corresponding TMA row pooled target ages 15–18. The upper-length tail remained unallocated.

Age (FT-NIRS / TMA)	FT-NIRS abundance	TMA abundance
1	2,194.690	2,025.867
2	5,340.635	3,729.246
3	1,978.834	3,958.120
4	597.222	374.975
5	338.742	318.742
6	299.224	403.011
7	619.494	713.961
8	786.844	656.327
9	343.438	197.732
10	99.819	63.788
11	45.953	106.936
12	12.907	80.216
13	2.903	19.546
14	0.836	1.844
15 / 15+	0.980	12.210

Table 23: Provisional core-area 2026 ATS TMA biomass, abundance and mean weight-at-age for length bins covered by the BTS age–length key. The 15+ row sums exact ages 15–18 before dividing biomass by abundance. Biomass and fish in the upper length bins beyond the key were recorded separately.

TMA age	Biomass (t)	Abundance (million fish)	Mean weight (kg/fish)
1	89,550.280	2,025.867	0.0442
2	525,587.105	3,729.246	0.1409
3	949,648.466	3,958.120	0.2399
4	182,528.304	374.975	0.4868
5	185,878.529	318.742	0.5832
6	263,257.538	403.011	0.6532
7	525,152.651	713.961	0.7355
8	518,643.709	656.327	0.7902
9	168,006.366	197.732	0.8497
10	57,043.013	63.788	0.8943
11	96,454.798	106.936	0.9020
12	81,491.146	80.216	1.0159
13	22,896.782	19.546	1.1714
14	2,181.579	1.844	1.1832
15+	13,821.450	12.210	1.1320

Table 24: Assumed age-composition likelihood sample sizes used in the completed full-data Model 23.0 fit, 1964–2026. Fishery inputs for 2023–2025 were the applied rounded values 443, 578 and 530; other values were rounded for display.

Year	Fishery	BTS	ATS
1964–1977	10		
1978	39		
1979	39		
1980	39		
1981	39		
1982	39	153	
1983	39	134	
1984	39	61	
1985	39	76	
1986	39	153	
1987	39	60	
1988	39	81	
1989	39	55	
1990	39	48	
1991	260	79	
1992	228	86	
1993	344	92	
1994	286	91	43
1995	257	103	
1996	189	227	32
1997	319	77	49
1998	355	64	
1999	476	97	67
2000	482	88	70
2001	328	178	
2002	487	187	72
2003	441	130	
2004	391	195	51
2005	494	188	
2006	506	321	47
2007	500	184	39
2008	524	238	35
2009	420	148	26
2010	549	107	34
2011	728	172	
2012	607	108	44
2013	753	64	
2014	606	117	79
2015	821	104	
2016	704	124	61
2017	607	241	
2018	668	156	50
2019	701	120	
2020	565		1
2021	818	150	
2022	641	181	52
2023	443	135	
2024	578	63	79
2025	530	111	
2026		131	94
Mean	503	129	51

Table 25: Revised mean-one AVO display index for 17 observations during 2009–2026, excluding 2020, including newly processed 2011 and 2013 values. Sampling relative errors, standard errors and scaled source 95% confidence intervals were retained. The blank 2020 row preserved calendar-year coverage.

Year	Index (million m^2)	Relative error (%)	SE (million m^2)	Relative index	SE (relative)	95% CI (relative)
2009	0.6951	12.22%	0.0849	0.2990	0.0365	0.2274–0.3707
2010	1.9218	6.56%	0.1261	0.8268	0.0542	0.7205–0.9331
2011	1.5679	4.51%	0.0707	0.6745	0.0304	0.6149–0.7342
2012	1.5206	5.32%	0.0810	0.6542	0.0348	0.5859–0.7225
2013	2.2347	4.64%	0.1037	0.9614	0.0446	0.8740–1.0488
2014	3.0769	4.11%	0.1263	1.3238	0.0543	1.2172–1.4303
2015	3.5927	2.46%	0.0884	1.5457	0.0380	1.4711–1.6202
2016	2.8319	2.91%	0.0825	1.2184	0.0355	1.1488–1.2879
2017	2.2630	3.05%	0.0691	0.9736	0.0297	0.9153–1.0319
2018	2.0841	2.66%	0.0555	0.8966	0.0239	0.8498–0.9434
2019	2.8292	4.89%	0.1383	1.2172	0.0595	1.1006–1.3338
2020						
2021	2.4101	4.79%	0.1154	1.0369	0.0496	0.9396–1.1342
2022	2.9031	3.41%	0.0990	1.2490	0.0426	1.1655–1.3325
2023	2.4810	2.94%	0.0730	1.0674	0.0314	1.0058–1.1289
2024	2.0070	2.72%	0.0546	0.8635	0.0235	0.8174–0.9095
2025	2.4954	5.26%	0.1313	1.0736	0.0565	0.9628–1.1843
2026	2.5997	4.55%	0.1182	1.1185	0.0508	1.0188–1.2181

Source: NOAA AFSC MACE AVO workbook, 2009–2026. The 2020 observation is unavailable, so its data cells are blank.

SE = index × CV. Relative index and SE share the mean-1 scaling; relative error is unchanged. Source 95% intervals are scaled by the same constant.

Table 26: Counts of AVO sampling intervals during 2009–2026, including positive intervals and zeros; these counts describe survey coverage. There were no AVO observations in 2020.

Year	Survey intervals	Positive intervals	Zeros
2009	5,557	2,430	56.3%
2010	5,699	2,584	54.7%
2011	7,829	5,171	34.0%
2012	6,740	4,750	29.5%
2013	8,021	4,725	41.1%
2014	10,032	8,315	17.1%
2015	10,524	9,700	7.8%
2016	8,603	7,912	8.0%
2017	8,798	6,833	22.3%
2018	8,880	8,044	9.4%
2019	8,836	7,301	17.4%
2020	—	—	—
2021	6,939	6,038	13.0%
2022	9,350	8,502	9.1%
2023	8,740	7,435	14.9%
2024	12,229	10,406	14.9%
2025	7,320	6,952	5.0%
2026	8,699	7,462	14.2%

Table 27: ATS biomass (million tons) and AVO backscatter (million m²), 2006–2026. AVO indices and sampling relative errors for 2009–2026 match Table 25. Assessment CVs from the saved Model 26.0 inputs average 23% across 20 observations; SE equals index × CV. The 2020 USV survey provided ATS biomass; AVO had no observation that year.

Year	ATS biomass (million t)	AVO index (million m^2)	Sampling RE	Assessment CV	Assessment SE (million m^2)
2006	1.8741	1.7415	0.0510	27.64%	0.4814
2007	2.2827	2.0019	0.0865	53.90%	1.0790
2008	1.4045	0.9915	0.0643	19.84%	0.1968
2009	1.3314	0.6951	0.1222	56.89%	0.3955
2010	2.6357	1.9218	0.0656	30.55%	0.5872
2011	—	1.5679	0.0451	21.01%	0.3294
2012	2.2794	1.5206	0.0532	24.80%	0.3771
2013	—	2.2347	0.0464	21.60%	0.4827
2014	4.7428	3.0769	0.0411	19.12%	0.5882
2015	—	3.5927	0.0246	11.46%	0.4118
2016	4.8377	2.8319	0.0291	13.57%	0.3843
2017	—	2.2630	0.0305	14.22%	0.3218
2018	2.4973	2.0841	0.0266	12.40%	0.2585
2019	—	2.8292	0.0489	22.77%	0.6441
2020	3.6170	—	—	—	—
2021	—	2.4101	0.0479	22.29%	0.5372
2022	3.8340	2.9031	0.0341	15.88%	0.4610
2023	—	2.4810	0.0294	13.70%	0.3400
2024	2.8750	2.0070	0.0272	12.67%	0.2543
2025	—	2.4954	0.0526	24.51%	0.6117
2026	3.6825	2.5997	0.0455	21.17%	0.5504
Mean	2.9149	2.2125	0.0486	23.00%	0.4646

Table 28: Annual fishery mean weight-at-age (kg), with observational inputs through 2025 and standalone WtAgeRE predictions and forecasts for 2026–2028. Observational inputs extend through 2025; the 2026 row was predicted. Age 15 was a 15+ group. The fixed early schedule and mean/CV definitions were described below.

Year / basis	Age (years)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
1964–1990	0.007	0.170	0.303	0.447	0.589	0.722	0.840	0.942	1.029	1.102	1.163	1.212	1.253	1.286	1.312
1991	0.007	0.150	0.285	0.483	0.604	0.730	0.844	0.882	1.020	1.123	1.135	1.237	1.236	1.296	1.247
1992	0.007	0.179	0.397	0.465	0.651	0.714	0.819	0.986	1.030	1.200	1.237	1.269	1.193	1.357	1.431
1993	0.007	0.331	0.495	0.612	0.652	0.775	0.934	1.062	1.198	1.240	1.423	1.540	1.576	1.609	1.508
1994	0.007	0.233	0.400	0.652	0.732	0.746	0.727	1.070	1.380	1.325	1.335	1.409	1.397	1.278	1.370
1995	0.007	0.153	0.386	0.505	0.729	0.843	0.847	0.970	1.232	1.296	1.401	1.402	1.392	1.095	1.306
1996	0.007	0.293	0.336	0.445	0.684	0.797	0.948	0.956	1.025	1.100	1.418	1.489	1.521	1.702	1.602
1997	0.007	0.187	0.327	0.477	0.559	0.748	0.889	1.074	1.095	1.236	1.287	1.400	1.561	1.363	1.338
1998	0.007	0.191	0.369	0.589	0.618	0.622	0.780	1.040	1.169	1.276	1.316	1.428	1.448	1.437	1.528
1999	0.007	0.188	0.404	0.507	0.643	0.702	0.729	0.894	1.038	1.253	1.224	1.422	0.995	0.616	1.239
2000	0.007	0.218	0.353	0.526	0.630	0.732	0.780	0.807	0.968	1.015	1.253	1.286	1.108	1.084	1.359
2001	0.006	0.227	0.329	0.505	0.668	0.786	0.964	0.986	1.061	1.133	1.320	1.411	1.568	1.472	1.495
2002	0.007	0.231	0.385	0.510	0.667	0.799	0.911	1.026	1.113	1.102	1.284	1.442	1.579	1.290	1.568
2003	0.006	0.276	0.489	0.549	0.652	0.769	0.863	0.953	1.086	1.202	1.212	1.194	1.374	1.355	1.709
2004	0.007	0.135	0.408	0.584	0.641	0.760	0.888	0.924	1.036	1.176	1.127	1.167	1.309	1.254	1.185
2005	0.007	0.283	0.351	0.508	0.641	0.742	0.880	0.960	1.062	1.074	1.216	1.268	1.217	1.076	1.342
2006	0.007	0.174	0.306	0.448	0.606	0.755	0.858	0.959	1.060	1.117	1.190	1.218	1.280	1.384	1.417
2007	0.007	0.155	0.349	0.507	0.642	0.783	0.961	1.100	1.192	1.266	1.327	1.488	1.444	1.729	1.512
2008	0.007	0.208	0.328	0.519	0.653	0.774	0.900	1.054	1.117	1.289	1.452	1.528	1.560	1.874	1.645
2009	0.007	0.136	0.340	0.525	0.705	0.879	0.999	1.130	1.398	1.479	1.558	1.576	1.807	2.026	2.222
2010	0.050	0.175	0.381	0.490	0.668	0.909	1.114	1.277	1.374	1.586	1.679	1.923	1.948	2.077	2.271
2011	0.031	0.205	0.290	0.508	0.666	0.809	0.971	1.224	1.342	1.513	1.582	1.623	2.080	1.707	2.242
2012	0.029	0.142	0.271	0.409	0.643	0.824	0.974	1.170	1.303	1.509	1.599	1.637	1.680	2.031	2.062
2013	0.095	0.144	0.290	0.442	0.564	0.781	1.130	1.281	1.440	1.685	1.827	1.786	1.934	2.159	2.182
2014	0.014	0.193	0.319	0.454	0.617	0.751	0.894	1.156	1.307	1.386	1.669	1.773	1.704	1.623	2.215
2015	0.025	0.181	0.404	0.462	0.571	0.690	0.786	0.887	1.141	1.195	1.315	1.671	1.389	1.559	2.600
2016	0.025	0.181	0.409	0.531	0.557	0.646	0.732	0.800	0.941	1.043	1.178	0.788	0.911	1.684	1.429
2017	0.025	0.191	0.408	0.499	0.650	0.694	0.752	0.827	0.894	0.911	1.028	0.961	0.312	0.701	0.688
2018	0.025	0.186	0.377	0.467	0.573	0.734	0.809	0.853	0.906	1.039	0.936	1.110	0.568	0.435	1.130
2019	0.025	0.186	0.422	0.565	0.643	0.759	0.878	0.962	1.007	1.065	1.035	1.182	0.754	0.698	0.769
2020	0.025	0.186	0.387	0.522	0.632	0.716	0.799	0.955	1.006	1.040	1.189	1.072	1.208	0.961	0.769
2021	0.025	0.186	0.393	0.480	0.574	0.690	0.757	0.841	1.011	1.130	1.160	1.269	1.215	0.936	0.408
2022	0.025	0.186	0.440	0.506	0.574	0.724	0.837	0.883	0.984	0.972	1.271	1.044	1.235	0.910	0.770
2023	0.025	0.186	0.494	0.483	0.524	0.602	0.812	0.923	0.957	1.041	1.095	1.294	1.331	1.218	1.131
2024	0.025	0.186	0.435	0.481	0.560	0.617	0.696	0.825	1.016	1.017	1.078	1.251	1.308	1.328	1.559
2025	0.025	0.186	0.314	0.556	0.621	0.693	0.730	0.855	0.966	1.140	1.194	1.082	1.314	1.343	1.268
2026 predicted	0.025	0.186	0.368	0.440	0.677	0.734	0.813	0.864	0.953	1.075	1.194	1.232	1.307	1.420	1.448
2027 forecast			0.368	0.482	0.560	0.800	0.858	0.936	0.985	1.069	1.187	1.300	1.333	1.402	1.508
2028 forecast			0.368	0.482	0.601	0.683	0.924	0.980	1.056	1.101	1.181	1.293	1.400	1.427	1.491
Mean	0.018	0.196	0.373	0.508	0.629	0.745	0.863	0.987	1.111	1.205	1.301	1.361	1.356	1.362	1.472
CV (%)	97.9%	22.7%	15.6%	10.0%	7.8%	9.1%	12.1%	13.2%	13.6%	15.1%	15.5%	18.1%	26.8%	31.0%	33.7%

1964–1990 uses the identical fixed schedule in every year. Annual rows through 2025 retain the actual main-data inputs: observed means at ages 3–15+ where available, with model-predicted fills for 2025 ages 13 and 14. The 2026 ages 3–15+ are the selected standalone WtAgeRE predictions.

Ages 1–2 in 2025 and 2026 retain the 2024 input values. Forecast rows 2027–2028 have blank ages 1–2 because that annual model estimates ages 3–15+ only. Blank cells indicate unavailable estimates. Future rows use the selected standalone WtAgeRE fishery forecasts. Projections hold the 2027 forecast fixed for catch and spawning weights. Detailed source records are in the technical appendix.

Mean and CV use the 35 main-input schedules from 1991–2025, including the identified fills and younger-age values retained from the baseline. The fixed early row and all 2026–2028 predictions/forecasts are excluded. CV = sample SD / mean, expressed as percent; it describes variation in the weight schedules among years.

Table 29: Effects of cumulative input updates within Model 23.0, expressed as 2026 estimates. Biomass used the same reference population weight schedule in every fit, and fishing mortality was the maximum realized rate across ages. Each row included preceding updates. ATS and AVO contrasts combine new observations, historical revisions and the stated uncertainty calibrations; the fits estimate their combined effect.

Input updates within Model 23.0				
Cumulative input update	Biomass (million t)	Spawning biomass (million t)	Age-1 fish (billion)	Fishing mortality (per year)
Catch + endpoint	9.030	2.623	18.525	0.348
+ Fishery weights 2024	8.856	2.542	18.541	0.348
+ Fishery weights 2026	8.857	2.533	18.541	0.348
+ Fishery age data	9.323	2.746	18.523	0.341
+ BTS	9.966	2.834	24.345	0.335
+ ATS	11.043	2.761	31.731	0.345
+ AVO	11.227	2.808	31.948	0.341

Table 30: Deterministic 2026 population estimates with the selected catch inputs. Model 26.1.2 was the Early-late fishery split comparison; its marginal sampling estimator was excluded.

2026 estimates after the catch revision				
Model	Biomass (million t)	Spawning biomass (million t)	Age-1 fish (billion)	Maximum F (per year)
Model 23.2	12.267	3.031	37.532	0.304
Model 23.0	11.227	2.808	31.948	0.341
Model 26.0	12.162	3.057	36.347	0.299
Model 26.1.0	12.153	3.053	36.334	0.300
Model 26.1.1	12.198	3.064	36.826	0.316
Model 26.1 decline penalty 0	12.351	3.110	37.608	0.338
Model 26.1.2 Early-late fishery split	12.235	3.065	36.518	0.315

ADMB biomass uses the same population weights as Model 26.0. Model 26.1.2 is a deterministic native joint mode conditional on fixed Foreign and Modern SDs; its sampling-based marginal estimator was excluded by author instruction. This table presents point estimates; scientific model adoption remains separate.

Table 31: Model 26.0 estimated population quantities in 2026. Ranges were approximate 95% confidence intervals under the selected model and fixed biological schedules. Fishing mortality was the largest realized rate across ages in 2026.

Estimated 2026 population					
Quantity	Estimate	SE	95% lower	95% upper	Units
Total biomass	12.162	1.511	9.534	15.515	Million tons
Spawning biomass	3.057	0.320	2.489	3.754	Million tons
Age-1 recruitment	36.347	19.395	12.772	103.440	Billion fish
Fishing mortality: most exposed age	0.299	0.067	0.194	0.463	Per year

Table 32: Model 26.0 annual estimates and approximate 95% confidence intervals, 1964–2026. Each cell gave the estimate followed by its 95% interval. Biomass and spawning biomass were million tons, recruitment was billion age-1 fish and fishing mortality was the maximum realized rate across ages per year. Recruitment was labeled by the calendar year fish enter age 1.

Annual population estimates and 95% intervals			
Year Biomass (million t)	Spawning biomass (million t)	Age-1 fish (billion)	Fishing mortality (per year)
1964 4.827 (3.351–6.953)	1.348 (0.909–1.998)	5.727 (2.316–14.165)	0.077 (0.043–0.135)
1965 5.201 (3.701–7.308)	1.376 (0.939–2.016)	23.494 (13.757–40.121)	0.085 (0.049–0.146)
1966 5.420 (3.893–7.545)	1.398 (0.946–2.067)	15.880 (8.083–31.199)	0.090 (0.053–0.153)
1967 6.159 (4.520–8.392)	1.508 (1.027–2.215)	27.213 (16.078–46.059)	0.161 (0.091–0.286)
1968 6.803 (5.019–9.223)	1.674 (1.131–2.476)	22.441 (12.605–39.953)	0.178 (0.107–0.297)
1969 7.387 (5.544–9.843)	1.895 (1.292–2.781)	26.281 (15.584–44.321)	0.179 (0.104–0.308)
1970 8.087 (6.171–10.599)	2.006 (1.388–2.899)	23.326 (13.486–40.346)	0.265 (0.126–0.556)
1971 8.012 (6.127–10.478)	2.117 (1.476–3.036)	13.629 (6.794–27.342)	0.386 (0.178–0.839)
1972 7.273 (5.512–9.596)	1.978 (1.384–2.825)	10.896 (5.305–22.380)	0.426 (0.196–0.929)
1973 6.521 (4.990–8.522)	1.697 (1.159–2.484)	26.743 (18.276–39.133)	0.471 (0.221–1.005)
1974 5.485 (4.193–7.175)	1.293 (0.834–2.007)	19.281 (13.001–28.596)	0.499 (0.303–0.821)
1975 4.711 (3.663–6.059)	1.200 (0.784–1.835)	16.451 (11.522–23.489)	0.467 (0.327–0.668)
1976 4.304 (3.468–5.342)	1.121 (0.794–1.581)	12.944 (9.258–18.097)	0.423 (0.278–0.643)
1977 4.036 (3.351–4.860)	1.305 (0.984–1.732)	14.023 (10.506–18.716)	0.377 (0.171–0.830)
1978 4.311 (3.700–5.023)	1.158 (0.892–1.504)	26.513 (21.903–32.094)	0.436 (0.197–0.968)
1979 5.530 (4.931–6.200)	1.068 (0.839–1.359)	62.439 (54.916–70.993)	0.462 (0.220–0.969)
1980 6.294 (5.684–6.969)	1.268 (1.044–1.541)	29.662 (24.950–35.264)	0.424 (0.263–0.684)
1981 7.831 (7.139–8.589)	1.934 (1.693–2.210)	34.243 (29.110–40.280)	0.308 (0.201–0.472)
1982 9.443 (8.615–10.352)	2.680 (2.387–3.008)	19.180 (15.520–23.704)	0.201 (0.139–0.291)
1983 10.311 (9.464–11.233)	3.594 (3.219–4.013)	52.001 (46.089–58.672)	0.174 (0.113–0.267)
1984 10.272 (9.441–11.176)	3.732 (3.350–4.158)	14.229 (11.444–17.692)	0.172 (0.130–0.227)
1985 12.273 (11.351–13.271)	4.262 (3.876–4.686)	32.543 (28.408–37.280)	0.181 (0.132–0.249)
1986 11.664 (10.861–12.526)	4.145 (3.805–4.516)	12.743 (10.478–15.497)	0.168 (0.115–0.246)
1987 10.839 (10.212–11.504)	4.157 (3.857–4.480)	7.323 (5.855–9.158)	0.129 (0.086–0.194)
1988 9.780 (9.224–10.370)	3.909 (3.657–4.179)	5.712 (4.552–7.168)	0.181 (0.122–0.268)
1989 8.195 (7.706–8.714)	3.382 (3.165–3.613)	11.908 (10.240–13.848)	0.209 (0.159–0.275)
1990 7.731 (7.305–8.183)	2.870 (2.674–3.080)	50.462 (46.960–54.226)	0.292 (0.214–0.396)
1991 8.525 (8.086–8.988)	2.320 (2.144–2.511)	27.363 (24.774–30.224)	0.406 (0.289–0.569)
1992 9.146 (8.688–9.628)	2.202 (2.049–2.366)	23.766 (21.304–26.512)	0.484 (0.330–0.711)
1993 10.389 (9.875–10.931)	2.878 (2.704–3.063)	46.285 (42.750–50.113)	0.304 (0.211–0.438)
1994 10.238 (9.733–10.769)	3.341 (3.143–3.551)	15.931 (14.075–18.031)	0.233 (0.157–0.346)
1995 8.867 (8.408–9.350)	3.572 (3.367–3.790)	11.171 (9.736–12.818)	0.296 (0.252–0.348)
1996 9.339 (8.859–9.845)	3.509 (3.307–3.723)	22.654 (20.657–24.844)	0.376 (0.308–0.458)
1997 8.875 (8.422–9.352)	3.412 (3.210–3.626)	30.307 (28.043–32.753)	0.339 (0.229–0.504)
1998 8.748 (8.302–9.217)	2.901 (2.726–3.087)	14.951 (13.463–16.604)	0.275 (0.199–0.380)
1999 8.937 (8.494–9.403)	3.020 (2.847–3.204)	16.029 (14.509–17.708)	0.213 (0.180–0.251)
2000 9.070 (8.635–9.528)	2.903 (2.741–3.075)	24.585 (22.686–26.642)	0.272 (0.224–0.330)
2001 9.067 (8.643–9.512)	2.939 (2.776–3.113)	34.415 (32.234–36.744)	0.291 (0.239–0.354)
2002 9.528 (9.109–9.966)	2.728 (2.577–2.889)	22.938 (21.267–24.742)	0.374 (0.318–0.440)
2003 10.763 (10.308–11.238)	2.748 (2.605–2.899)	14.341 (13.115–15.681)	0.415 (0.338–0.510)
2004 9.630 (9.214–10.065)	3.032 (2.882–3.189)	6.525 (5.751–7.404)	0.361 (0.279–0.467)
2005 7.764 (7.409–8.136)	2.663 (2.529–2.804)	4.624 (3.988–5.362)	0.335 (0.282–0.399)
2006 6.805 (6.471–7.156)	2.431 (2.302–2.567)	11.539 (10.424–12.774)	0.406 (0.348–0.474)
2007 6.328 (6.007–6.666)	1.994 (1.876–2.119)	24.986 (23.081–27.048)	0.432 (0.370–0.505)
2008 4.826 (4.568–5.099)	1.528 (1.427–1.636)	13.553 (12.109–15.170)	0.443 (0.372–0.528)

Annual population estimates and 95% intervals			
Year Biomass (million t)	Spawning biomass (million t)	Age-1 fish (billion)	Fishing mortality (per year)
2009 5.899 (5.593–6.221)	1.617 (1.512–1.730)	49.521 (46.316–52.948)	0.381 (0.256–0.569)
2010 7.701 (7.321–8.101)	1.654 (1.549–1.767)	23.135 (21.102–25.363)	0.317 (0.237–0.425)
2011 8.485 (8.068–8.924)	2.029 (1.907–2.158)	14.211 (12.693–15.910)	0.433 (0.356–0.526)
2012 8.811 (8.359–9.287)	2.475 (2.331–2.628)	12.310 (10.960–13.827)	0.429 (0.266–0.691)
2013 9.756 (9.251–10.287)	2.824 (2.655–3.003)	43.285 (40.546–46.208)	0.428 (0.253–0.723)
2014 10.381 (9.869–10.919)	2.782 (2.606–2.969)	49.480 (46.207–52.984)	0.403 (0.226–0.719)
2015 11.568 (11.013–12.151)	2.597 (2.436–2.768)	21.258 (19.132–23.620)	0.449 (0.245–0.823)
2016 12.325 (11.722–12.960)	2.855 (2.690–3.030)	8.625 (7.265–10.239)	0.312 (0.244–0.400)
2017 11.425 (10.826–12.056)	3.300 (3.110–3.502)	7.890 (6.545–9.511)	0.295 (0.211–0.414)
2018 9.899 (9.330–10.502)	3.152 (2.957–3.361)	16.823 (14.472–19.557)	0.276 (0.232–0.329)
2019 10.741 (10.071–11.457)	3.067 (2.851–3.299)	87.831 (78.998–97.651)	0.438 (0.360–0.532)
2020 11.795 (10.940–12.717)	2.364 (2.171–2.575)	27.572 (23.257–32.688)	0.419 (0.353–0.497)
2021 11.818 (10.823–12.905)	2.619 (2.394–2.866)	12.958 (9.881–16.992)	0.416 (0.332–0.523)
2022 13.137 (11.866–14.545)	3.742 (3.383–4.139)	12.683 (9.030–17.815)	0.291 (0.220–0.385)
2023 11.901 (10.613–13.345)	3.779 (3.369–4.238)	11.616 (7.811–17.274)	0.232 (0.155–0.348)
2024 10.767 (9.397–12.337)	3.526 (3.076–4.041)	39.254 (25.030–61.560)	0.243 (0.201–0.294)
2025 10.134 (8.563–11.993)	3.228 (2.732–3.814)	27.976 (16.327–47.937)	0.293 (0.225–0.380)
2026 12.162 (9.534–15.515)	3.057 (2.489–3.754)	36.347 (12.772–103.440)	0.299 (0.194–0.463)

Table 33: Final 2026 population summaries from the regularized Model 26.0 posterior. All 5,000 saved draws contribute. Intervals were central 95% credible intervals. Priors, parameter support and biology remain fixed. Production-fit estimates and projections retained their separate roles.

Posterior population uncertainty				
Quantity and units	Mean	Median	2.5%	97.5%
SSB 2026 (million t)	2.9645	2.9465	2.4497	3.5844
Biomass 2026 (million t)	11.5860	11.4616	9.2151	14.7192
Recruitment 2026 (billion fish)	36.4680	31.1518	12.2880	91.0616

Table 34: Model 26.0 start-of-year numbers at age, 1964–2026, in billion fish. Age 15+ included all older fish. Values were rounded to 0.001 billion fish; full precision was retained in the supporting tables.

Numbers at age (billion fish)															
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
1964	5.727	4.350	2.577	0.877	0.514	0.633	0.390	0.247	0.198	0.173	0.149	0.127	0.106	0.088	0.159
1965	23.494	2.328	2.763	1.872	0.612	0.356	0.434	0.269	0.171	0.137	0.120	0.104	0.089	0.074	0.172
1966	15.880	9.549	1.476	1.987	1.274	0.417	0.243	0.297	0.184	0.117	0.094	0.083	0.072	0.061	0.170
1967	27.213	6.454	6.040	1.053	1.345	0.864	0.283	0.165	0.202	0.125	0.080	0.064	0.057	0.049	0.158
1968	22.441	11.052	4.038	4.077	0.664	0.850	0.548	0.180	0.105	0.129	0.080	0.051	0.041	0.036	0.132
1969	26.281	9.109	6.877	2.693	2.528	0.414	0.533	0.345	0.113	0.066	0.081	0.050	0.032	0.026	0.106
1970	23.326	10.660	5.638	4.445	1.667	1.574	0.259	0.334	0.216	0.071	0.041	0.051	0.031	0.020	0.082
1971	13.629	9.439	6.459	3.435	2.654	0.984	0.930	0.152	0.193	0.124	0.041	0.024	0.029	0.018	0.058
1972	10.896	5.500	5.584	3.709	1.888	1.418	0.529	0.500	0.079	0.100	0.064	0.021	0.012	0.015	0.038
1973	26.743	4.398	3.158	2.995	1.895	0.965	0.726	0.271	0.249	0.039	0.049	0.031	0.010	0.006	0.026
1974	19.281	10.796	2.452	1.583	1.418	0.896	0.457	0.345	0.126	0.116	0.018	0.023	0.014	0.005	0.014
1975	16.451	7.788	5.813	1.103	0.714	0.641	0.407	0.208	0.155	0.057	0.052	0.008	0.010	0.007	0.009
1976	12.944	6.658	4.425	2.700	0.526	0.347	0.314	0.200	0.102	0.077	0.028	0.026	0.004	0.005	0.007
1977	14.023	5.244	3.863	2.220	1.311	0.261	0.174	0.159	0.102	0.052	0.039	0.014	0.013	0.002	0.006
1978	26.513	5.685	3.073	2.134	1.152	0.671	0.135	0.090	0.083	0.053	0.027	0.020	0.007	0.007	0.004
1979	62.439	10.753	3.356	1.697	1.095	0.568	0.333	0.067	0.045	0.041	0.025	0.013	0.009	0.003	0.005
1980	29.662	25.334	6.512	1.953	0.894	0.526	0.271	0.160	0.032	0.021	0.019	0.012	0.006	0.004	0.004
1981	34.243	12.042	15.722	4.120	1.061	0.440	0.255	0.132	0.078	0.016	0.010	0.009	0.006	0.003	0.004
1982	19.180	13.910	7.571	10.735	2.474	0.577	0.240	0.140	0.073	0.043	0.009	0.006	0.005	0.003	0.004
1983	52.001	7.794	8.800	5.406	7.005	1.499	0.350	0.146	0.085	0.044	0.026	0.005	0.003	0.003	0.004
1984	14.229	21.135	4.935	6.345	3.678	4.454	0.933	0.219	0.091	0.053	0.028	0.017	0.003	0.002	0.005
1985	32.543	5.783	13.399	3.558	4.364	2.346	2.778	0.583	0.137	0.057	0.033	0.017	0.010	0.002	0.004
1986	12.743	13.228	3.666	9.626	2.464	2.876	1.450	1.721	0.363	0.086	0.036	0.021	0.011	0.007	0.004
1987	7.323	5.180	8.390	2.635	6.620	1.641	1.821	0.908	1.088	0.229	0.054	0.023	0.013	0.007	0.007
1988	5.712	2.977	3.291	6.063	1.859	4.529	1.089	1.207	0.591	0.709	0.150	0.036	0.015	0.009	0.009
1989	11.908	2.322	1.889	2.308	4.180	1.215	2.892	0.674	0.753	0.369	0.446	0.095	0.023	0.009	0.011
1990	50.462	4.841	1.474	1.348	1.573	2.721	0.768	1.739	0.412	0.467	0.229	0.278	0.059	0.014	0.013
1991	27.363	20.513	3.069	1.051	0.883	0.939	1.582	0.426	0.962	0.232	0.268	0.128	0.158	0.034	0.015
1992	23.766	11.123	13.004	2.212	0.709	0.545	0.550	0.835	0.237	0.517	0.130	0.133	0.065	0.080	0.025
1993	46.285	9.660	7.040	9.058	1.484	0.440	0.299	0.266	0.386	0.109	0.241	0.059	0.061	0.030	0.048
1994	15.931	18.816	6.141	5.016	5.788	0.975	0.266	0.164	0.145	0.212	0.061	0.136	0.033	0.034	0.043
1995	11.171	6.476	11.970	4.488	3.422	3.424	0.588	0.156	0.097	0.087	0.127	0.037	0.082	0.020	0.046
1996	22.654	4.542	4.119	8.785	3.202	2.200	1.886	0.337	0.090	0.057	0.052	0.077	0.022	0.050	0.040
1997	30.307	9.210	2.882	3.010	6.386	2.202	1.297	0.960	0.172	0.049	0.032	0.030	0.045	0.013	0.053
1998	14.951	12.321	5.830	2.098	2.142	4.358	1.377	0.729	0.524	0.091	0.027	0.018	0.017	0.026	0.037
1999	16.029	6.078	7.822	4.233	1.487	1.457	2.659	0.843	0.421	0.295	0.052	0.016	0.011	0.010	0.037
2000	24.585	6.517	3.865	5.567	2.949	1.011	0.946	1.592	0.514	0.259	0.182	0.032	0.010	0.007	0.029
2001	34.415	9.995	4.144	2.792	3.765	1.891	0.648	0.560	0.899	0.307	0.159	0.112	0.020	0.006	0.022
2002	22.938	13.991	6.359	3.017	1.923	2.277	1.047	0.364	0.318	0.524	0.184	0.095	0.068	0.012	0.017
2003	14.341	9.325	8.893	4.605	2.049	1.174	1.160	0.540	0.192	0.175	0.301	0.108	0.057	0.040	0.017
2004	6.525	5.830	5.931	6.270	3.117	1.213	0.615	0.567	0.271	0.102	0.098	0.176	0.063	0.033	0.034
2005	4.624	2.653	3.710	4.296	3.941	1.884	0.684	0.318	0.295	0.147	0.058	0.058	0.105	0.038	0.040
2006	11.539	1.880	1.688	2.690	2.846	2.166	0.998	0.370	0.176	0.165	0.085	0.034	0.035	0.064	0.047
2007	24.986	4.691	1.195	1.193	1.747	1.593	1.069	0.507	0.191	0.093	0.089	0.047	0.020	0.020	0.063
2008	13.553	10.158	2.982	0.845	0.768	0.978	0.766	0.526	0.262	0.101	0.050	0.048	0.026	0.011	0.045
2009	49.521	5.510	6.459	2.150	0.555	0.441	0.465	0.369	0.260	0.132	0.053	0.026	0.025	0.013	0.029
2010	23.135	20.133	3.507	4.643	1.417	0.335	0.226	0.238	0.190	0.135	0.068	0.027	0.013	0.013	0.022

Numbers at age (billion fish)															
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
2011	14.211	9.405	12.817	2.564	2.970	0.863	0.197	0.127	0.128	0.103	0.074	0.037	0.014	0.007	0.019
2012	12.310	5.777	5.985	9.326	1.780	1.497	0.415	0.096	0.062	0.063	0.050	0.036	0.019	0.007	0.013
2013	43.285	5.005	3.675	4.338	6.114	1.155	0.723	0.201	0.047	0.031	0.031	0.024	0.018	0.009	0.010
2014	49.480	17.597	3.185	2.667	2.916	3.703	0.691	0.385	0.098	0.023	0.015	0.015	0.012	0.008	0.009
2015	21.258	20.116	11.197	2.315	1.823	1.817	2.084	0.356	0.201	0.051	0.011	0.007	0.008	0.006	0.009
2016	8.625	8.642	12.808	7.777	1.536	1.146	1.015	1.080	0.185	0.105	0.025	0.005	0.004	0.004	0.007
2017	7.890	3.507	5.505	9.386	4.577	0.972	0.694	0.596	0.586	0.103	0.059	0.014	0.003	0.002	0.006
2018	16.823	3.208	2.233	4.045	6.465	2.573	0.548	0.391	0.334	0.323	0.058	0.033	0.008	0.002	0.004
2019	87.831	6.840	2.042	1.641	2.896	3.781	1.446	0.314	0.224	0.194	0.191	0.034	0.020	0.005	0.004
2020	27.572	35.707	4.349	1.497	1.185	1.992	2.008	0.691	0.164	0.123	0.109	0.113	0.020	0.012	0.005
2021	12.958	11.209	22.578	3.140	1.035	0.768	1.044	0.979	0.355	0.082	0.062	0.056	0.060	0.011	0.009
2022	12.683	5.268	7.061	15.644	2.187	0.668	0.471	0.534	0.478	0.181	0.042	0.033	0.030	0.032	0.011
2023	11.616	5.156	3.322	5.072	10.705	1.455	0.427	0.283	0.296	0.276	0.107	0.024	0.019	0.018	0.025
2024	39.254	4.722	3.268	2.384	3.526	6.678	0.891	0.267	0.171	0.174	0.164	0.063	0.014	0.011	0.025
2025	27.976	15.959	3.002	2.342	1.659	2.308	3.879	0.546	0.166	0.104	0.106	0.100	0.038	0.009	0.022
2026	36.347	11.374	10.149	2.172	1.644	1.112	1.276	2.157	0.320	0.098	0.062	0.064	0.060	0.023	0.019

Table 35: Model 26.0 start-of-2026 numbers at age and uncertainty, in billion fish. Ranges were approximate 95% confidence intervals, accounting for covariance in the fitted model. Age 15+ included all older fish.

2026 numbers at age and uncertainty					
Age	Estimate	SE	CV	95% lower	95% upper
1	36.347	19.395	53.4%	12.772	103.440
2	11.374	3.125	27.5%	6.638	19.489
3	10.149	2.335	23.0%	6.466	15.932
4	2.172	0.449	20.7%	1.448	3.259
5	1.644	0.309	18.8%	1.138	2.376
6	1.112	0.184	16.5%	0.804	1.537
7	1.276	0.176	13.8%	0.973	1.672
8	2.157	0.259	12.0%	1.704	2.730
9	0.320	0.045	13.9%	0.243	0.420
10	0.098	0.016	16.6%	0.071	0.136
11	0.062	0.011	18.1%	0.043	0.088
12	0.064	0.012	18.0%	0.045	0.091
13	0.060	0.012	19.7%	0.041	0.089
14	0.023	0.006	25.1%	0.014	0.038
15+	0.019	0.006	31.3%	0.010	0.034

Table 36: Model 26.0 biological schedules and fishery weight predictions at ages 1–15+, with weights for 2024–2026. Mortality was an annual instantaneous rate; maturity and female fraction were proportions; weights were kg per fish. Population weights were the BTS schedule. Fishery 2026 values show the current predictions; projections use fixed 2027 fishery forecasts for catch and spawning weights.

Biological schedules and recent weights												
Age	Natural mortality	Mature	Female	Population weights (kg)			Fishery weights (kg)			Spawning weights (kg)		
				2024	2025	2026	2024	2025	2026	2024	2025	2026
1	0.900	0.000	0.500	0.017	0.020	0.020	0.025	0.025	0.025	0.085	0.085	0.085
2	0.450	0.008	0.500	0.090	0.079	0.066	0.186	0.186	0.186	0.196	0.196	0.196
3	0.300	0.289	0.500	0.309	0.226	0.397	0.435	0.314	0.368	0.387	0.415	0.317
4	0.300	0.641	0.500	0.454	0.526	0.544	0.481	0.556	0.440	0.452	0.523	0.541
5	0.300	0.842	0.500	0.560	0.587	0.640	0.560	0.621	0.677	0.521	0.596	0.657
6	0.300	0.901	0.500	0.607	0.676	0.725	0.617	0.693	0.734	0.633	0.668	0.732
7	0.300	0.947	0.500	0.693	0.734	0.809	0.696	0.730	0.813	0.750	0.779	0.804
8	0.300	0.963	0.500	0.923	0.812	0.874	0.825	0.855	0.864	0.879	0.893	0.911
9	0.300	0.970	0.500	0.997	0.903	0.949	1.016	0.966	0.953	0.987	1.016	1.019
10	0.300	1.000	0.500	1.020	1.087	1.027	1.017	1.140	1.075	1.055	1.116	1.135
11	0.300	1.000	0.500	1.126	1.066	1.048	1.078	1.194	1.194	1.127	1.175	1.227
12	0.300	1.000	0.500	1.137	1.150	1.192	1.251	1.082	1.232	1.245	1.239	1.279
13	0.300	1.000	0.500	1.259	1.258	1.416	1.308	1.314	1.307	1.294	1.347	1.333
14	0.300	1.000	0.500	1.406	1.399	1.449	1.328	1.343	1.420	1.336	1.388	1.434
15+	0.300	1.000	0.500	1.754	1.547	1.360	1.559	1.268	1.448	1.391	1.421	1.466

Table 37: Model 26.0 selectivity at age in 2026. Cells give the estimate and approximate 95% confidence interval. ATS and AVO share the same estimated curve. Relative selectivity can exceed one because the existing curve convention used a different normalization than division by its maximum.

2026 selectivity and uncertainty			
Age	Fishery	BTS	ATS and AVO
1	0.000 (0.000–0.003)	0.054 (0.019–0.155)	0.000 (0.000–0.000)
2	0.016 (0.006–0.045)	0.026 (0.012–0.055)	0.776 (0.516–1.169)
3	0.145 (0.055–0.382)	0.066 (0.039–0.112)	0.789 (0.535–1.163)
4	0.337 (0.133–0.852)	0.156 (0.099–0.244)	0.709 (0.483–1.039)
5	0.646 (0.261–1.594)	0.326 (0.207–0.513)	0.779 (0.541–1.122)
6	1.589 (1.018–2.481)	0.559 (0.374–0.836)	0.974 (0.690–1.376)
7	1.556 (1.076–2.249)	0.769 (0.583–1.013)	1.141 (0.831–1.567)
8	1.536 (1.098–2.148)	0.897 (0.770–1.046)	1.125 (0.992–1.275)
9	1.429 (1.042–1.960)	0.958 (0.889–1.033)	1.125 (0.992–1.275)
10	1.354 (0.999–1.837)	0.984 (0.950–1.018)	1.125 (0.992–1.275)
11	1.295 (0.963–1.743)	0.994 (0.979–1.009)	1.125 (0.992–1.275)
12	1.274 (0.937–1.733)	0.998 (0.991–1.004)	1.125 (0.992–1.275)
13	1.274 (0.937–1.733)	0.999 (0.996–1.002)	1.125 (0.992–1.275)
14	1.274 (0.937–1.733)	1.000 (0.998–1.001)	1.125 (0.992–1.275)
15+	1.274 (0.937–1.733)	1.000 (0.999–1.000)	1.125 (0.992–1.275)

Table 38: Estimated parameter groups and their uncertainty in Model 26.0. Standard errors use each group's estimation scale; differences in scales make direct comparisons among groups inappropriate.

Estimated parameter groups					
Parameter group	Count	Minimum estimate	Maximum estimate	Median SE	Maximum SE
BTS age-1 deviation	44	−0.401	0.359	0.138	0.211
BTS age-1 log selectivity	1	−3.048	−3.048	0.307	0.307
BTS midpoint deviation	44	−0.351	0.192	0.099	0.123
BTS slope deviation	44	0.246	1.589	0.234	0.398
Initial-age deviation	14	−1.480	−0.395	0.651	0.803
Log catchability	3	−8.225	−0.248	0.071	0.185
Log fishing scale	63	−2.939	−0.821	0.134	0.233
Log logistic slope	1	−0.838	−0.838	0.196	0.196
Logistic midpoint	1	6.981	6.981	0.641	0.641
Recruitment deviation	63	−1.234	1.710	0.142	0.538
Recruitment level	1	9.673	9.673	0.121	0.121
Selectivity increment	987	−1.459	1.287	0.280	0.597

Table 39: Contributions to the Model 26.0 fit, grouped by data source or stabilizing assumption. Rounded rows may differ slightly from their sum. Negative values arise from likelihood constants. Contributions across different data and model structures use different scales and assumptions.

Contributions to the fit	
Contribution	Value
Catch data	−127.771
Composition data	421.207
Index data	160.956
Initial abundance deviates	19.860
Non-parametric selectivity	18.325
Recruitment deviates	71.193
Selectivity deviates	188.221

Table 40: Observed-index residual summaries for Model 26.0. Residuals measure observed-minus-predicted differences relative to the selected observation errors. The retained 2020 ATS placeholders were excluded.

Model 26.0 index residuals			
Series	Observations	Mean residual	Residual SD
ATS	20	−0.10	1.04
ATS age 1	19	0.06	1.13
AVO	20	0.12	0.97
BTS	44	0.09	1.19
Historical CPUE	12	0.05	0.53

BTS residuals account for the covariance among survey years. A spread near 1 agrees with the selected observation-error scale. These are fitted-model diagnostics.

Table 41: Model 26.0 profile likelihood points and conditional 2027 female spawning biomass (thousand tons, kt), with approximate 95% confidence intervals. ATS catchability was fixed separately at each point; all other active parameters were re-estimated. The projection assumed 1,375 kt catch in 2027 and the mean 2023–2025 fishery selectivity curve.

2027 female spawning biomass at fixed ATS catchability				
ATS q	ΔNLL	2027 SSB (kt)	Lower 95% (kt)	Upper 95% (kt)
0.45000	2.477	3,567.3	2,737.3	4,649.0
0.45837	1.866	3,533.9	2,709.7	4,608.9
0.46674	1.349	3,501.6	2,682.8	4,570.3
0.47510	0.922	3,470.2	2,656.8	4,532.6
0.48347	0.581	3,439.7	2,631.5	4,496.0
0.49184	0.322	3,410.1	2,607.0	4,460.5
0.50021	0.141	3,381.2	2,583.6	4,425.0
0.50858	0.035	3,353.0	2,560.3	4,391.0
0.51694	0.000	3,325.5	2,538.0	4,357.3
0.53358	0.130	3,272.7	2,494.8	4,293.2
0.55021	0.505	3,222.5	2,453.8	4,232.0
0.56684	1.102	3,174.7	2,414.2	4,174.7
0.58347	1.901	3,129.3	2,376.6	4,120.4
0.60010	2.886	3,086.1	2,340.4	4,069.5
0.61674	4.039	3,045.0	2,306.3	4,020.4
0.63337	5.347	3,005.8	2,273.8	3,973.5
0.65000	6.797	2,968.3	2,242.7	3,928.7

Intervals use the fixed-q penalized Hessian and the delta method on log SSB. They propagate fitted-parameter uncertainty, including fitted abundance and selectivity, conditional on the stated catch, biological schedules and ATS q. They exclude uncertainty in ATS q, future recruitment process variation and weight-at-age schedules. Spawning occurs on April 1; age 15+ is retained.

Table 42: Model 26.0 Mohn’s rho against the full-2026 fit. Rho was the mean proportional terminal revision.

Model 26.0 retrospective Mohn's rho			
Quantity	2024–2025 (2 peels)	2023–2025 (3 peels)	2017–2025 (9 peels)
Maximum fishing mortality	0.04411	0.15391	−0.06364
Age-1 recruitment	−0.26348	0.04013	−0.09848
Total biomass	−0.10792	−0.10774	0.00006
Female spawning biomass	−0.07636	−0.09393	0.12096

Table 43: Model 26.0 retrospective terminal estimates and revisions: All rows use the full-2026 reference. Each row omitted all observations after its terminal year, using the same data-lag rules. Relative revisions were 100 × (peel estimate / full-2026-fit estimate for the same calendar year − 1). SSB was female spawning biomass; F was the maximum age-specific fishing mortality. These were point-estimate comparisons; the peel comparisons cover population estimates only.

Retrospective revisions in Model 26.0						
Terminal year	F revision (%)	Recruitment revision (%)	Biomass revision (%)	SSB revision (%)	Peel SSB (million t)	Full-fit SSB (million t)
2025	−9.7	−30.8	−11.0	−4.5	3.08	3.23
2024	18.5	−21.9	−10.5	−10.8	3.15	3.53
2023	37.4	64.7	−10.7	−12.9	3.29	3.78
2022	7.6	−35.0	1.6	2.3	3.83	3.74
2021	34.7	44.6	−9.8	−13.8	2.26	2.62
2020	−35.6	−59.0	−11.0	40.7	3.33	2.36
2019	−53.4	−79.4	0.8	28.2	3.93	3.07
2018	−17.2	−21.3	14.3	26.9	4.00	3.15
2017	−39.5	49.4	36.5	52.8	5.04	3.30

Table 44: Native fitting objectives with the selected catch inputs, including the Early-late fishery split comparison. Model-specific penalties and normalizations preclude direct likelihood ranking.

model	objective	method
26_0	751.989578	Established deterministic penalized fit
26_1_0	746.780971	Established deterministic penalized fit
26_1_1	726.234542	Established deterministic penalized fit
26_1_decline_zero	706.054843	Established deterministic penalized fit
26_1_2_conditional	731.019469	Early-late fishery split; Foreign 0.1235; Modern fixed at prior marginal estimate

Objectives have model-specific penalties and normalizations. The Early-late fishery split comparison supplies its native joint objective. These values support run verification; direct AIC or likelihood-ratio ranking is excluded.

Table 45: Maximum ABC and OFL for the four separately fitted Rceattle configurations and the Early-late fishery split Model 26.1.2 comparison under matched Scenario 2 assumptions, in million tons. Model 26.0 (Rceattle) was the adopted assessment model and main proposal for Tier 3 calculations and specifications; Model 26.1.2 was the sensitivity analysis. Adopted catch specifications remained separate.

Maximum ABC and OFL under matched Scenario 2 catches				
Model	2027		2028	
	Maximum ABC (difference)	OFL	Maximum ABC (difference)	OFL
Model 26.0	1.896 (+0.00%)	2.328	1.968 (+0.00%)	2.422
Model 26.1.0	1.895 (-0.09%)	2.326	1.966 (-0.09%)	2.420
Model 26.1.1	1.863 (-1.75%)	2.281	1.953 (-0.74%)	2.396
26.1 decline penalty = 0	1.867 (-1.57%)	2.278	1.970 (+0.09%)	2.408
26.1.2 Early-late fishery split	1.855 (-2.19%)	2.269	1.958 (-0.51%)	2.399

Million tons; differences are relative to Model 26.0 in the same year. Recruitment is fixed at each model's historical arithmetic mean. The 26.1.2 row is the Early-late fishery split comparator. Simulation, retrospective and MCMC analyses are excluded. Adopted specifications remain unchanged.

Table 46: Final Model 26.0 posterior stock and selectivity summaries from 5,000 saved draws. SD was posterior standard deviation; intervals were central 95% credible intervals. R-hat and chain ESS describe the saved chains.

Posterior stock and selectivity summaries					
Quantity and units	Mean	Posterior SD	Median	2.5%	97.5%
SSB 2026 (million t)	2.9645	0.2928	2.9465	2.4497	3.5844
Biomass 2026 (million t)	11.5860	1.4111	11.4616	9.2151	14.7192
Recruitment 2026 (billion fish)	36.4680	21.2479	31.1518	12.2880	91.0616
Ages1-3 2026 (billion fish)	56.0356	22.4635	50.9012	28.5376	113.5991
BTS selectivity age 1	0.0702	0.0354	0.0635	0.0207	0.1578
BTS selectivity age 2	0.0330	0.0120	0.0314	0.0152	0.0605
BTS selectivity age 5	0.3631	0.0795	0.3541	0.2332	0.5394
BTS selectivity age 10	0.9772	0.0215	0.9839	0.9172	0.9985
BTS selectivity age 15	0.9995	0.0009	0.9999	0.9969	1.0000

Table 47: Reference points for revised Model 26.0 and the Early-late fishery split Model 26.1.2 comparison. Biomass was female spawning biomass in million tons; F was the annual rate on the most selected age. Each column used that model's primary projection selectivity and fixed biological schedules.

Quantity	Model 26.0	26.1.2 Early-late fishery split	Units
B100%	6.158	6.220	Million tons
B40%	2.463	2.488	Million tons
B35%	2.155	2.177	Million tons
F40%	0.335	0.296	Per year
F35%	0.429	0.377	Per year

Revised fits; model-specific 1978–2023 arithmetic mean recruitment. These SPR reference points condition on fixed biology and the stated selectivity window.

Table 48: Projections from the revised fits. Harvest scenarios under the Model 26.0 base fit. Each scenario retained its own rule; specified catches apply only to Scenario 2.

Scenario	Rule
1	Fishing at maximum permissible ABC each year.
2	Expected catch of 1,375 kt in 2027 and 2028, followed by maximum permissible ABC; author F fraction 1.
3	Mean annual maximum fishery F over 2021–2025, held constant.
4	One-half the maximum permissible ABC fishing mortality, without fixed-catch conditioning.
5	No fishing.
6	Fishing at the OFL threshold each year.
7	Maximum ABC fishing in 2027 and 2028, followed by OFL fishing from 2029.

Table 49: Projections from the revised fits. Short-term Tier 3 calculations under Scenario 2. Catch, spawning biomass, maximum ABC and OFL were thousand tons; F was the annual rate on the most selected age. The 2028 catch was a planning assumption.

Year	Assumed catch	Spawning biomass	Maximum ABC	OFL	F
2027	1,375	3,198	1,896	2,328	0.231
2028	1,375	3,394	1,968	2,422	0.223

Table 50: Projections from the revised fits. Thirteen-year catch table for the proposed harvest scenarios, in thousand tons.

Year	Catch (kt) by harvest scenario						
	1: Maximum ABC	2: Expected catch	3: Recent F	4: Half FABC	5: No fishing	6: OFL	7: ABC, then OFL
2026	1,313	1,313	1,313	1,313	1,313	1,313	1,313
2027	1,896	1,375	1,166	1,026	0	2,328	1,896
2028	1,828	1,375	1,240	1,112	0	2,114	1,828
2029	1,997	2,268	1,460	1,328	0	2,211	2,449
2030	1,900	2,060	1,468	1,351	0	2,047	2,175
2031	1,845	1,933	1,482	1,375	0	1,940	2,015
2032	1,675	1,720	1,384	1,294	0	1,662	1,700
2033	1,602	1,625	1,334	1,251	0	1,603	1,612
2034	1,569	1,580	1,307	1,228	0	1,594	1,596
2035	1,550	1,556	1,289	1,212	0	1,594	1,594
2036	1,541	1,544	1,278	1,202	0	1,595	1,595
2037	1,536	1,538	1,271	1,195	0	1,596	1,595
2038	1,534	1,535	1,267	1,191	0	1,596	1,596

Table 51: Projections from the revised fits. Thirteen-year female spawning-biomass table for the proposed harvest scenarios, in thousand tons.

Year	SSB (kt) by harvest scenario						
	1: Maximum ABC	2: Expected catch	3: Recent F	4: Half FABC	5: No fishing	6: OFL	7: ABC, then OFL
2026	3,057	3,057	3,057	3,057	3,057	3,057	3,057
2027	3,127	3,198	3,225	3,243	3,366	3,064	3,127
2028	3,123	3,394	3,496	3,569	4,123	2,911	3,123
2029	3,181	3,528	3,774	3,898	4,919	2,871	3,115
2030	2,987	3,188	3,722	3,885	5,348	2,632	2,760
2031	2,815	2,925	3,632	3,823	5,664	2,446	2,508
2032	2,641	2,697	3,475	3,678	5,790	2,302	2,325
2033	2,555	2,585	3,382	3,590	5,904	2,269	2,275
2034	2,510	2,525	3,321	3,530	5,981	2,263	2,263
2035	2,488	2,495	3,286	3,494	6,051	2,263	2,263
2036	2,476	2,480	3,262	3,469	6,091	2,263	2,263
2037	2,470	2,472	3,247	3,452	6,119	2,263	2,263
2038	2,466	2,467	3,237	3,441	6,137	2,263	2,263

Table 52: Thirteen-year fishing-mortality table for the proposed harvest scenarios. F was the annual rate on the most selected age.

Year	F (yr^{-1}) by harvest scenario						
	1: Maximum ABC	2: Expected catch	3: Recent F	4: Half FABC	5: No fishing	6: OFL	7: ABC, then OFL
2026	0.188	0.188	0.188	0.188	0.188	0.188	0.188
2027	0.335	0.231	0.193	0.167	0.000	0.429	0.335
2028	0.335	0.223	0.193	0.167	0.000	0.429	0.335
2029	0.335	0.335	0.193	0.167	0.000	0.429	0.429
2030	0.335	0.335	0.193	0.167	0.000	0.429	0.429
2031	0.335	0.335	0.193	0.167	0.000	0.426	0.429
2032	0.335	0.335	0.193	0.167	0.000	0.399	0.404
2033	0.335	0.335	0.193	0.167	0.000	0.393	0.394
2034	0.335	0.335	0.193	0.167	0.000	0.392	0.392
2035	0.335	0.335	0.193	0.167	0.000	0.392	0.392
2036	0.335	0.335	0.193	0.167	0.000	0.392	0.392
2037	0.335	0.335	0.193	0.167	0.000	0.392	0.392
2038	0.335	0.335	0.193	0.167	0.000	0.392	0.392

Table 53: Definitions of the nine Model 26.0 catch-decision indicators. All benchmarks were calculated from the Model 26.0 fit.

Probability event	Definition	Purpose
$P(F_{2027} > F_{35\%})$	2027 fishing mortality exceeds the rate giving 35% of unfished spawning potential per recruit.	Compare the catch scenario with the Tier 3 reference rate.
$P(B_{2028} <$ mean B)	2028 female spawning biomass at spawning is below mean estimated SSB over 1978–2025.	Compare the following year's stock with its historical mean.
$P(B_{2031} <$ mean B)	2031 female spawning biomass at spawning is below mean estimated SSB over 1978–2025.	Compare medium-term stock condition with its historical mean.
$P(B_{2031} < B_{2027})$	2031 female spawning biomass at spawning is below the first projected-year value under the same scenario.	Describe medium-term change relative to 2027.
$P(B_{2029} < B_{20\%})$	2029 female spawning biomass at spawning is below 20% of the model-specific unfished reference biomass.	Describe the historical low-biomass benchmark used in this decision table; Model 26.0 uses mean-recruitment B_{100} and ADMB uses stock–recruit Bzero.
$P(Y_{2031} > Y_{\text{hist}})$	The 2031 abundance ratio of ages 1–5 to ages 6–15+ exceeds the corresponding ratio pooled over 1964–2026.	Describe relative abundance of young fish. The historical threshold pools abundance across years, rather than averaging annual proportions.
$P(D_{2028} < D_{1994})$	The effective number of mature-biomass age classes in 2028 is below its estimated 1994 value.	Describe near-term age diversity relative to a historical low-diversity year.
$P(D_{2031} < D_{1994})$	The effective number of mature-biomass age classes in 2031 is below its estimated 1994 value.	Describe medium-term age diversity relative to 1994.
$P(E_{2027} > E_{2026})$	Mean age-specific fishing mortality in 2027 exceeds mean age-specific fishing mortality in 2026.	Provide an F-based relative-effort proxy. Observed vessel effort, catchability changes and costs are outside this indicator.

B denotes female spawning biomass at spawning. Y denotes the young-to-old abundance ratio. D is exp(−sum(p × log(p))), with p the beginning-year mature-biomass age shares. E is the mean-age F proxy. Model-specific biological schedules and reference points are retained.

Table 54: Model 26.0 probabilities under eight alternative 2027 catches (kt), expressed as chances out of 100. Fishing mortality was set to achieve each 2027 catch and then held constant through 2031.

Probability event	2027 catch (kt)							
	10.0	317.5	635.0	952.5	1270.0	1587.5	1905.0	2540.0
$P(F_{2027} > F_{35\%})$	0	0	0	0	0	0	4	73
$P(B_{2028} <$ mean B$)$	2	3	6	10	16	23	32	51
$P(B_{2031} <$ mean B$)$	0	0	2	6	15	30	52	89
$P(B_{2031} < B_{2027})$	0	1	3	10	27	54	80	99
$P(B_{2029} < B_{20\%})$	0	0	0	0	0	0	0	2
$P(Y_{2031} > Y_{\text{hist}})$	0	0	0	2	11	27	44	69
$P(D_{2028} < D_{1994})$	0	0	0	0	0	1	1	5
$P(D_{2031} < D_{1994})$	0	0	0	1	2	4	10	41
$P(E_{2027} > E_{2026})$	0	0	0	5	79	99	100	100

Nine supported events. Assessment covariance is propagated through the catch solution, projections and estimated benchmarks. Future recruitment equals the estimated 1978–2023 mean; independent future recruitment innovations and weight-estimation uncertainty are excluded.

Entries are approximate chances out of 100, rounded to whole numbers. A displayed 0 or 100 reflects rounding.

Figures

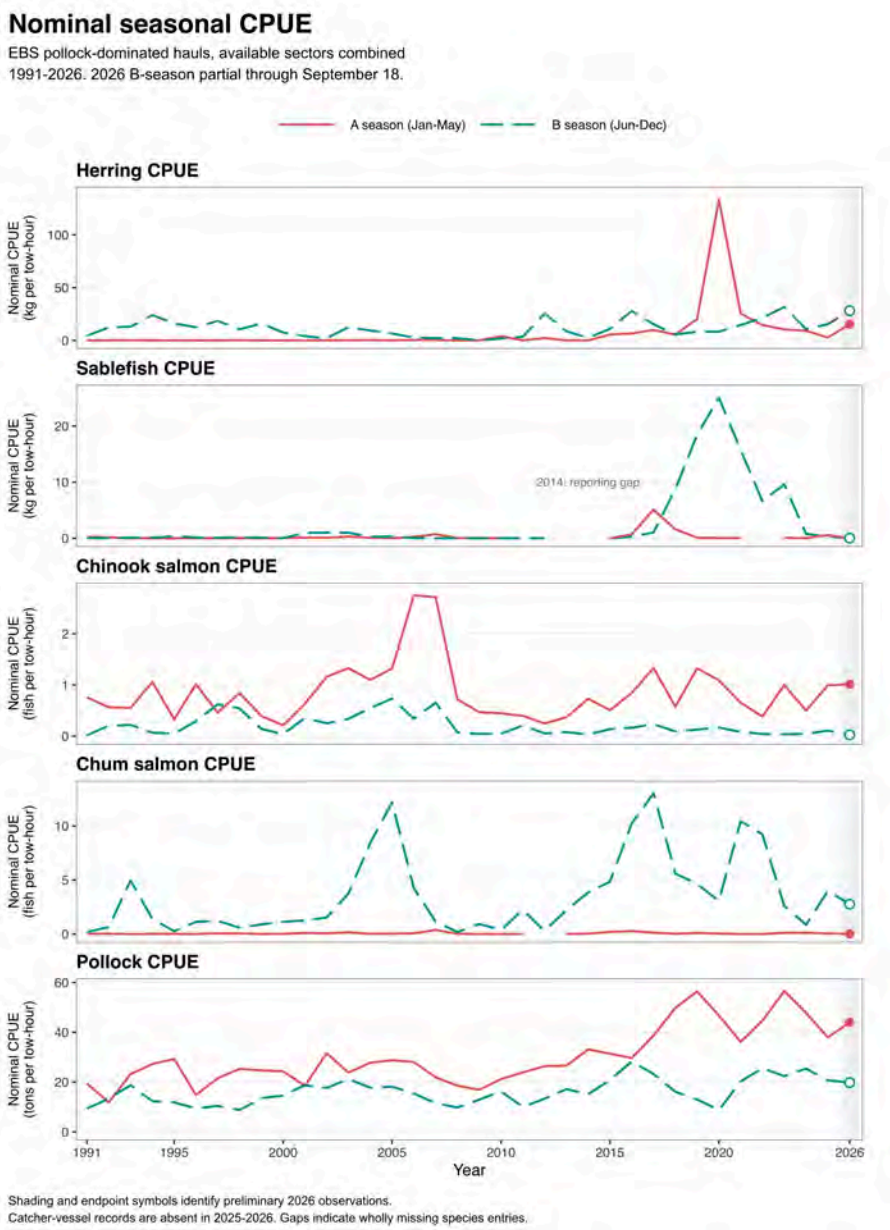


Figure 1: Nominal seasonal catch per tow-hour for herring, sablefish, Chinook salmon, chum salmon, and pollock in EBS pollock-dominated hauls, 1991–2026. Rates equal total extrapolated catch divided by total valid tow-hours. Units are kg per tow-hour for herring and sablefish, tons per tow-hour for pollock, and fish per tow-hour for salmon. A season is January–May; B season is June–December. Hauls are in NMFS areas 500–539, with positive total catch and more than 80% pollock by weight. The 2026 B-season data extend through September 18. Missing species catches are omitted from catch sums while their tow-hours remain in the denominator; unreported species-season combinations appear as gaps. Catcher-vessel and electronic-monitoring coverage is incomplete; catcher-vessel records are absent in 2025–2026 after filtering.

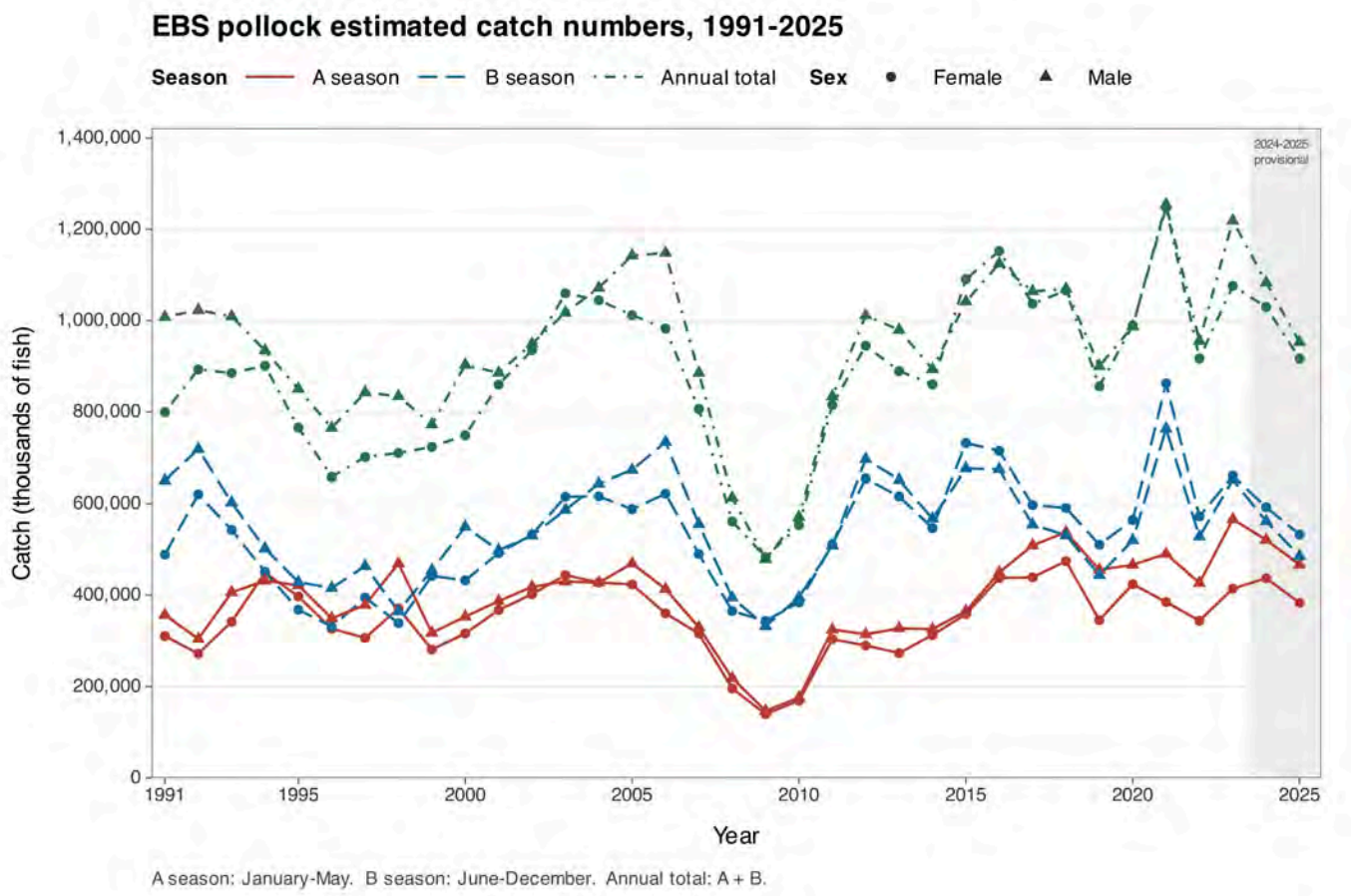


Figure 2: Estimated EBS pollock catch numbers (thousands of fish) by sex for the A season (January–May), B season (June–December), and annual total, 1991–2025. Circles denote females and triangles denote males. B-season estimates combine northwest and southeast areas; annual totals equal A + B. Shading marks provisional 2024–2025 estimates based on released FT-NIRS ages before conversion to thin-section tester ages. Both years cover all 12 months. The estimates have limited age–length coverage: approximately 0.50% and 0.36% of catch biomass, respectively, remain unallocated in age–length cells with no conversion estimates.

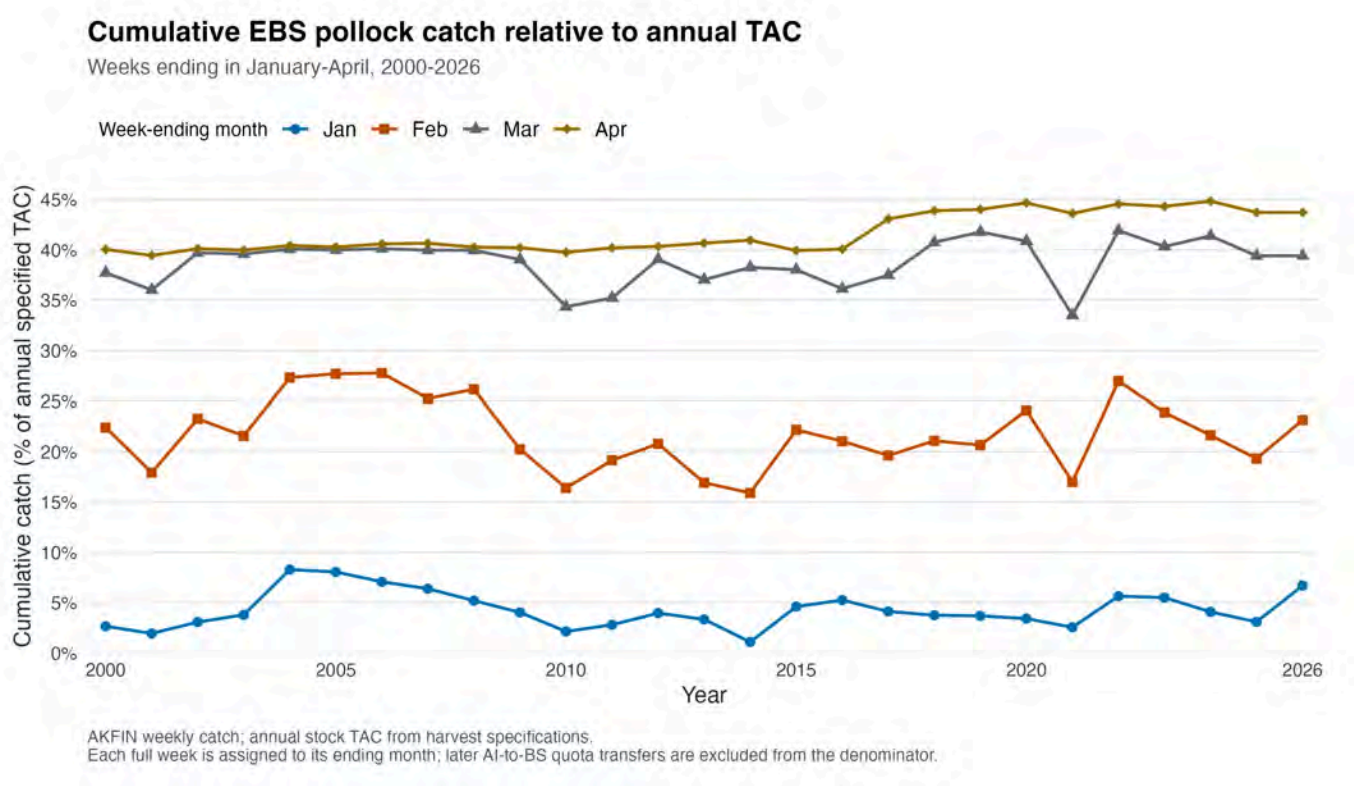


Figure 3: Cumulative EBS pollock catch as a proportion of annual specified TAC for weeks ending in January, February, March, and April, 2000–2026. Catch includes retained and discarded pollock from all gears and targets in the Bering Sea subarea, excluding Bogoslof reporting area 518. Each full reporting week is assigned to its week-ending month. The denominator is the annual stock TAC from harvest specifications, before later Aleutian Islands-to-Bering Sea quota transfers. Amendment 110 shifted five percentage points of the directed fishery seasonal allocation from B to A to provide greater flexibility to avoid Chinook salmon bycatch; 2017 was the first A season after the rule took effect.

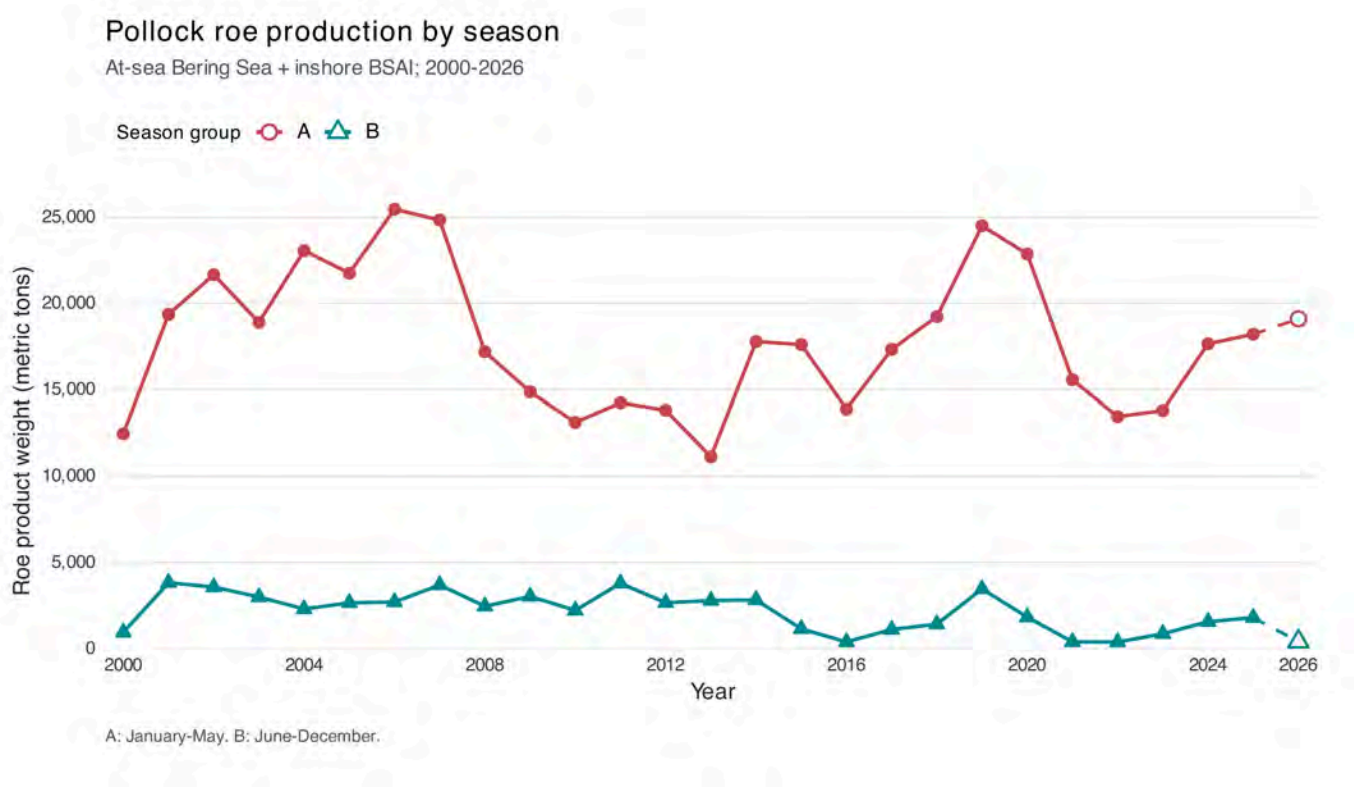


Figure 4: Pollock roe production for the A (January–May) and B (June–December) seasons, 2000–2026. Data combine at-sea Bering Sea and inshore Bering Sea and Aleutian Islands (BSAI) production. Values are roe product metric tons. Open markers and dashed links identify provisional 2026 values through October 2026.

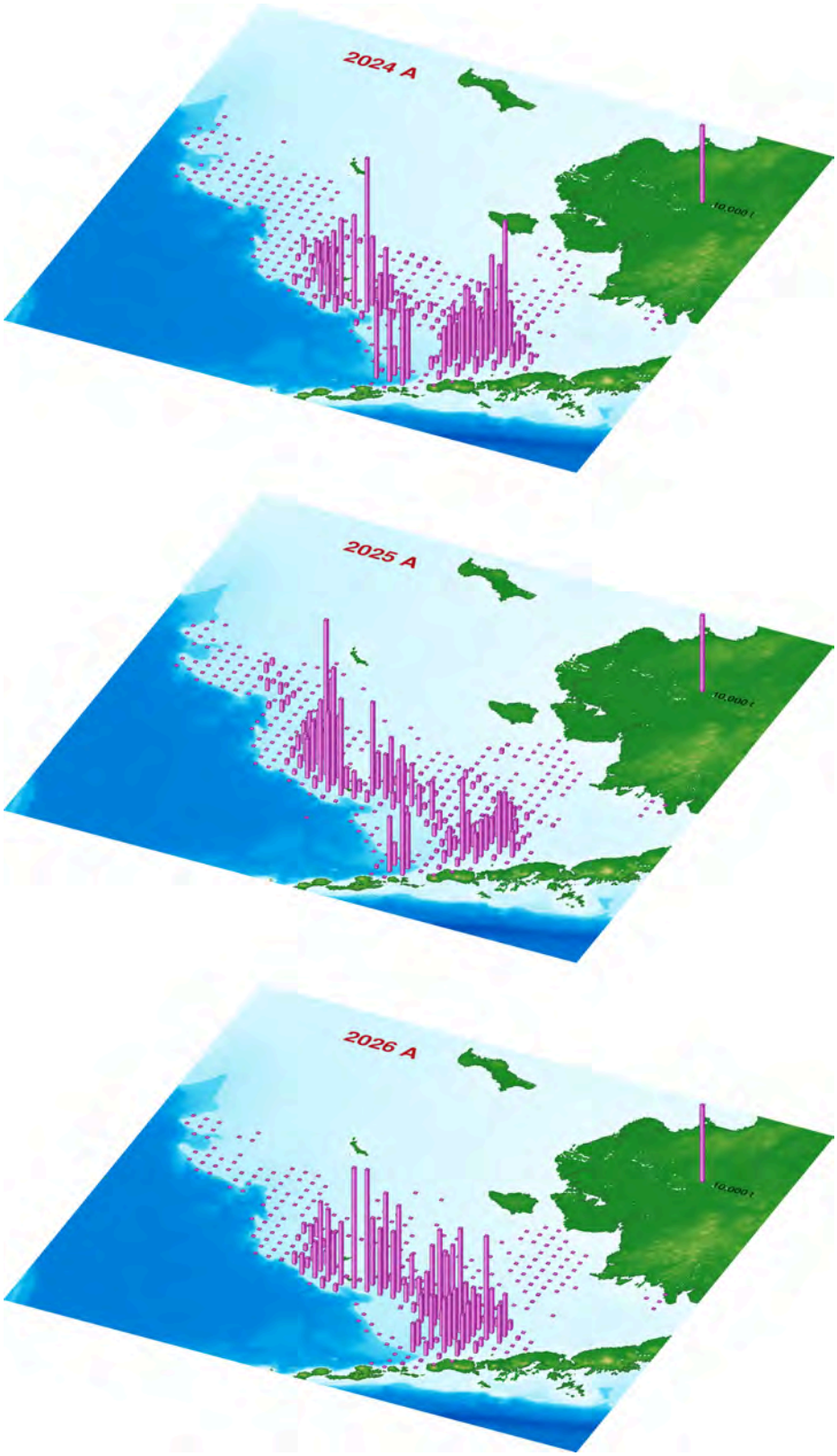


Figure 5: Spatial distribution of observed pollock catch in the A season (January 20–June 9), 2024–2026, in each year. Purple vertical bar height represents catch tons within 0.5-degree longitude by 0.25-degree latitude cells; the height scale is fixed across years within each season, with a 10,000-t reference column in each panel. Data include available catcher-processor, mothership and observed catcher-vessel records in NMFS areas below 540. Electronic-monitoring catcher-vessel records are absent. The maps show observed-record catch totals rather than fleet-wide expanded catches. Blue shades show ocean depth and green shades show land elevation.

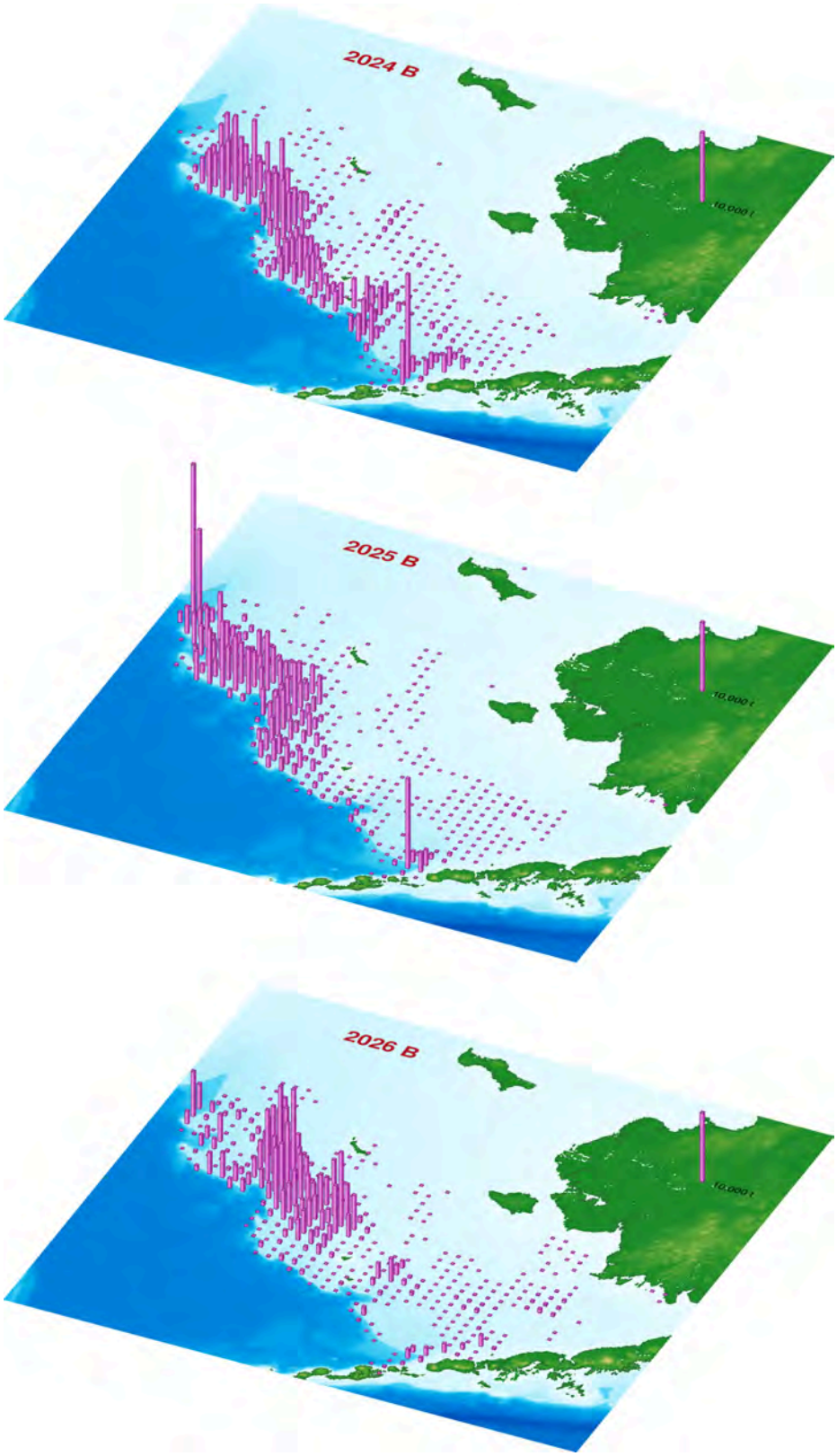


Figure 6: Spatial distribution of observed pollock catch in the B season (June 10–September 18), 2024–2026, in each year. Purple vertical bar height represents catch tons within 0.5-degree longitude by 0.25-degree latitude cells; the height scale is fixed across years within each season, with a 10,000-t reference column in each panel. Data include available catcher-processor, mothership and observed catcher-vessel records in NMFS areas below 540. Electronic-monitoring catcher-vessel records are absent. The maps show observed-record catch totals rather than fleet-wide expanded catches. Blue shades show ocean depth and green shades show land elevation.

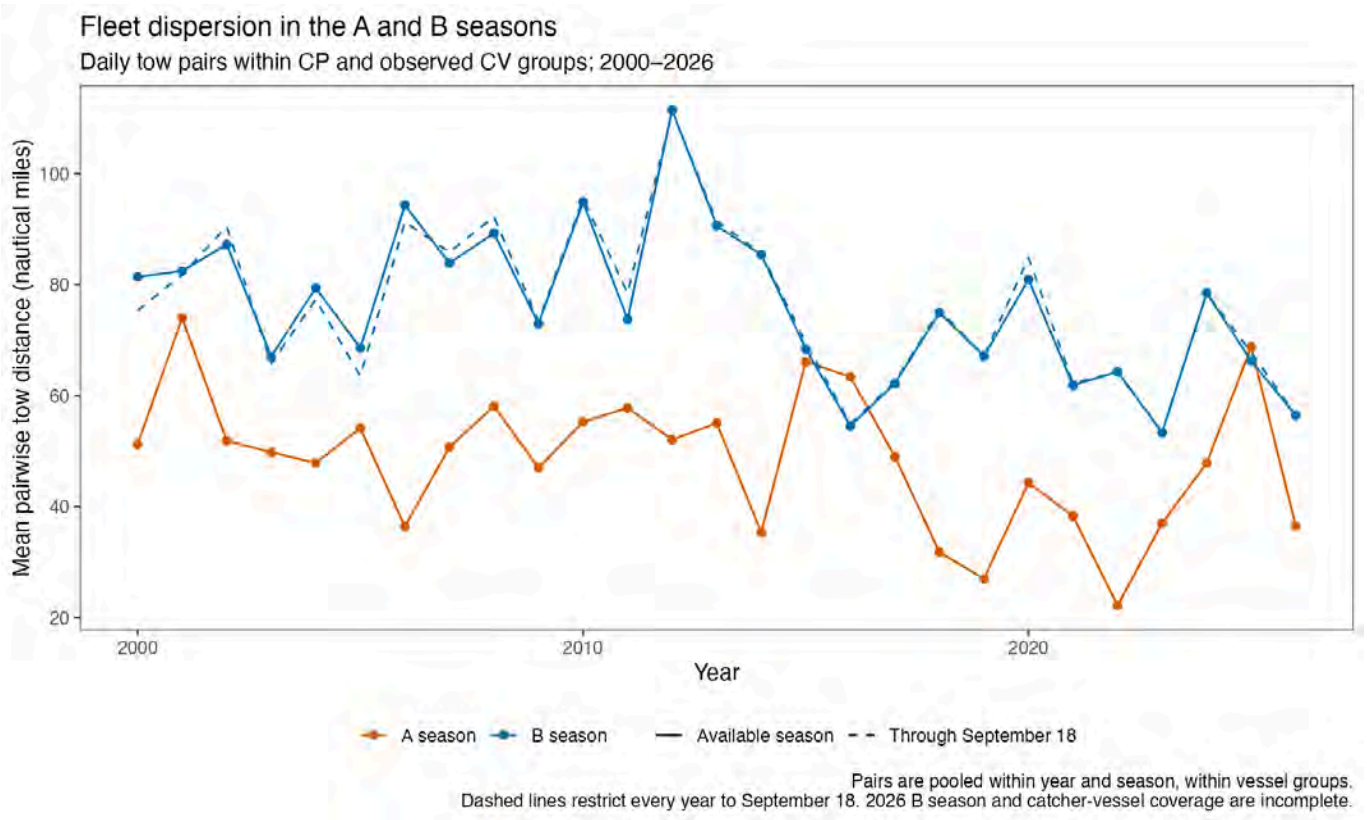


Figure 7: Fleet dispersion in the A and B seasons, 2000–2026 using a daily pairwise-distance approach. Unique tow pairs are formed within each day and vessel group (catcher-processors and observed catcher vessels); seasonal means pool distance sums and pair counts across both groups. No cross-group pairs are included. Distances are great-circle nautical miles. Solid lines use available seasonal records; dashed lines use records occurring between January 1 and September 18. The 2026 B season is partial. Tows included caught more than 80% pollock by catch weight, had valid locations, occurred in EBS reporting areas 500–539, and had tow durations between zero and 40 hours. Duration is calculated from timestamps with recorded minutes as fallback. Electronic-monitoring catcher-vessel records are absent.

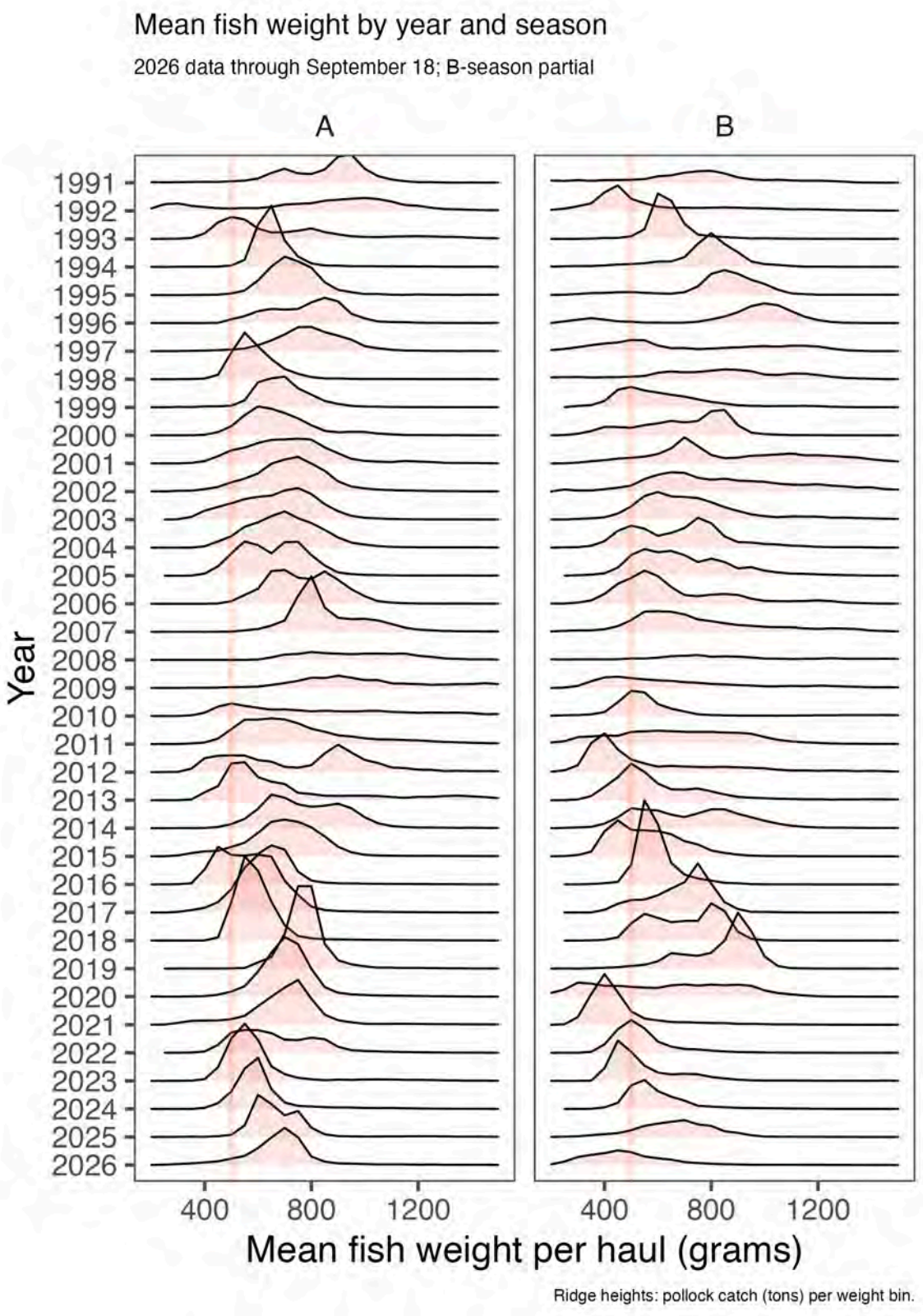


Figure 8: Catch-weighted distributions of mean pollock weight per individual for A and B seasons, 1991–2026. Catch tons are grouped in 50-g bins; the vertical line marks 500 g. The 2026 B-season coverage includes data up to September 18. Available catcher-vessel records exclude electronic-monitoring records. Ridges describe the distribution of the mean individual weight by haul.

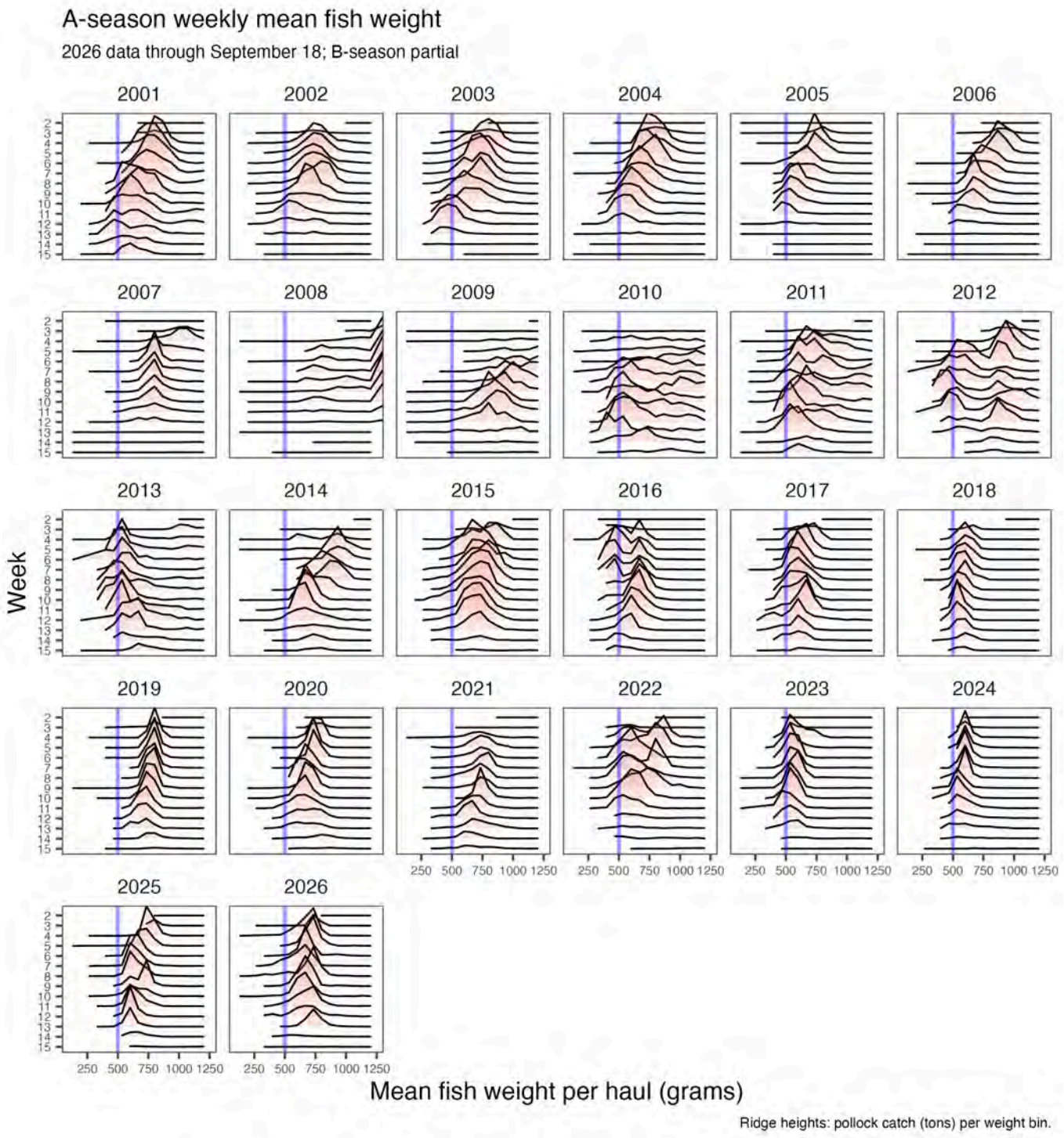


Figure 9: Weekly A-season (defined here as weeks 2–15) distributions of mean pollock weight, 2001–2026. Catch tons are grouped in approximately 66.7-g bins; the vertical line marks 500 g. Available catcher-vessel coverage is incomplete.

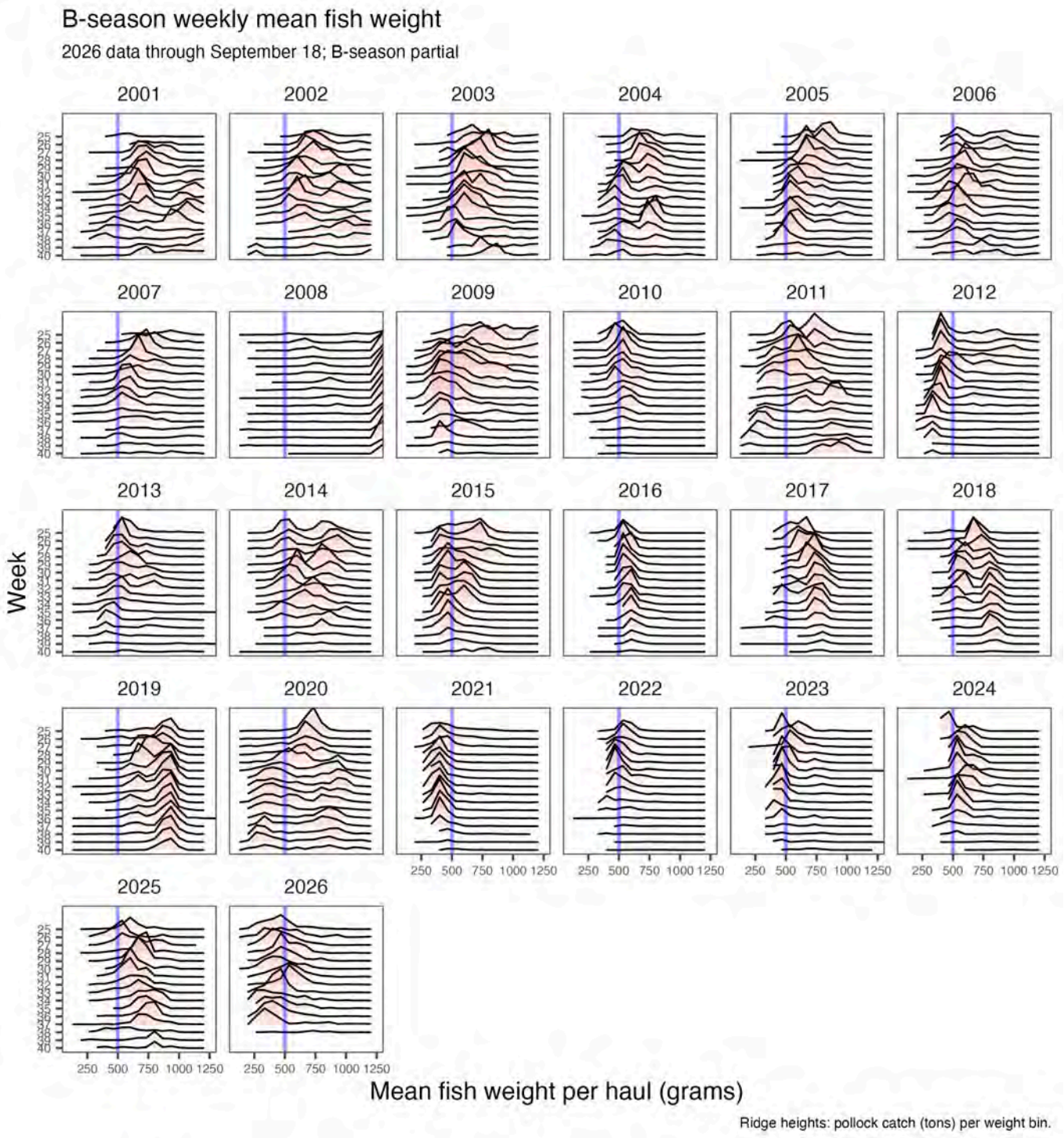


Figure 10: Weekly B-season (defined here as weeks 25–40) distributions of mean pollock weight, 2001–2026. Catch tons are grouped in approximately 66.7-g bins; the vertical line marks 500 g. The 2026 series extends through September 18 and covers only part of this window. Available catcher-vessel coverage is incomplete.

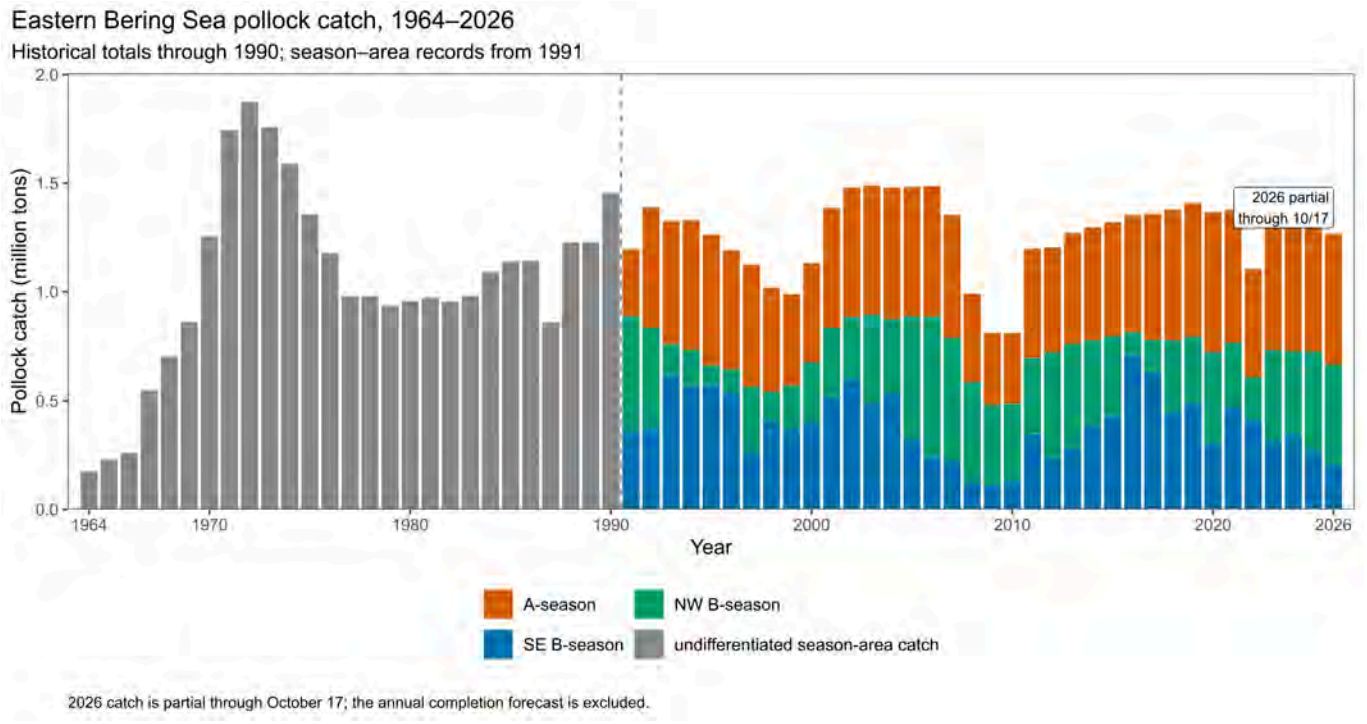


Figure 11: Eastern Bering Sea pollock catch, 1964–2026, in million tons. Catches for 1964–1990 are undifferentiated by season and area. From 1991, catch from weeks ending before June 1 (A season) is combined across regions; catch from weeks ending June 1 or later (B season) is shown by region. The figure uses NMFS areas 520–529 for NW and 500–517 and 519 for SE. Tables 3 and 4 use the broader NW range 520–539. The partial 2026 bar shows 1.268 million tons through October 17.

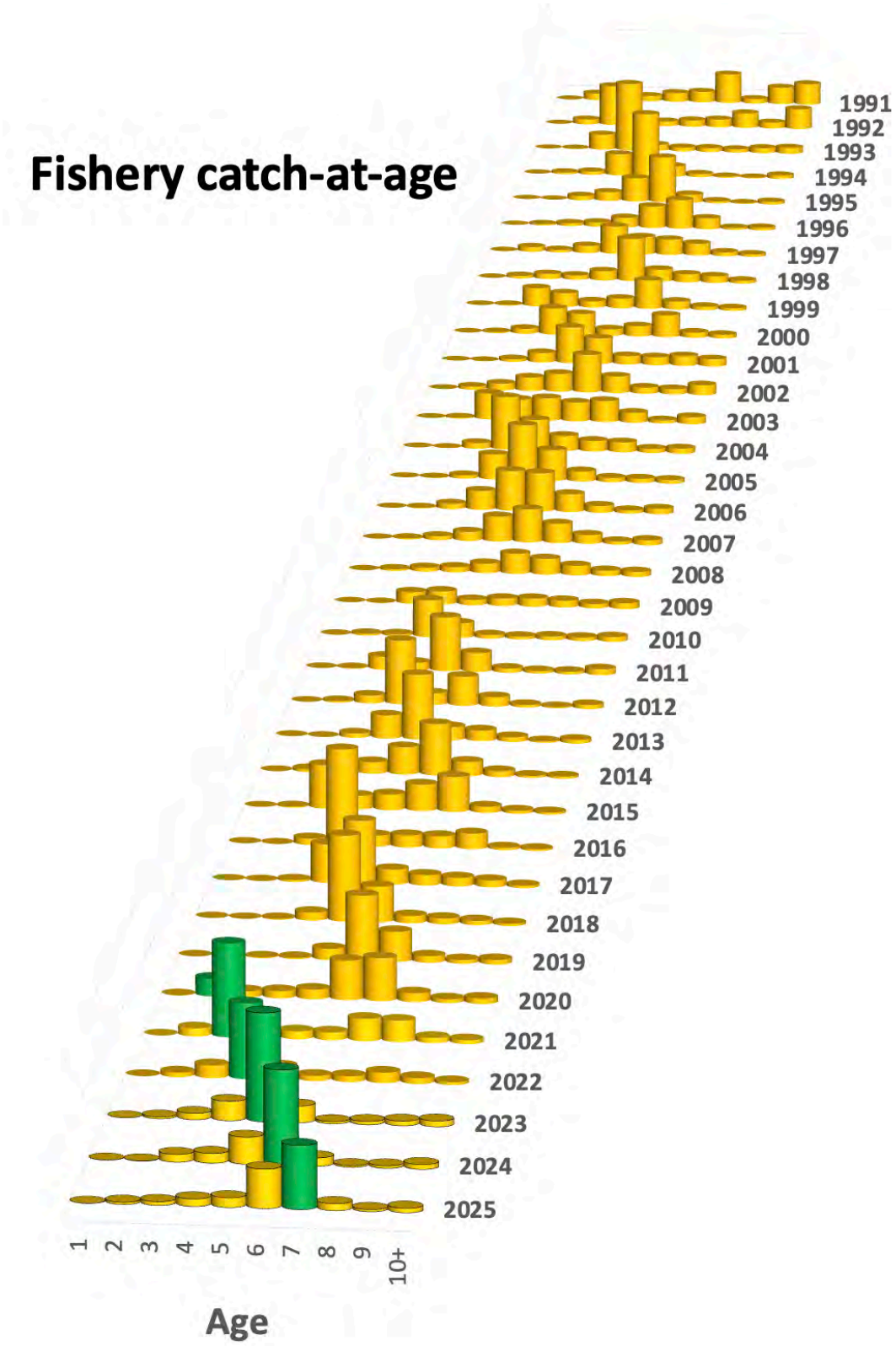


Figure 12: EBS pollock fishery catch-at-age, 1991–2025. Column heights show relative catch numbers at age; ages 10 and older are pooled as 10+ in this display. Green columns highlight the 2018 year class, progressing from age 2 in 2020 to age 7 in 2025. Annual catch numbers at ages 1–14 and 15+ are provided in Table 5.

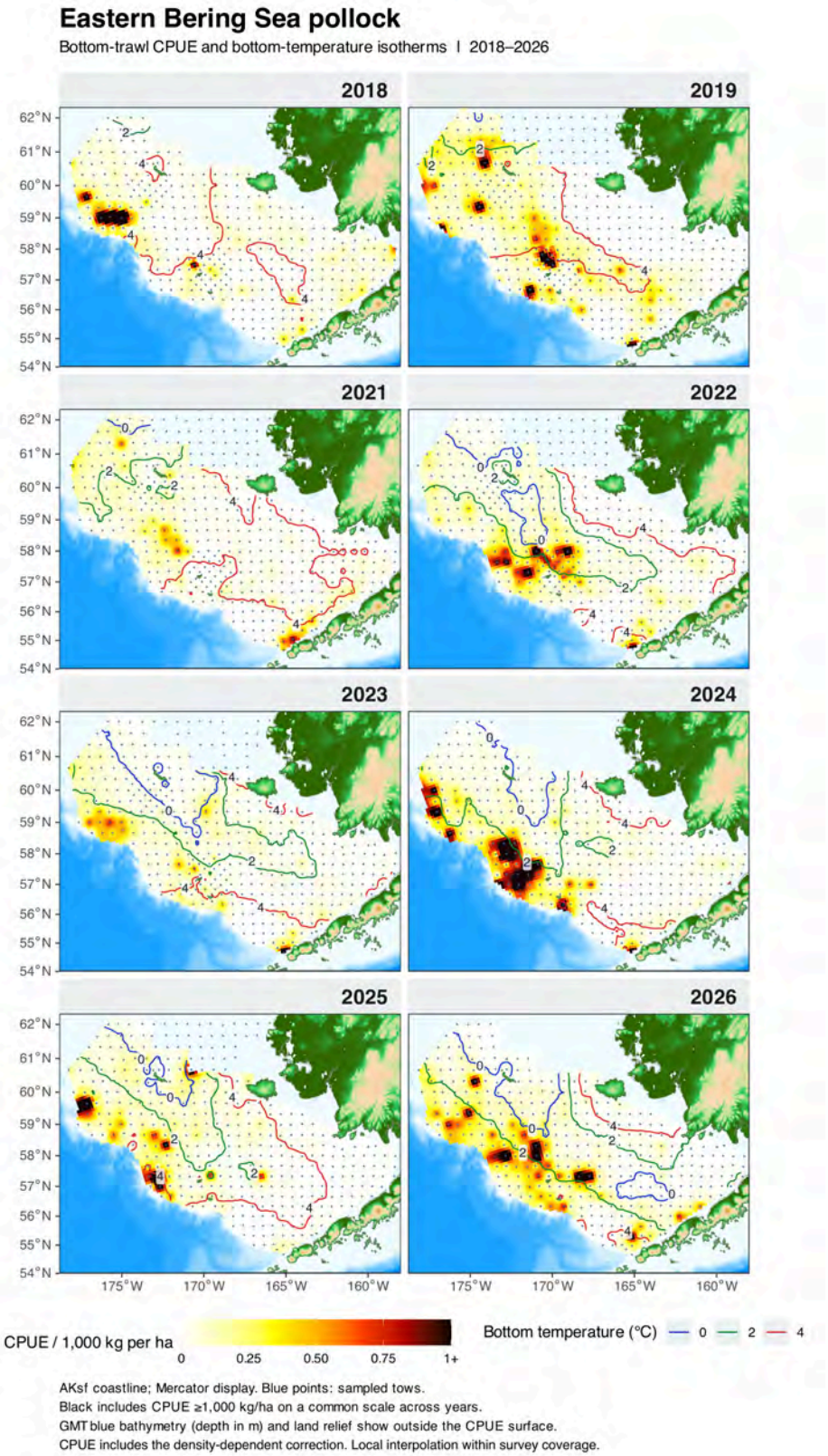


Figure 13: EBS bottom-trawl survey (BTS) pollock CPUE and bottom-temperature contours, 2018–2026 (no survey was conducted in 2020), reproduced from the AKsf R-package's pollock-mapping example (Ianelli 2026). Blue points mark sampled tows; contours are labeled 0, 2 and 4 °C. Surfaces are descriptive local interpolations within survey coverage, with no spatial prediction intervals. The CPUE includes a density-dependent correction whose version and adoption status are unspecified in the example.

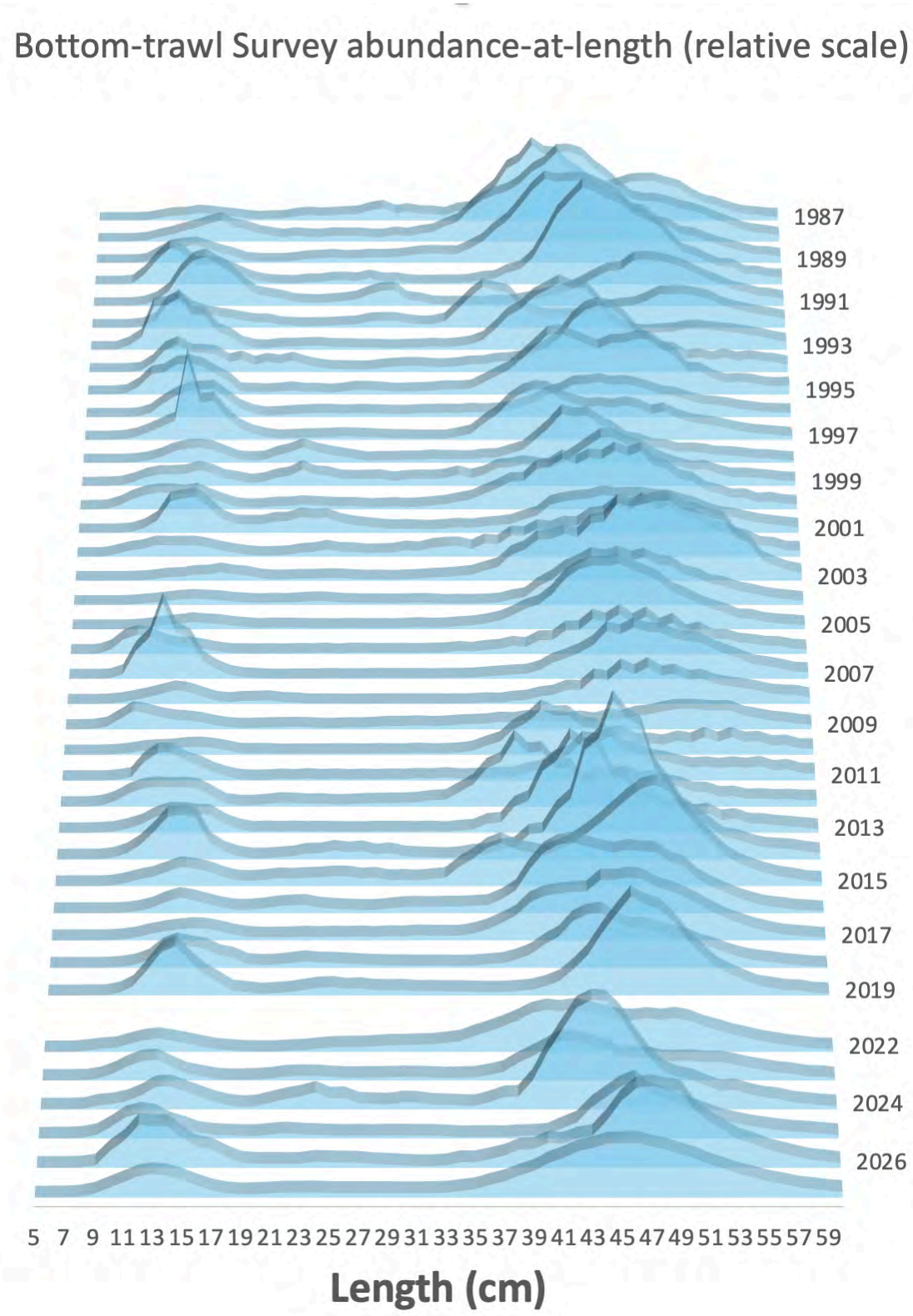


Figure 14: BTS abundance at length on a relative scale, 1987–2026. The BTS was not conducted in 2020.

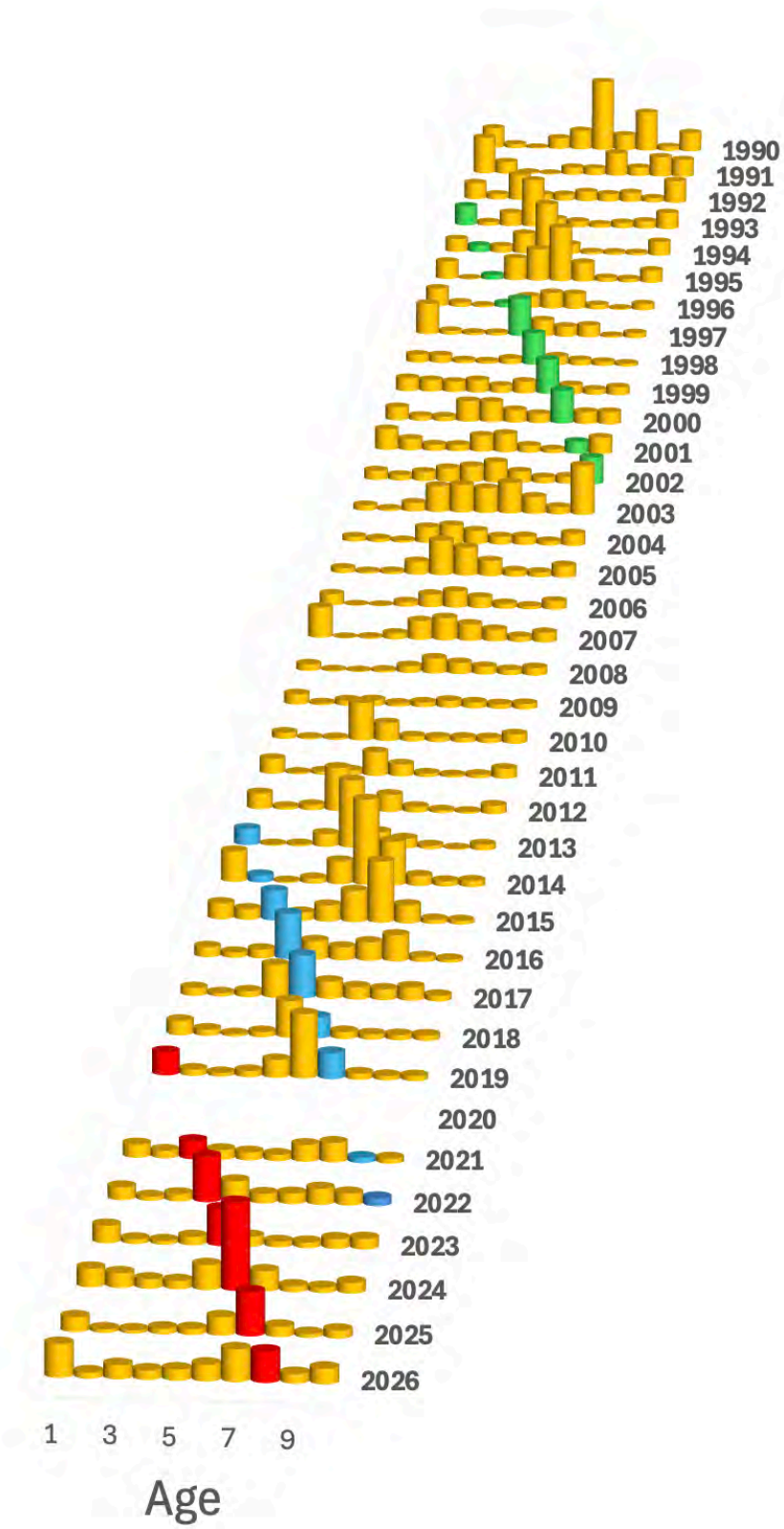


Figure 15: BTS age composition by year, 1990–2026. Highlighted bars trace the 1992 (green), 2012 (blue) and 2018 (red) year classes as they advance through successive ages. The BTS was not conducted in 2020.

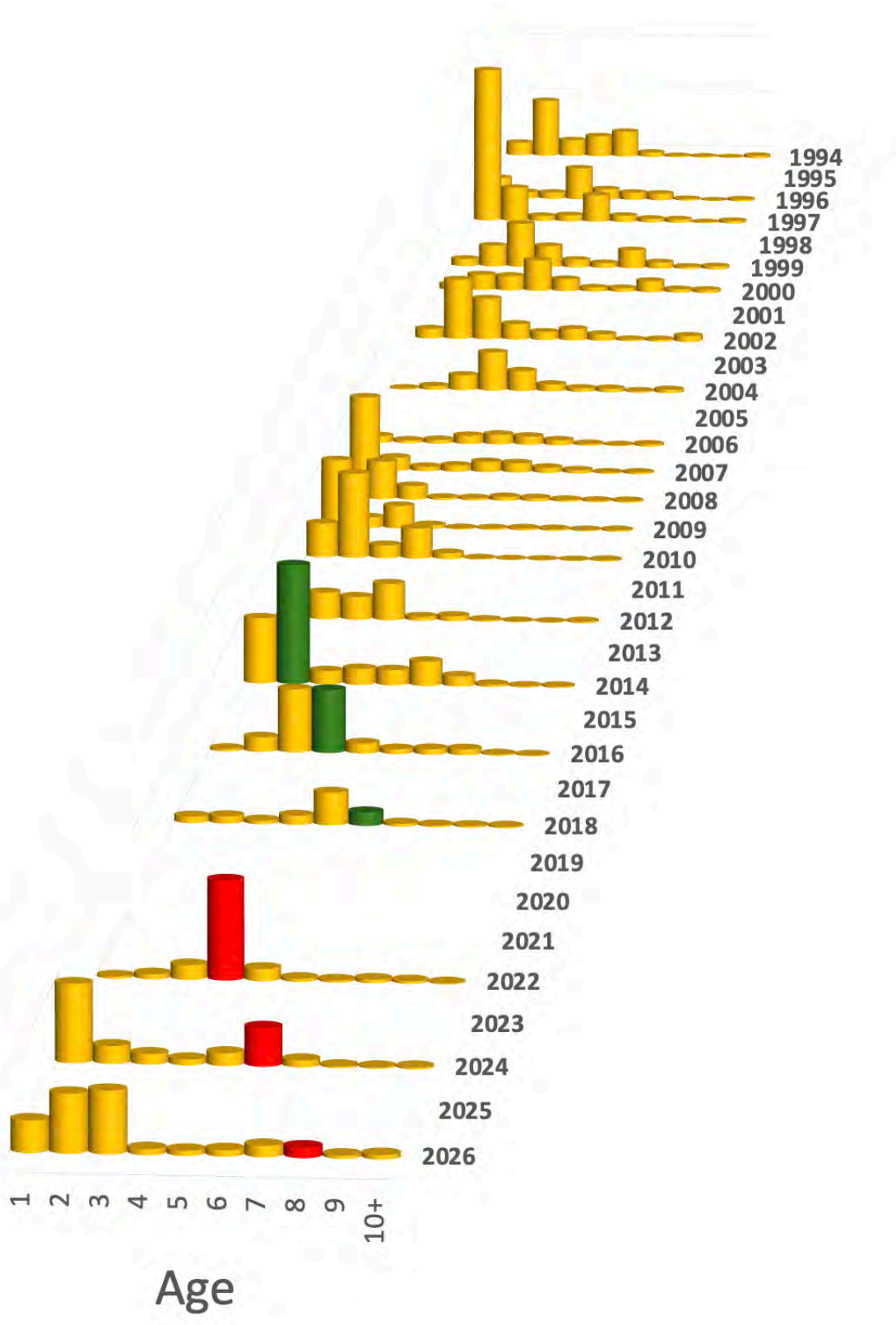


Figure 16: ATS age composition by year, 1994–2026. Blank rows indicate years without age-composition observations. Highlighted bars trace the 2014 (green) and 2018 (red) year classes. The provisional 2026 estimates apply the BTS age–length key to expanded ATS length distributions that extend to 0.5 m above the seafloor.

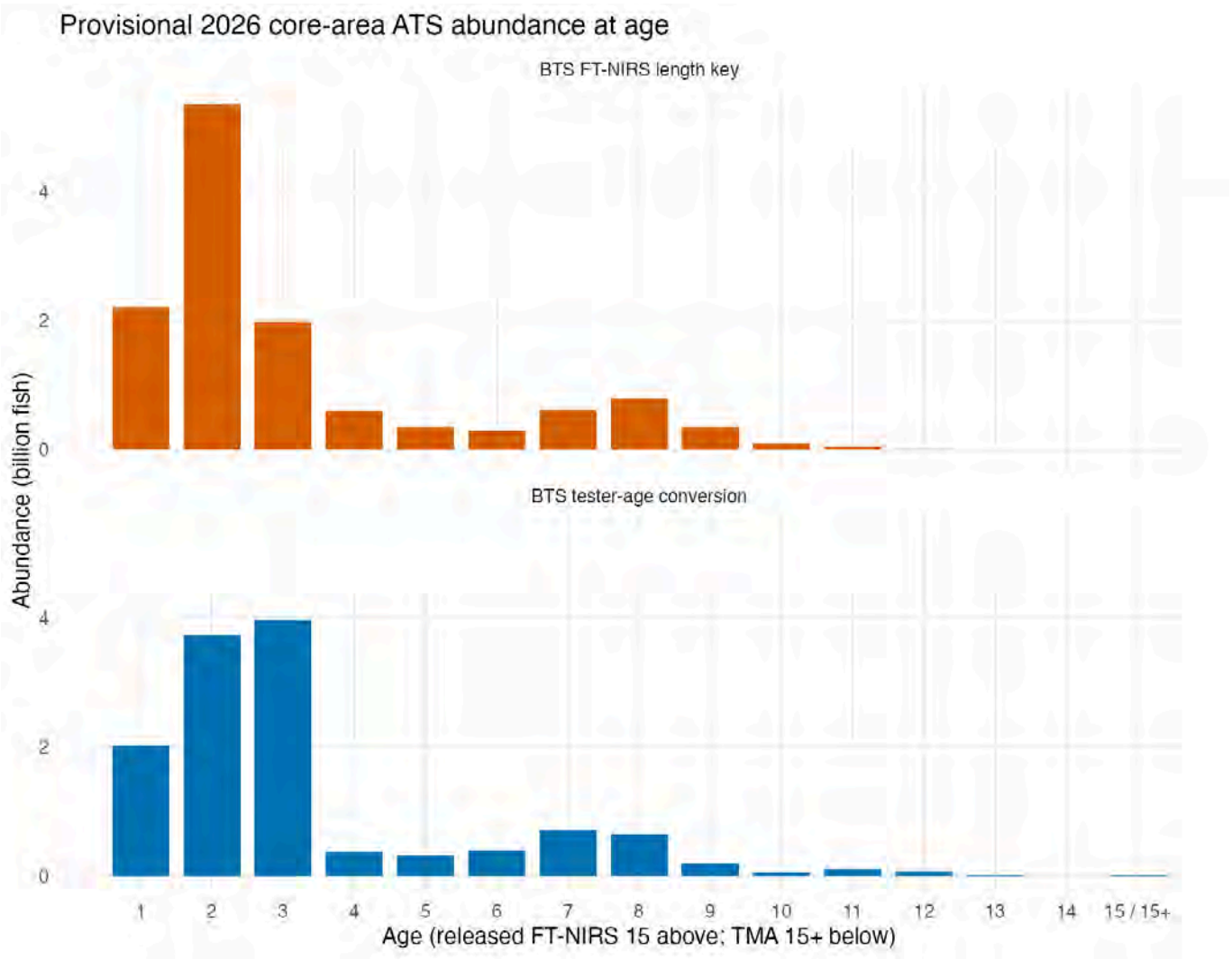


Figure 17: Provisional core-area 2026 ATS abundance-at-age after applying a BTS FT-NIRS length key (upper panel) and the screened 307-pair BTS conditional tester-age key (lower panel). Bars show billion fish over observed lengths only, with no uncertainty intervals. The expanded ATS length distributions extend to 0.5 m above the seafloor. The analysis uses 1-cm length bins covered by the BTS age–length key; the 307-pair tester-age key excludes flagged calibration outliers.

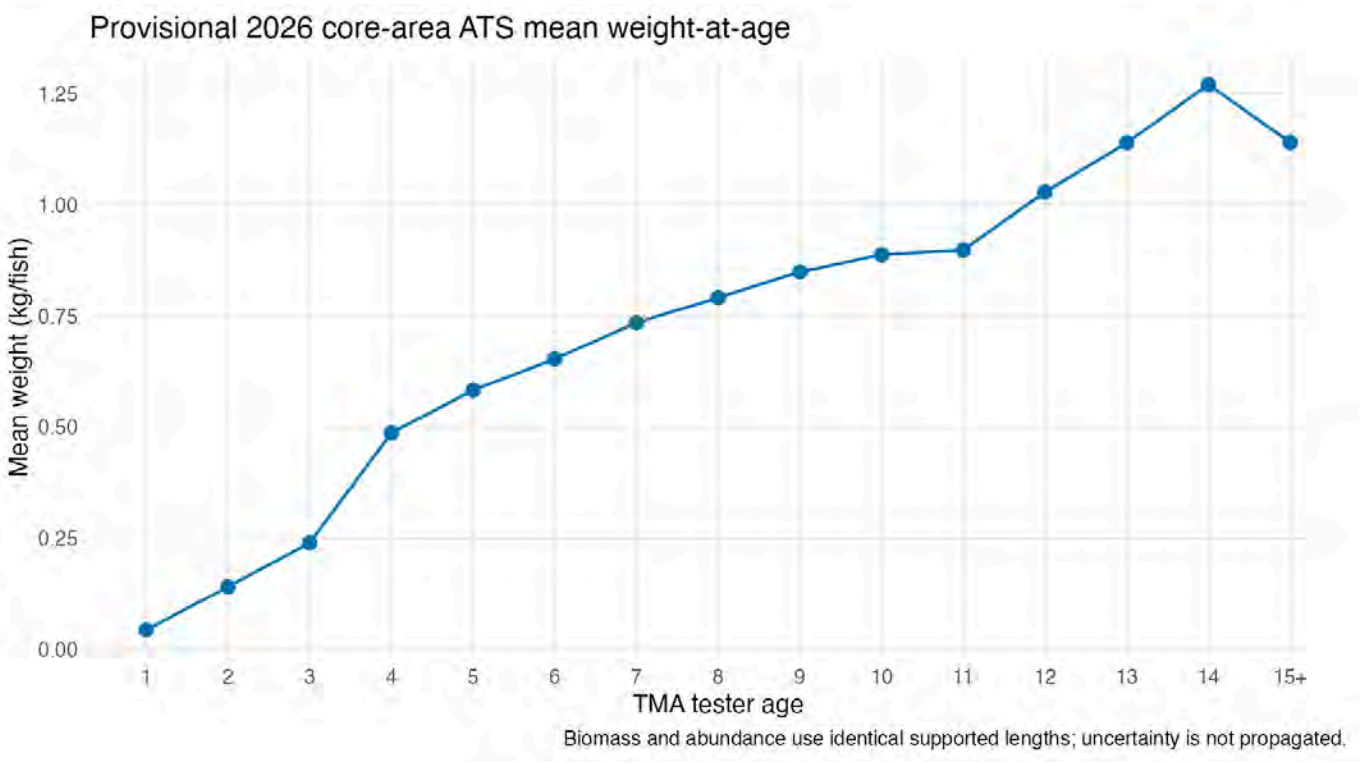


Figure 18: Provisional core-area 2026 ATS mean weight-at-age using TMA tester age, obtained by dividing biomass by estimated (converted) abundance-at-age. The 15+ point includes ages 15–18. These point estimates cover observed lengths only.

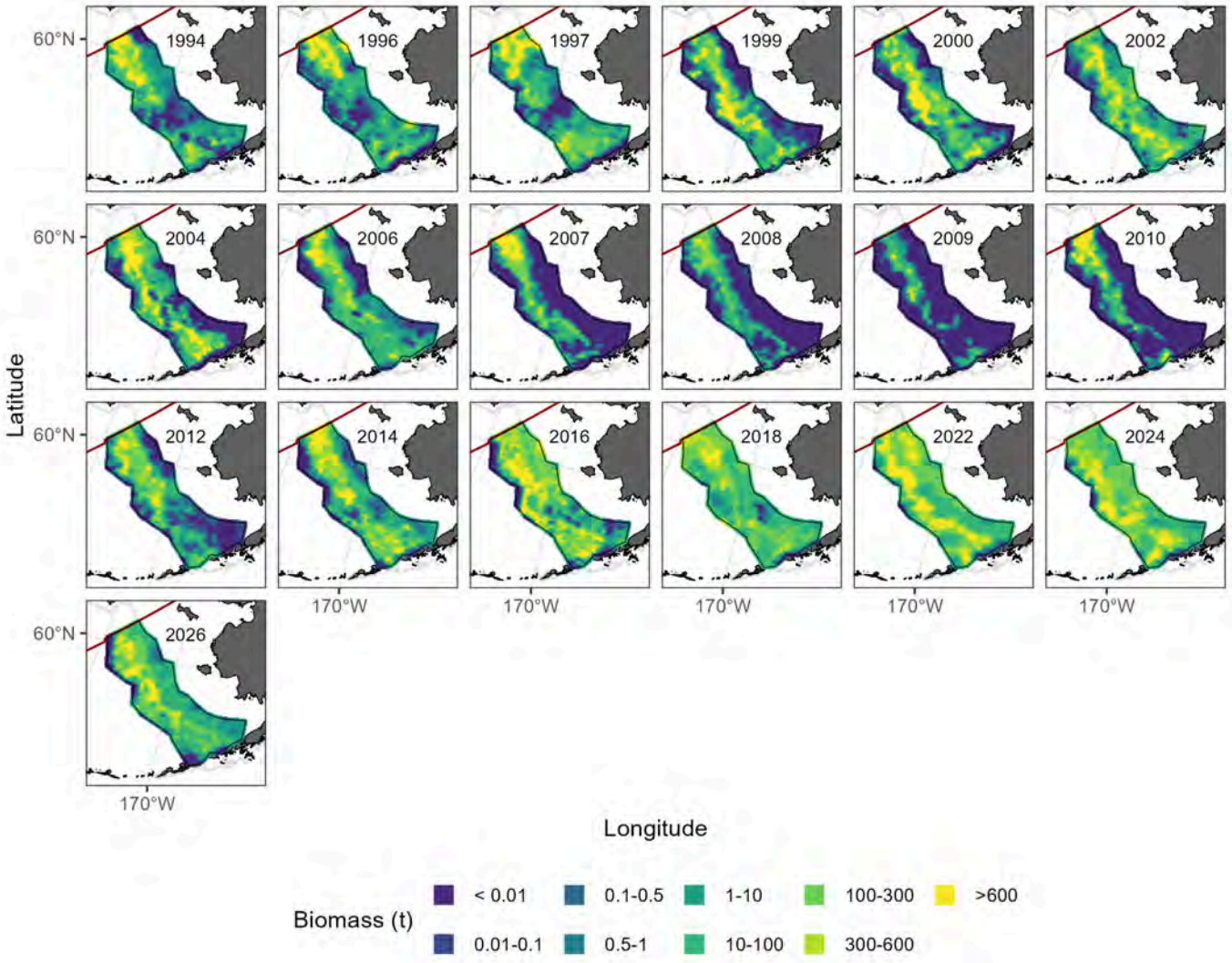


Figure 19: ATS pollock biomass between near surface and 3.0 m above the bottom, 1994–2026. Biomass between 3.0 m and the seafloor is excluded. The legend gives biomass in tons (t).

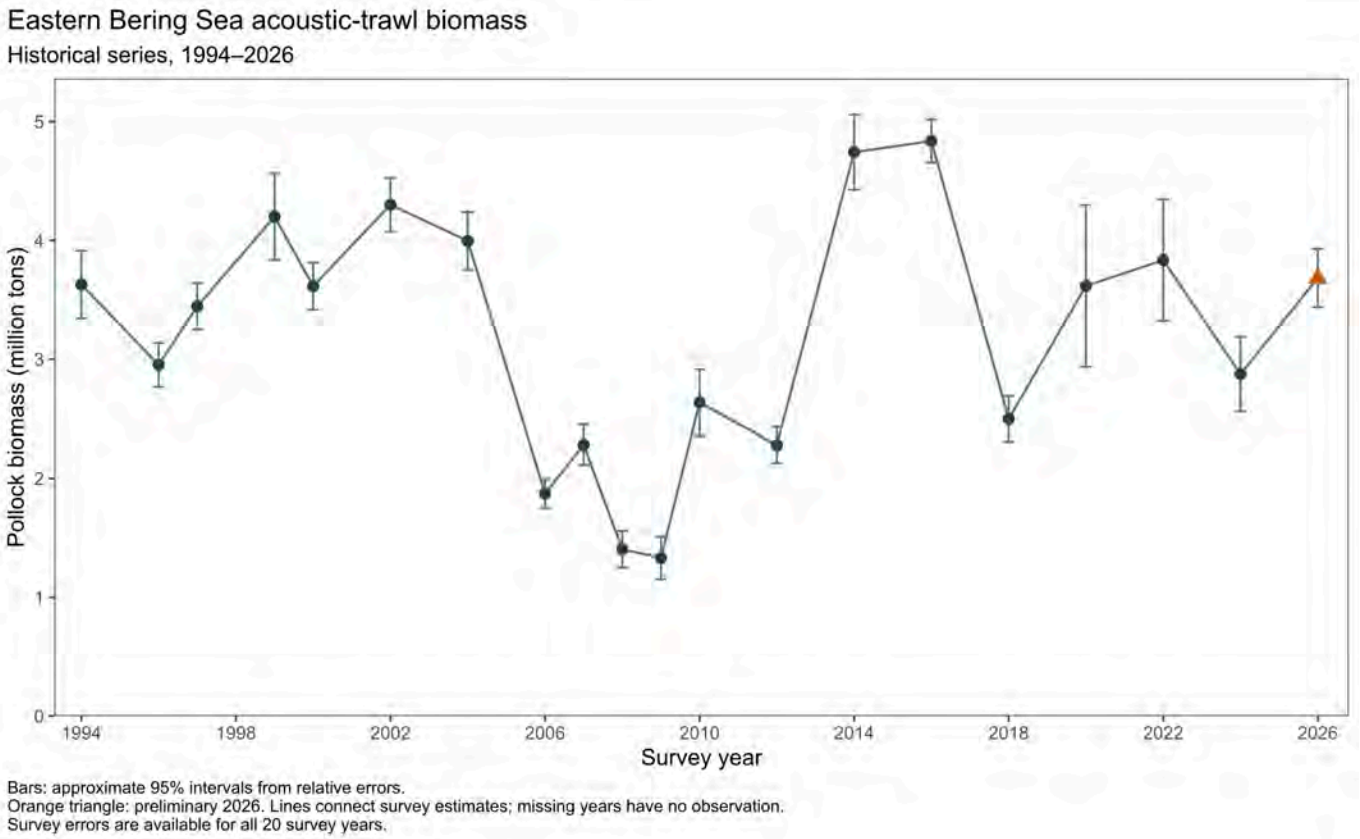


Figure 20: ATS core-shelf biomass (dots) and corresponding approximate asymptotic normal 95% intervals (vertical bars), 1994–2026. The line connects observed survey estimates.

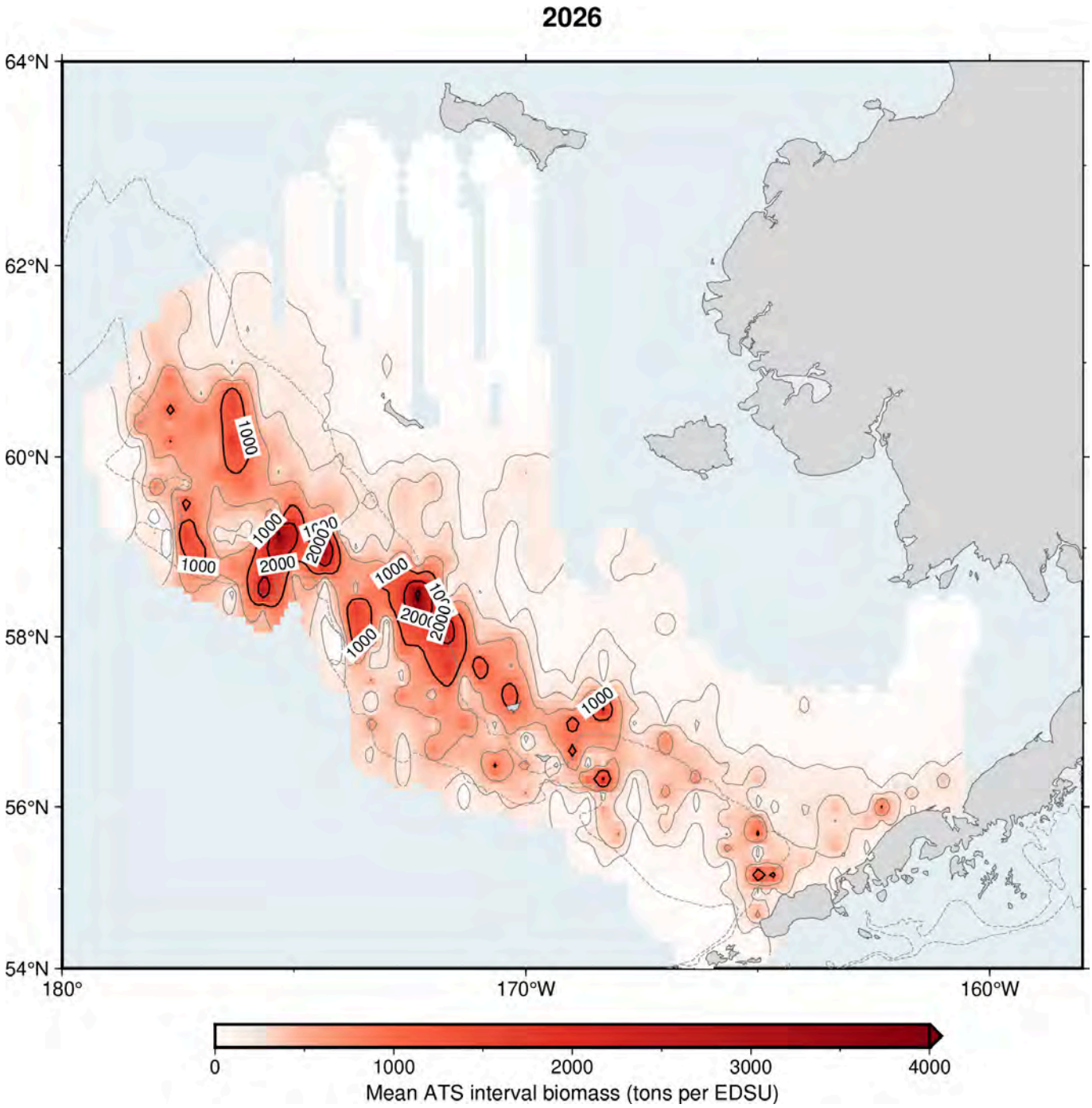


Figure 21: Preliminary 2026 ATS pollock distribution, including the Northern Extension. Colors and GMT contours showed gridded mean interval biomass (tons per EDSU), using all 10,924 observations. Approximately 10-nautical-mile cell means are smoothed and displayed within 30 km of sampled cell centers. Dashed gray lines mark 100 and 200 m depths. Coastline: AKsf.

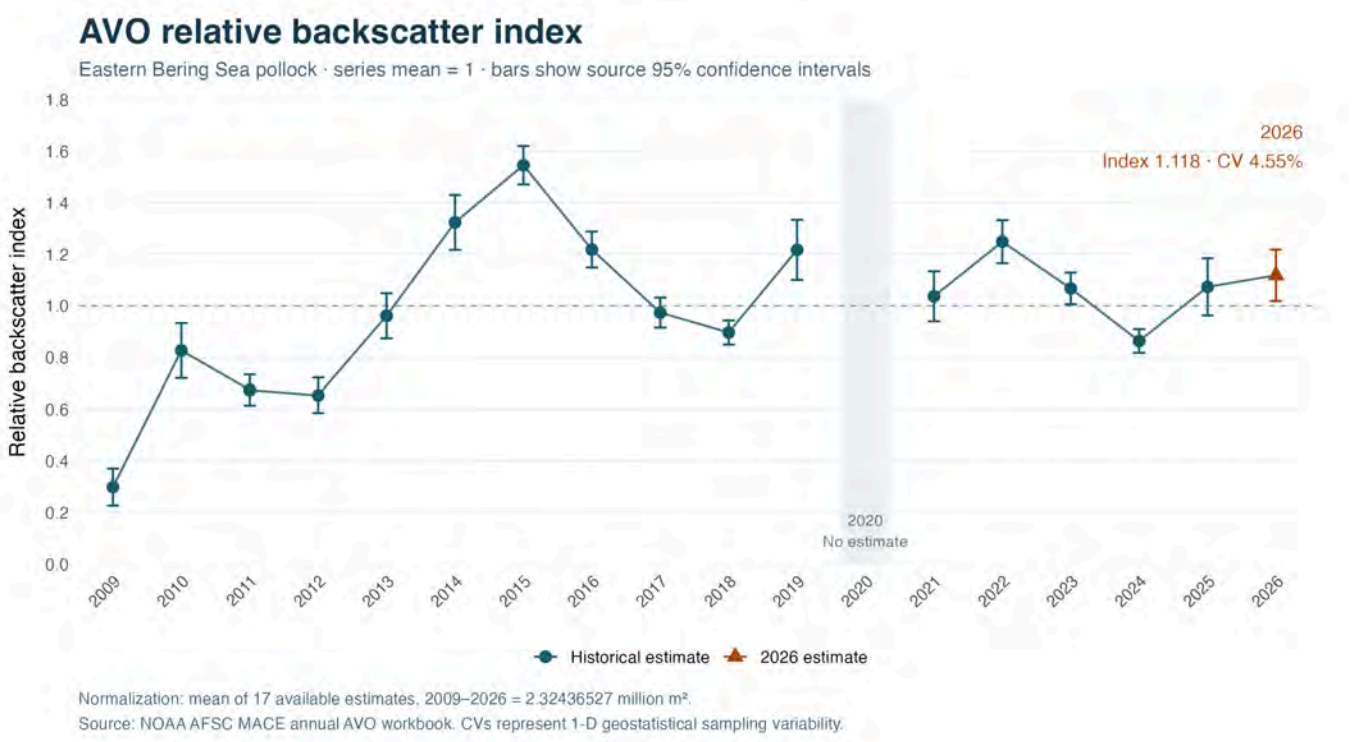


Figure 22: Annual AVO relative backscatter index for 2009–2026, with the 95% confidence intervals rescaled by the same mean. The dashed line marks a relative index of 1. The line has a gap at 2020; the orange triangle identifies 2026.

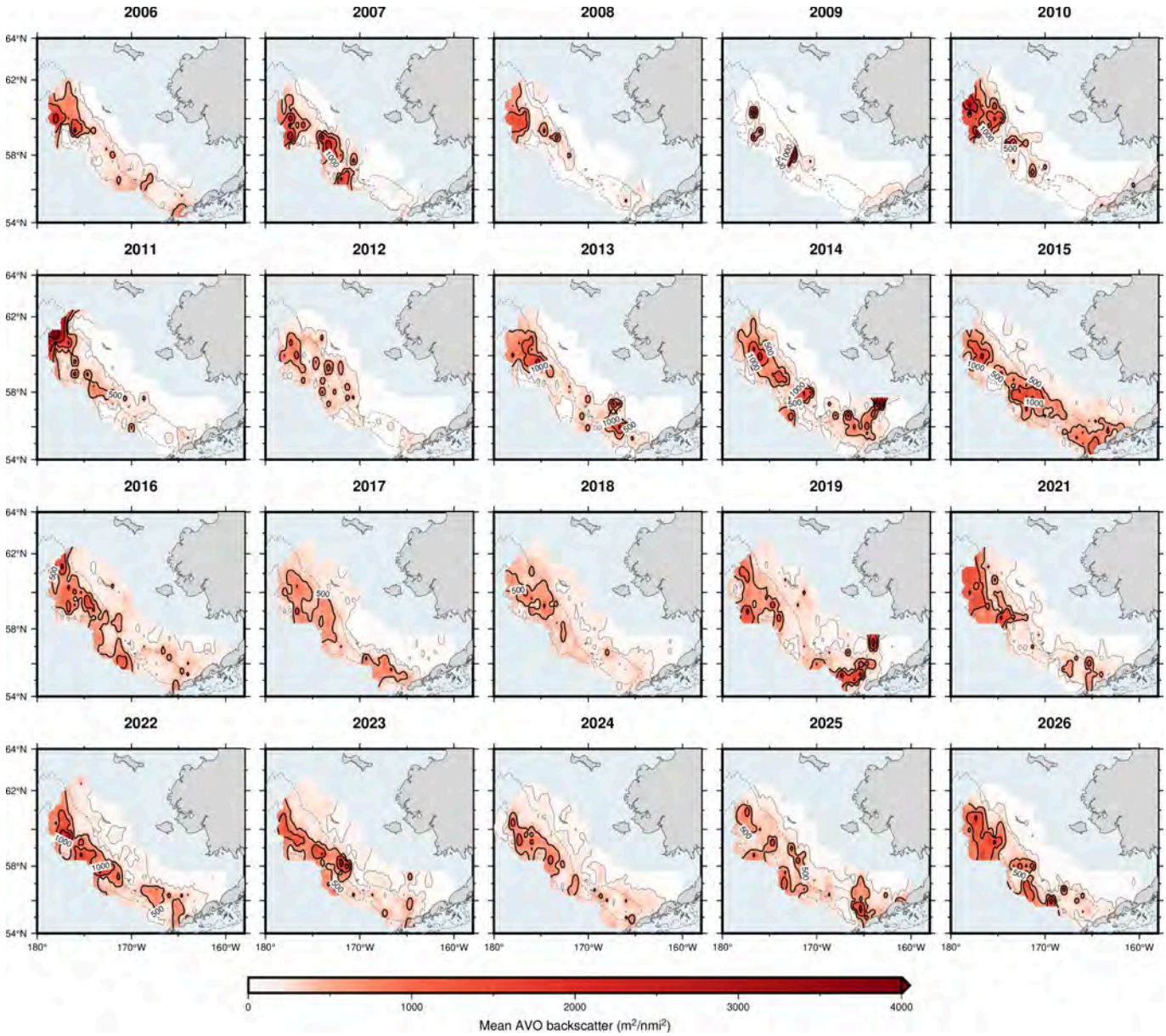
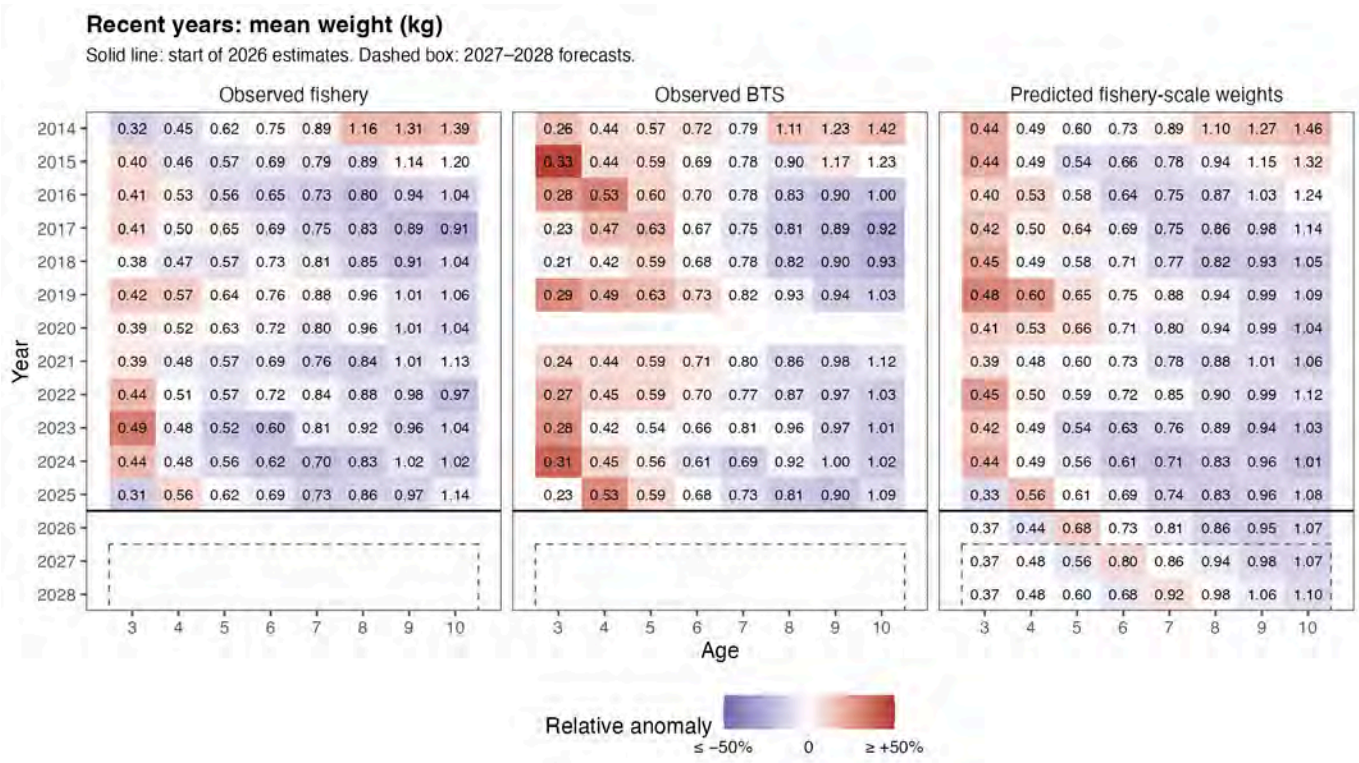


Figure 23: AVO pollock backscatter, 2006–2026 (m^2/nmi^2), mapped with common GMT gridding and contour levels. Twenty survey years are shown; AVO observations are unavailable for 2020. Cell means include observed zeros and use an approximately 20-nautical-mile grid. Surfaces are displayed within 45 km of sampled cell centers. Dashed gray lines mark 100 and 200 m depths. Coastline: AKsf. The 2026 observations are preliminary.



Download the figure data and anomaly reference means.

Figure 24: Observed and predicted weight-at-age, 2014–2028, after omitting 2026 BTS weight observations from the standalone random-effects fit. Cell labels give mean weight in kg per fish for ages 3–10. Fishery and BTS observations end in 2025; the right-hand panel includes 2026 estimates without weight observations and 2027–2028 forecasts. The solid line marks 2026; dashed boxes mark forecast years. Colours show proportional deviations from each age's mean through 2025 within its own panel, saturating at ±50%. Blank cells indicate absent observations, including the 2020 BTS gap.

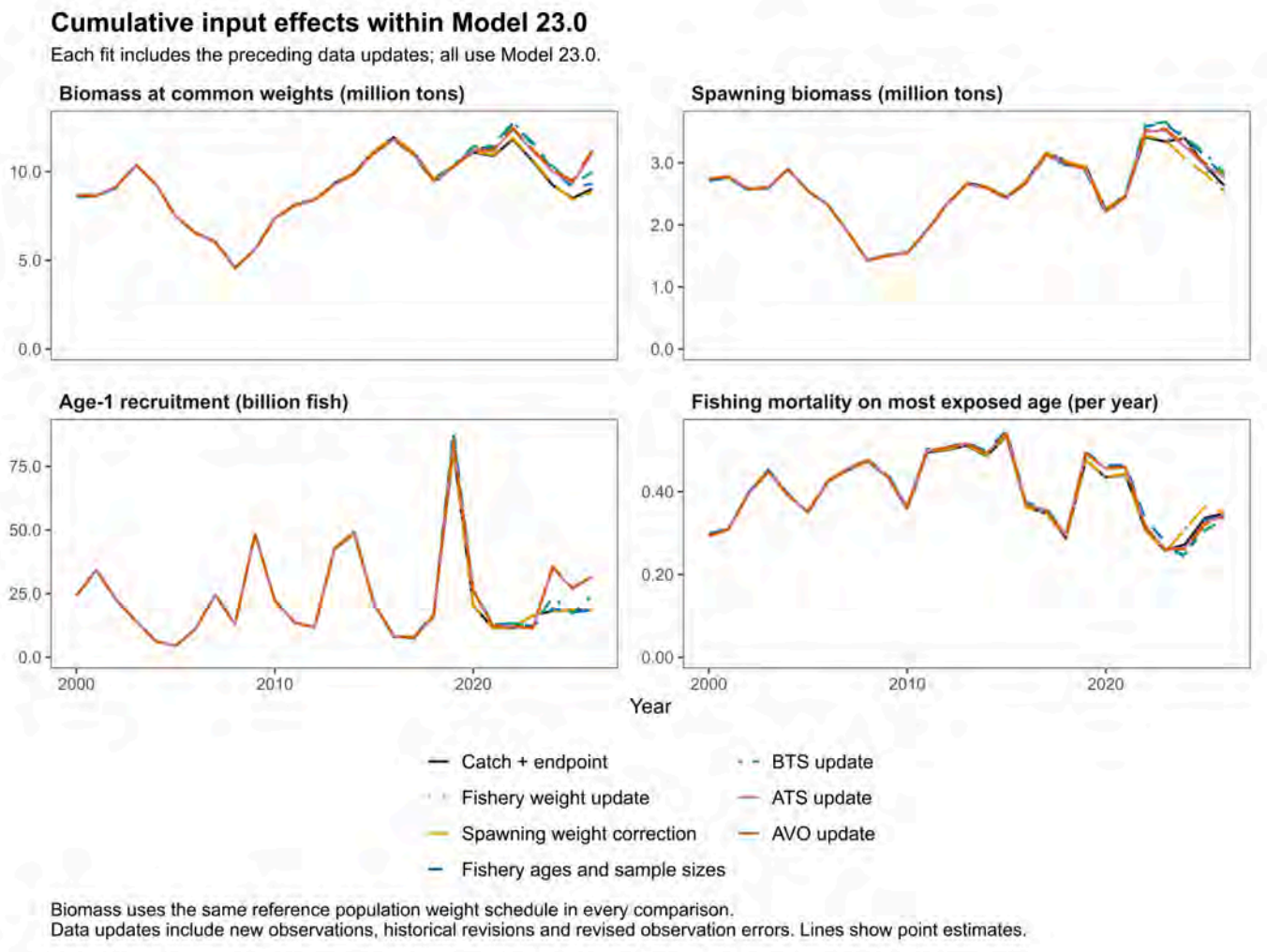


Figure 25: Cumulative input-update comparisons within Model 23.0, 2000–2026. Each fit includes the preceding updates. Biomass uses the same population-weight schedule in every comparison, and fishing mortality is the maximum realized rate across ages. ATS and AVO updates combine observations, historical revisions and observation-error calibrations. Lines show point estimates.

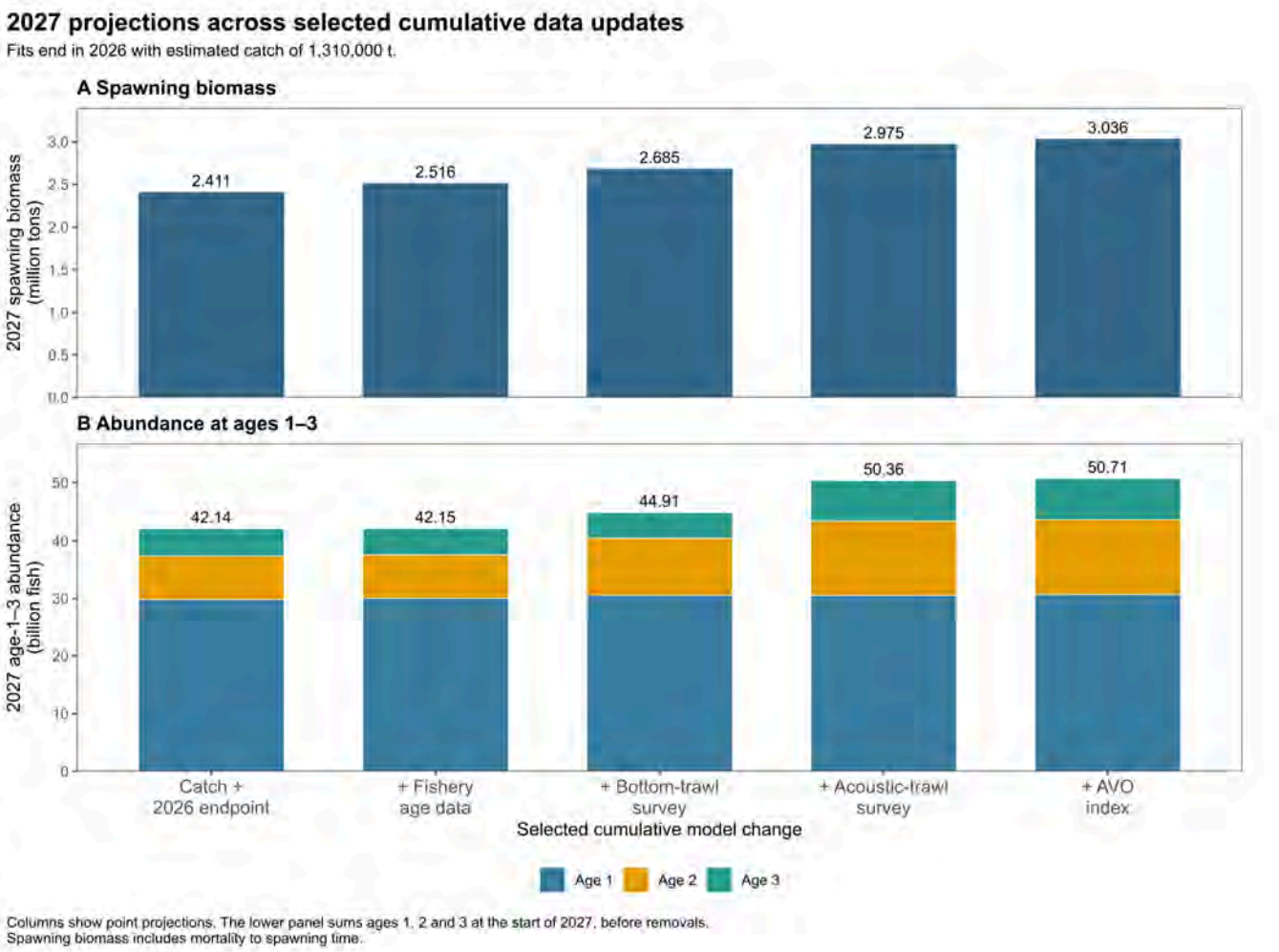


Figure 26: Projected 2027 spawning biomass and combined abundance at ages 1–3 across five selected cumulative Model 23.0 input-update stages. These comparisons use estimated annual 2026 catch of 1,310,000 t. The displayed stages are cumulative; the omitted weight-at-age and A-season spawning-weight updates remain included in the fishery-age and later stages. Lower-panel columns stack ages 1, 2 and 3 at the start of 2027, before removals; spawning biomass includes mortality to spawning time. Projection methods are described in the technical supplement.

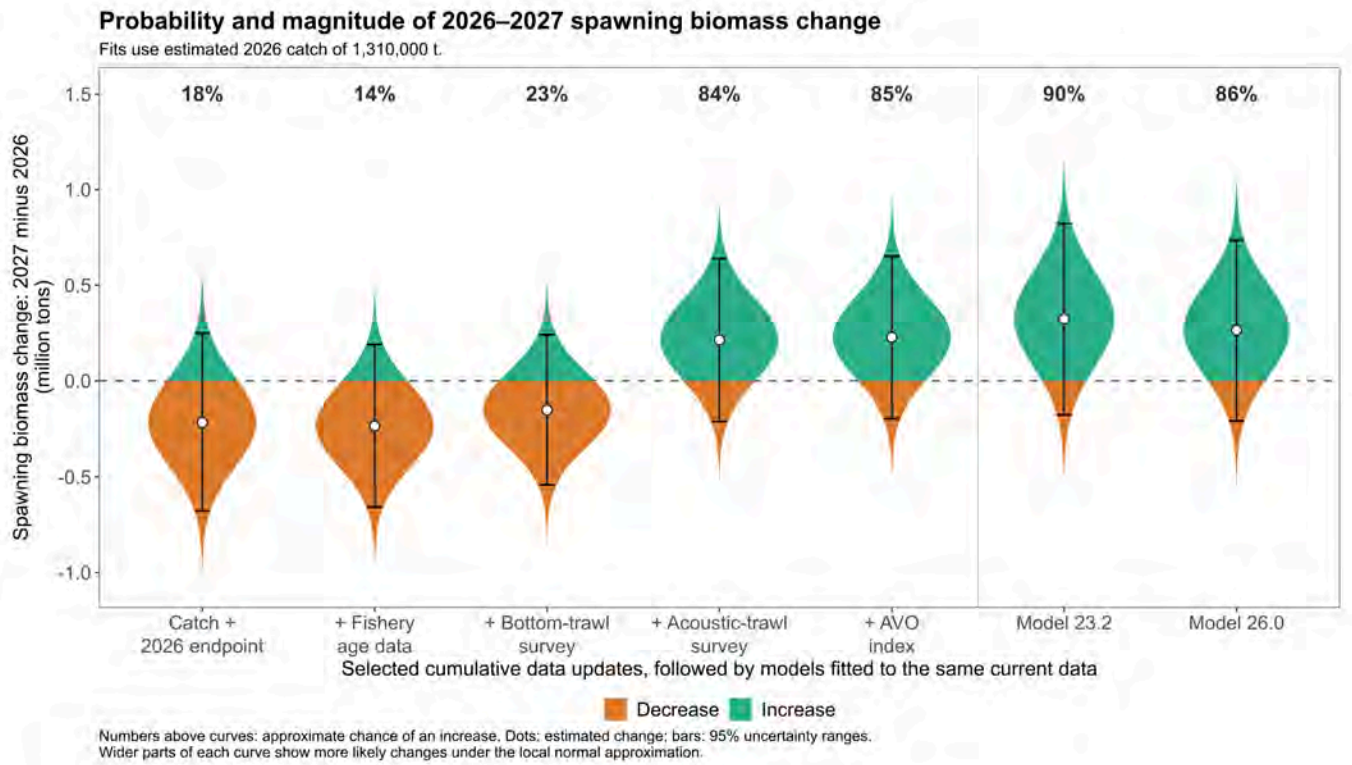


Figure 27: Approximate distributions of spawning-biomass change from 2026 to 2027 across five selected cumulative input-update stages, followed by Models 23.2 and 26.0 fitted to the same assessment data. These comparisons use estimated annual 2026 catch of 1,310,000 t. The displayed stages are cumulative; the omitted weight-at-age and A-season spawning-weight updates remain included in the fishery-age and later stages. Green area represents an increase and orange area a decrease. Dots show estimated changes, bars show 95% local asymptotic ranges, and labels give approximate chances of an increase rounded to whole percentages. Distributions use fitted parameter covariance; projection methods are described in the technical supplement.

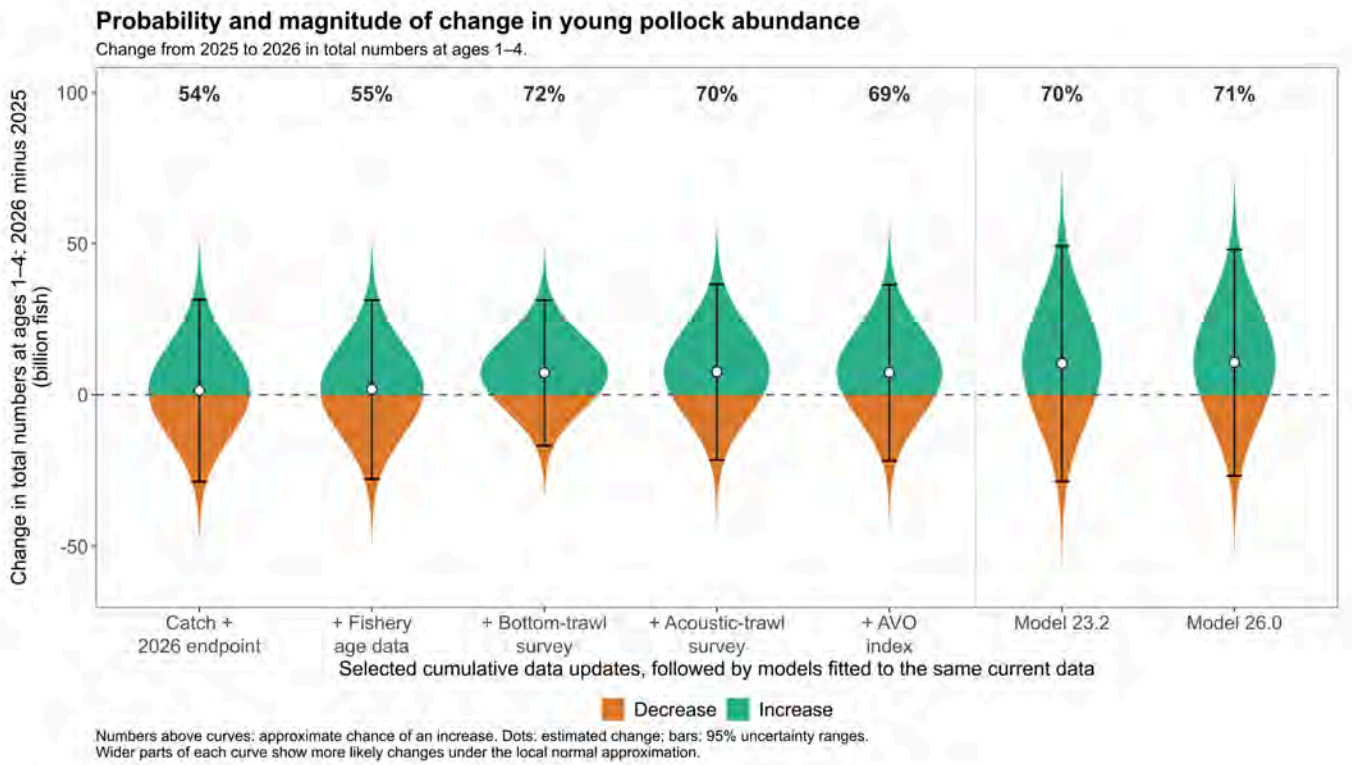


Figure 28: Approximate distributions of change from 2025 to 2026 in total numbers at ages 1–4. Five selected cumulative input-update stages are followed by Models 23.2 and 26.0 fitted to the same assessment data. The displayed stages are cumulative; the omitted weight-at-age and A-season spawning-weight updates remain included in the fishery-age and later stages. Annual totals sum ages 1–4 at the start of the year and account for cross-age and cross-year parameter covariance. Green area represents an increase and orange area a decrease. Dots show estimates, bars show 95% uncertainty ranges and labels give approximate chances of an increase.

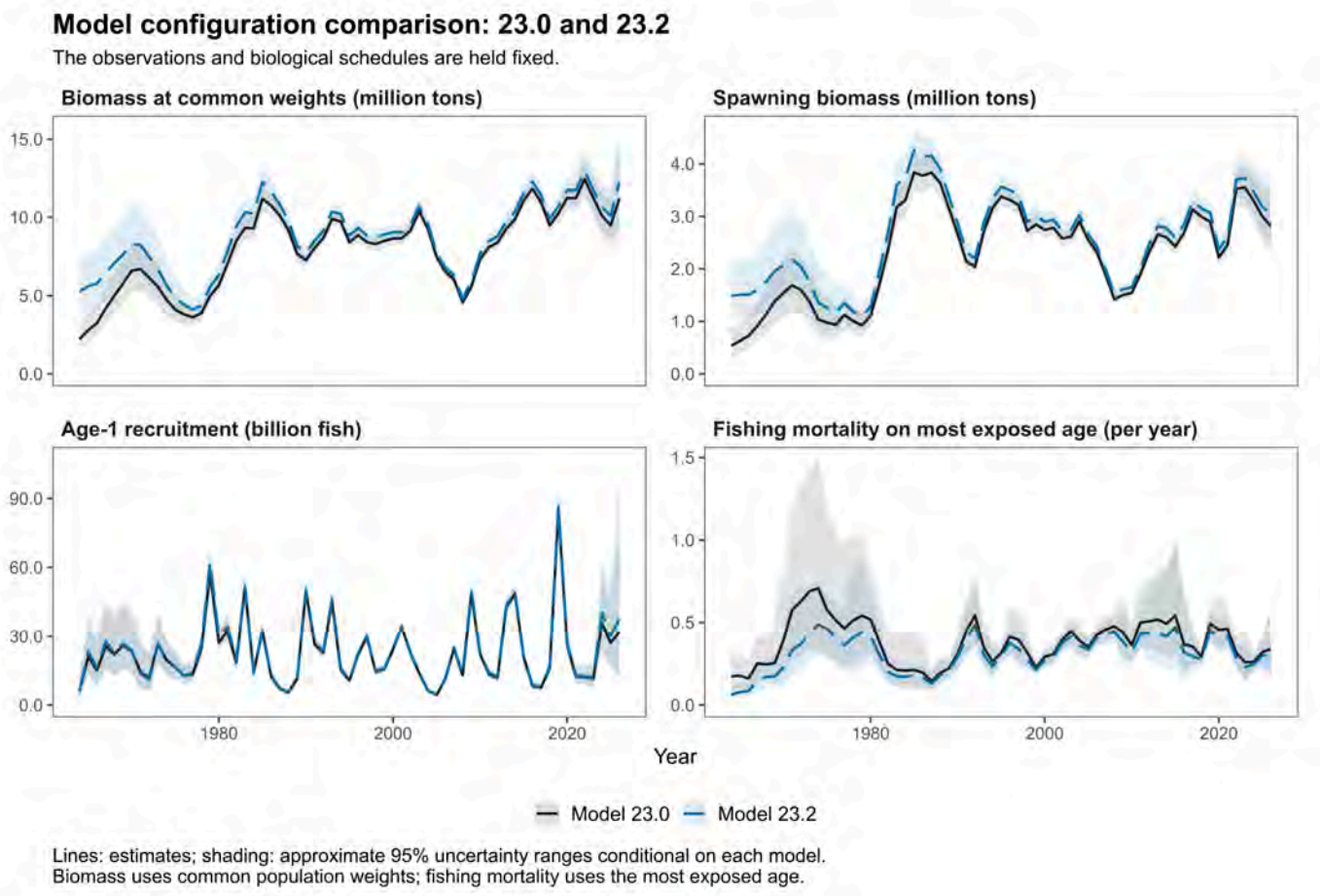


Figure 29: Models 23.0 and 23.2 fitted to the same observations and biological schedules. Lines show annual estimates and shading gives approximate 95% local asymptotic uncertainty ranges. Panels show biomass at common population weights, spawning biomass, age-1 recruitment and maximum realized fishing mortality across ages.

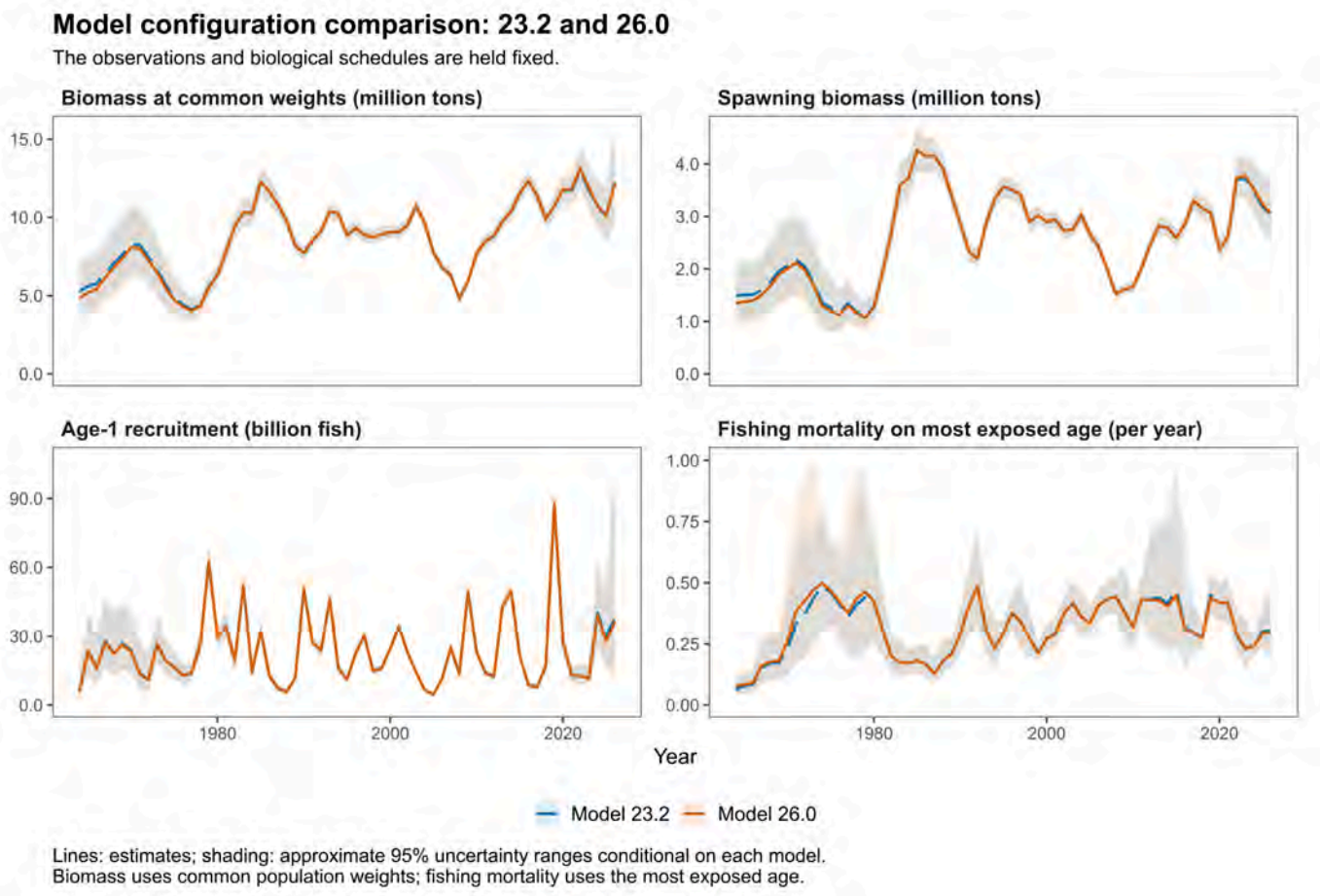


Figure 30: Models 23.2 and 26.0 fitted to the same observations and biological schedules. Lines show annual estimates and shading gives approximate 95% local asymptotic uncertainty ranges. Panels show biomass at common population weights, spawning biomass, age-1 recruitment and maximum realized fishing mortality across ages. These estimation ranges are conditional on the stated model and inputs.

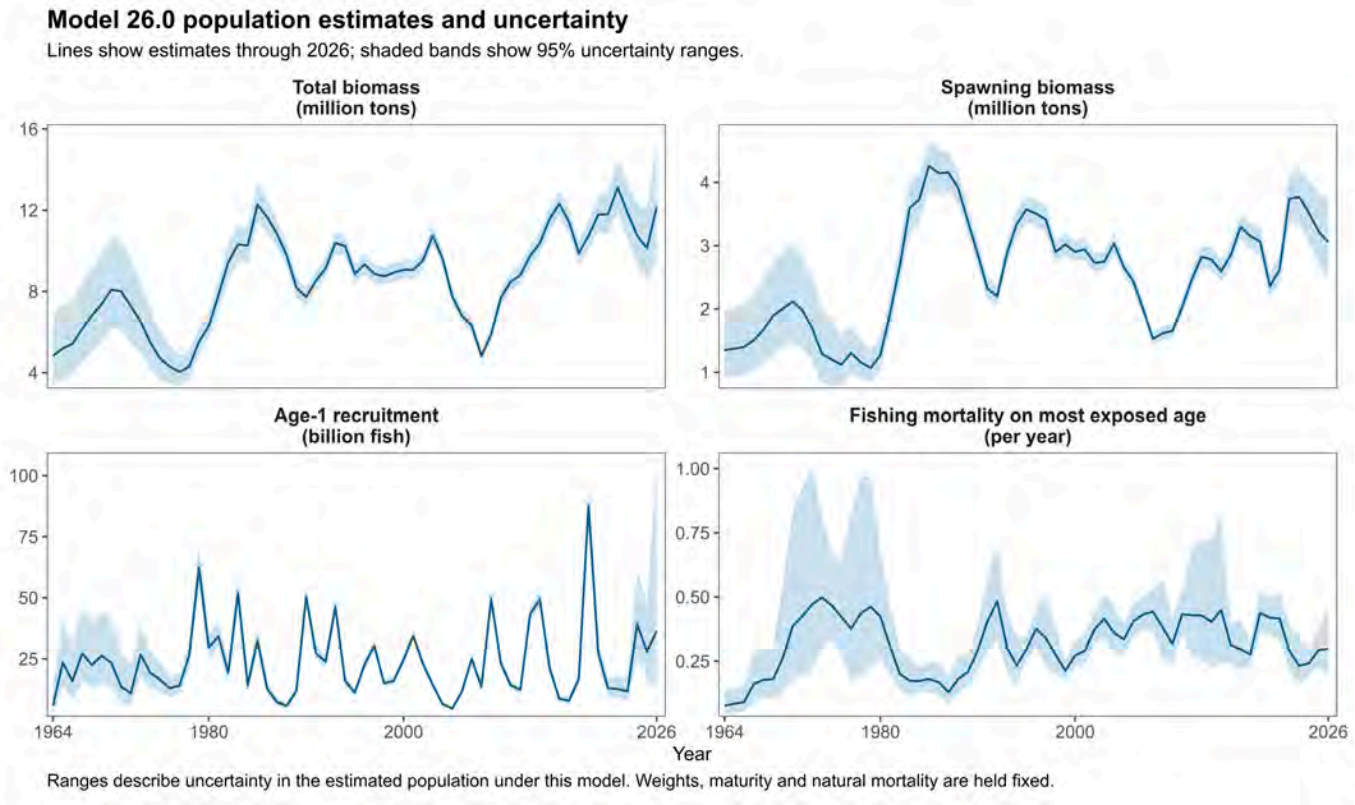
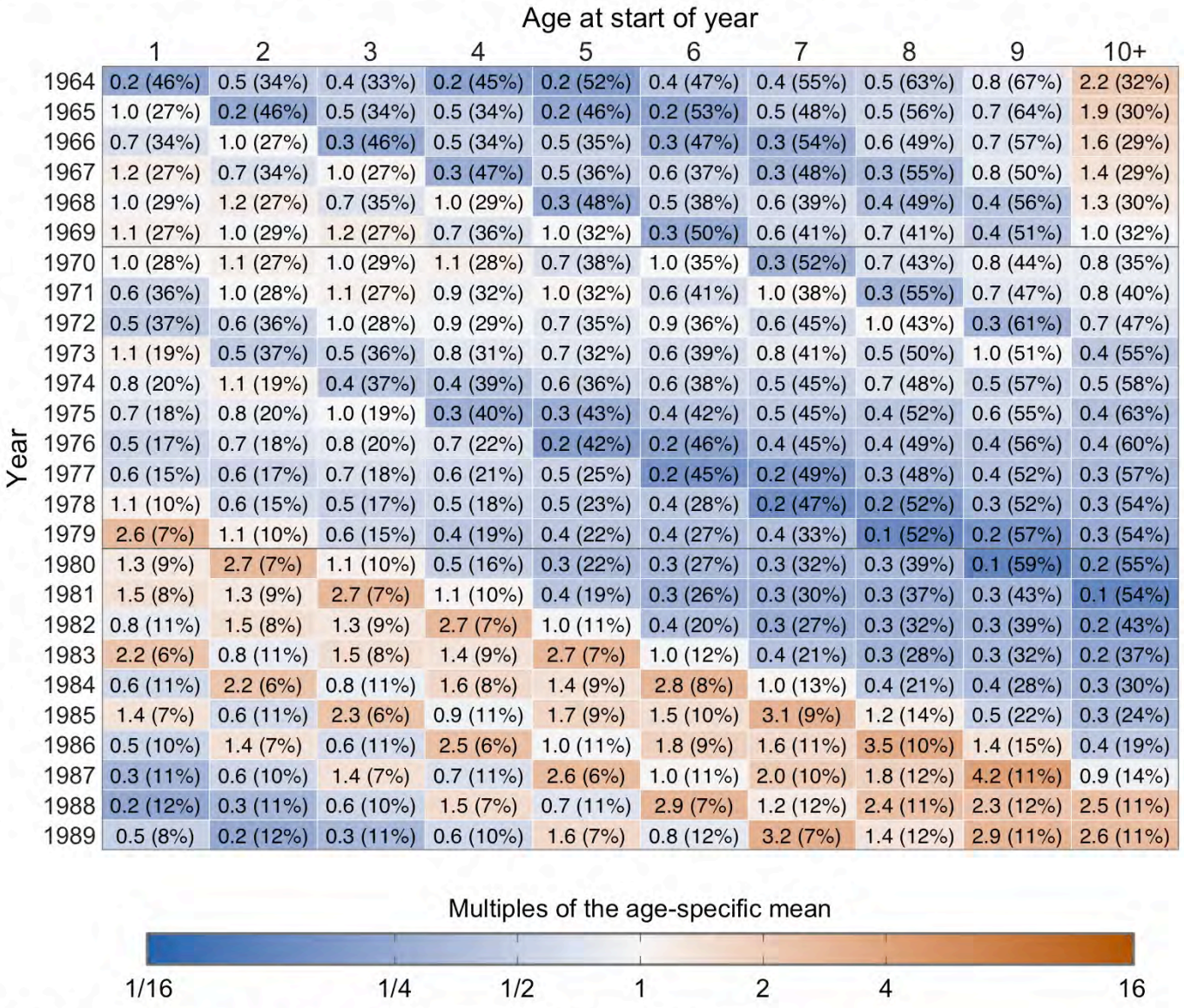


Figure 31: Model 26.0 annual total biomass, female spawning biomass, age-1 recruitment and fishing mortality through 2026, with approximate 95% asymptotic estimation ranges. Total biomass uses population weights; spawning biomass uses mature female spawning weights and survival to spawning. Recruitment is labeled by the year fish enter age 1; fishing mortality is the maximum realized rate across ages. Biological schedules are fixed.

Model 26.0 numbers at age

1964-1989 | abundance relative to each age's 1964-2026 mean
Cells: abundance / age-specific mean (CV%); CV = asymptotic SE as a percentage of the estimate



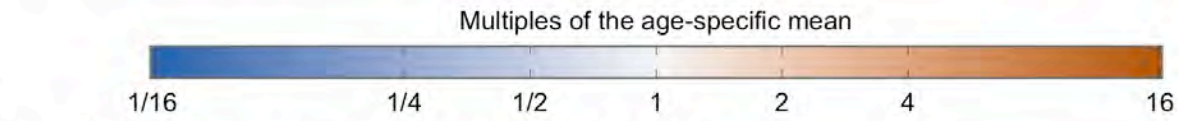
Colour denominators: each age's arithmetic mean over 1964-2026 (all 63 years).
Labels: multiples to 1 decimal; CV to whole %. 1 = age mean; 2 = twice the mean.
10+ sums ages 10-14 and 15+ once; its SE retains all cross-age covariance.

Figure 32: Model 26.0 start-of-year numbers at age, 1964–2026, displayed across two pages. Cells show abundance relative to each age group's 1964–2026 mean, rounded to one decimal place, with asymptotic CV (%) in parentheses. Ages 10–14 and 15+ are pooled into 10+; its SE accounts for the full fitted parameter covariance. Both pages use the same scales and cell sizes.

Model 26.0 numbers at age (continued)

1990-2026 | abundance relative to each age's 1964-2026 mean
Cells: abundance / age-specific mean (CV%); CV = asymptotic SE as a percentage of the estimate

Year	Age at start of year 1	2	3	4	5	6	7	8	9	10+
1990	2.1 (4%)	0.5 (8%)	0.3 (12%)	0.3 (11%)	0.6 (10%)	1.7 (7%)	0.9 (12%)	3.5 (8%)	1.6 (13%)	2.8 (9%)
1991	1.2 (5%)	2.2 (4%)	0.5 (8%)	0.3 (12%)	0.3 (11%)	0.6 (10%)	1.8 (7%)	0.9 (12%)	3.7 (8%)	2.2 (9%)
1992	1.0 (6%)	1.2 (5%)	2.2 (4%)	0.6 (8%)	0.3 (12%)	0.3 (13%)	0.6 (12%)	1.7 (9%)	0.9 (14%)	2.5 (9%)
1993	2.0 (4%)	1.0 (6%)	1.2 (5%)	2.3 (4%)	0.6 (8%)	0.3 (13%)	0.3 (15%)	0.5 (15%)	1.5 (13%)	1.5 (11%)
1994	0.7 (6%)	2.0 (4%)	1.1 (6%)	1.3 (5%)	2.3 (4%)	0.6 (9%)	0.3 (14%)	0.3 (17%)	0.6 (17%)	1.4 (11%)
1995	0.5 (7%)	0.7 (6%)	2.1 (4%)	1.1 (6%)	1.3 (6%)	2.2 (5%)	0.7 (9%)	0.3 (15%)	0.4 (18%)	1.1 (12%)
1996	1.0 (5%)	0.5 (7%)	0.7 (6%)	2.2 (4%)	1.3 (6%)	1.4 (6%)	2.1 (6%)	0.7 (10%)	0.3 (16%)	0.8 (12%)
1997	1.3 (4%)	1.0 (5%)	0.5 (7%)	0.8 (6%)	2.5 (4%)	1.4 (6%)	1.4 (7%)	1.9 (8%)	0.7 (12%)	0.6 (12%)
1998	0.6 (5%)	1.3 (4%)	1.0 (5%)	0.5 (7%)	0.8 (6%)	2.8 (4%)	1.5 (7%)	1.5 (9%)	2.0 (10%)	0.6 (12%)
1999	0.7 (5%)	0.6 (5%)	1.3 (4%)	1.1 (5%)	0.6 (7%)	0.9 (7%)	3.0 (5%)	1.7 (7%)	1.6 (10%)	1.1 (11%)
2000	1.0 (4%)	0.7 (5%)	0.7 (5%)	1.4 (4%)	1.2 (5%)	0.6 (8%)	1.1 (8%)	3.2 (6%)	2.0 (8%)	1.4 (10%)
2001	1.5 (3%)	1.1 (4%)	0.7 (5%)	0.7 (5%)	1.5 (4%)	1.2 (6%)	0.7 (8%)	1.1 (9%)	3.4 (7%)	1.7 (8%)
2002	1.0 (4%)	1.5 (3%)	1.1 (4%)	0.8 (5%)	0.8 (6%)	1.5 (5%)	1.2 (7%)	0.7 (9%)	1.2 (10%)	2.4 (7%)
2003	0.6 (5%)	1.0 (4%)	1.5 (3%)	1.2 (4%)	0.8 (5%)	0.7 (6%)	1.3 (6%)	1.1 (8%)	0.7 (11%)	1.9 (7%)
2004	0.3 (6%)	0.6 (5%)	1.0 (4%)	1.6 (3%)	1.2 (4%)	0.8 (6%)	0.7 (8%)	1.1 (8%)	1.0 (10%)	1.4 (8%)
2005	0.2 (8%)	0.3 (6%)	0.6 (5%)	1.1 (4%)	1.5 (4%)	1.2 (5%)	0.8 (7%)	0.6 (9%)	1.1 (9%)	1.2 (8%)
2006	0.5 (5%)	0.2 (8%)	0.3 (6%)	0.7 (5%)	1.1 (4%)	1.4 (4%)	1.1 (6%)	0.7 (8%)	0.7 (10%)	1.2 (8%)
2007	1.1 (4%)	0.5 (5%)	0.2 (8%)	0.3 (7%)	0.7 (5%)	1.0 (5%)	1.2 (5%)	1.0 (7%)	0.7 (9%)	0.9 (8%)
2008	0.6 (6%)	1.1 (4%)	0.5 (5%)	0.2 (8%)	0.3 (7%)	0.6 (6%)	0.9 (6%)	1.1 (7%)	1.0 (8%)	0.8 (9%)
2009	2.1 (3%)	0.6 (6%)	1.1 (4%)	0.5 (5%)	0.2 (8%)	0.3 (8%)	0.5 (7%)	0.7 (8%)	1.0 (9%)	0.7 (9%)
2010	1.0 (5%)	2.1 (3%)	0.6 (6%)	1.2 (4%)	0.6 (6%)	0.2 (9%)	0.3 (11%)	0.5 (10%)	0.7 (9%)	0.7 (9%)
2011	0.6 (6%)	1.0 (5%)	2.2 (3%)	0.7 (6%)	1.2 (5%)	0.6 (7%)	0.2 (11%)	0.3 (13%)	0.5 (12%)	0.7 (10%)
2012	0.5 (6%)	0.6 (6%)	1.0 (5%)	2.4 (3%)	0.7 (6%)	1.0 (6%)	0.5 (9%)	0.2 (13%)	0.2 (16%)	0.5 (12%)
2013	1.8 (3%)	0.5 (6%)	0.6 (6%)	1.1 (5%)	2.4 (4%)	0.7 (7%)	0.8 (8%)	0.4 (11%)	0.2 (17%)	0.3 (15%)
2014	2.1 (3%)	1.9 (3%)	0.5 (6%)	0.7 (6%)	1.1 (5%)	2.4 (4%)	0.8 (8%)	0.8 (11%)	0.4 (16%)	0.2 (19%)
2015	0.9 (5%)	2.1 (3%)	1.9 (3%)	0.6 (6%)	0.7 (6%)	1.2 (6%)	2.3 (5%)	0.7 (10%)	0.8 (14%)	0.2 (18%)
2016	0.4 (9%)	0.9 (5%)	2.2 (3%)	2.0 (4%)	0.6 (6%)	0.7 (7%)	1.1 (7%)	2.2 (7%)	0.7 (12%)	0.4 (17%)
2017	0.3 (10%)	0.4 (9%)	0.9 (5%)	2.4 (4%)	1.8 (4%)	0.6 (7%)	0.8 (8%)	1.2 (9%)	2.2 (9%)	0.5 (14%)
2018	0.7 (8%)	0.3 (10%)	0.4 (9%)	1.0 (5%)	2.5 (4%)	1.6 (5%)	0.6 (8%)	0.8 (9%)	1.3 (10%)	1.1 (12%)
2019	3.7 (5%)	0.7 (8%)	0.4 (10%)	0.4 (9%)	1.1 (6%)	2.4 (4%)	1.6 (6%)	0.6 (9%)	0.9 (11%)	1.2 (11%)
2020	1.2 (9%)	3.8 (5%)	0.7 (8%)	0.4 (10%)	0.5 (9%)	1.3 (6%)	2.2 (6%)	1.4 (9%)	0.6 (11%)	1.0 (11%)
2021	0.5 (14%)	1.2 (9%)	3.9 (5%)	0.8 (8%)	0.4 (10%)	0.5 (10%)	1.2 (7%)	2.0 (8%)	1.4 (11%)	0.8 (14%)
2022	0.5 (17%)	0.6 (14%)	1.2 (9%)	4.0 (6%)	0.9 (8%)	0.4 (11%)	0.5 (11%)	1.1 (10%)	1.8 (11%)	0.9 (14%)
2023	0.5 (20%)	0.5 (17%)	0.6 (14%)	1.3 (9%)	4.2 (6%)	0.9 (9%)	0.5 (13%)	0.6 (13%)	1.1 (12%)	1.3 (12%)
2024	1.7 (23%)	0.5 (20%)	0.6 (17%)	0.6 (14%)	1.4 (10%)	4.3 (7%)	1.0 (10%)	0.5 (14%)	0.7 (15%)	1.2 (13%)
2025	1.2 (27%)	1.7 (23%)	0.5 (20%)	0.6 (18%)	0.6 (15%)	1.5 (11%)	4.3 (9%)	1.1 (12%)	0.6 (15%)	1.0 (13%)
2026	1.5 (53%)	1.2 (27%)	1.7 (23%)	0.6 (21%)	0.6 (19%)	0.7 (17%)	1.4 (14%)	4.4 (12%)	1.2 (14%)	0.9 (14%)



Colour denominators: each age's arithmetic mean over 1964-2026 (all 63 years).
Labels: multiples to 1 decimal; CV to whole %. 1 = age mean; 2 = twice the mean.
10+ sums ages 10-14 and 15+ once; its SE retains all cross-age covariance.

Figure 32 (continued): 1990–2026. Age groups, full-period denominators, scales and row sizing match the preceding page.

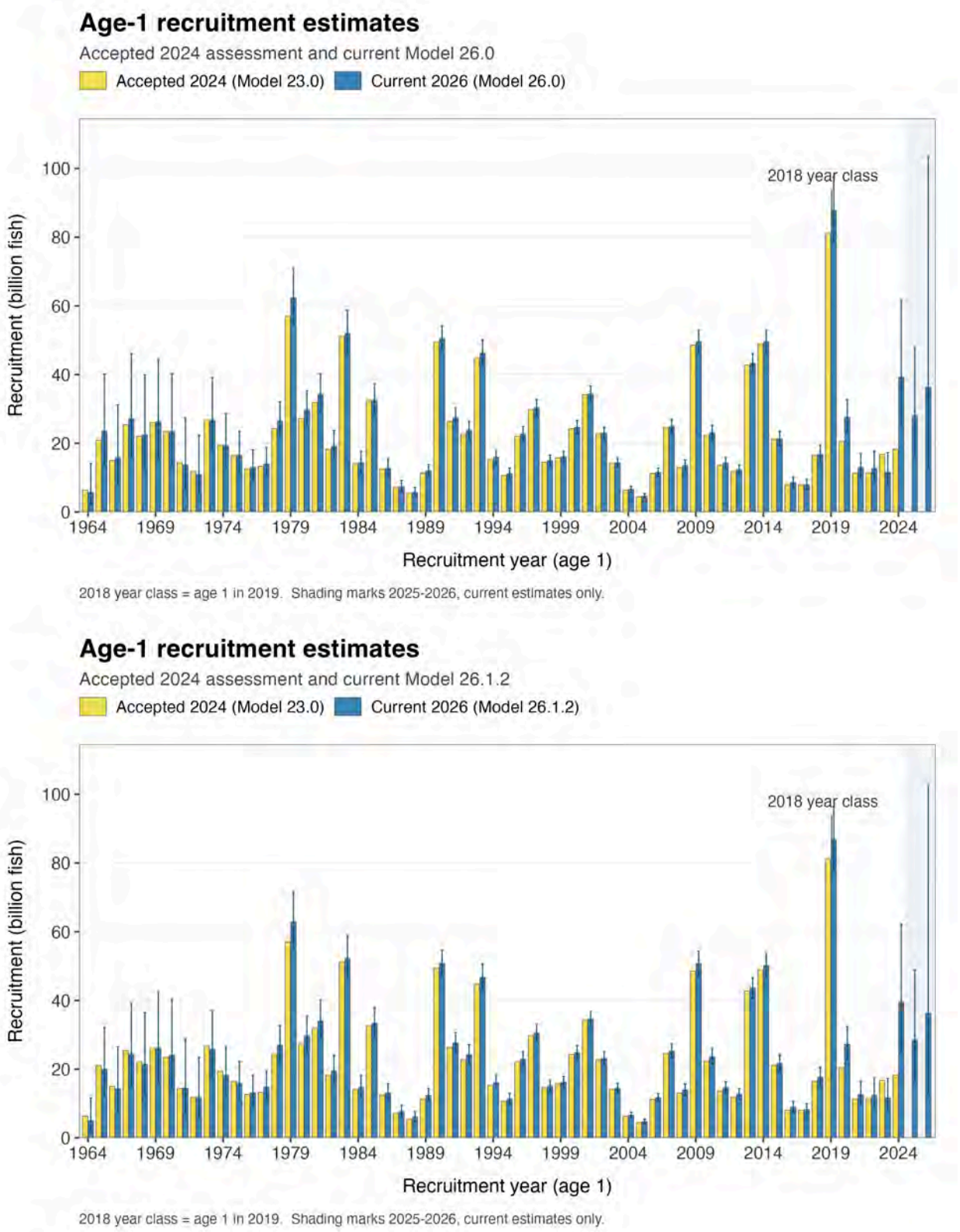


Figure 33: Age-1 recruitment from the accepted 2024 assessment compared with Models 26.0 (panel A) and 26.1.2 (panel B). Bars show point estimates for both sexes in billions of fish. Historical estimates are shown without intervals. Whiskers show local 95% log-scale intervals: the native asymptotic covariance for Model 26.0 and the marginal fit's Louis observed information for Model 26.1.2, conditional on its integration samples and normalizer grid. Calendar year denotes age 1; the 2018 year class enters at age 1 in 2019.

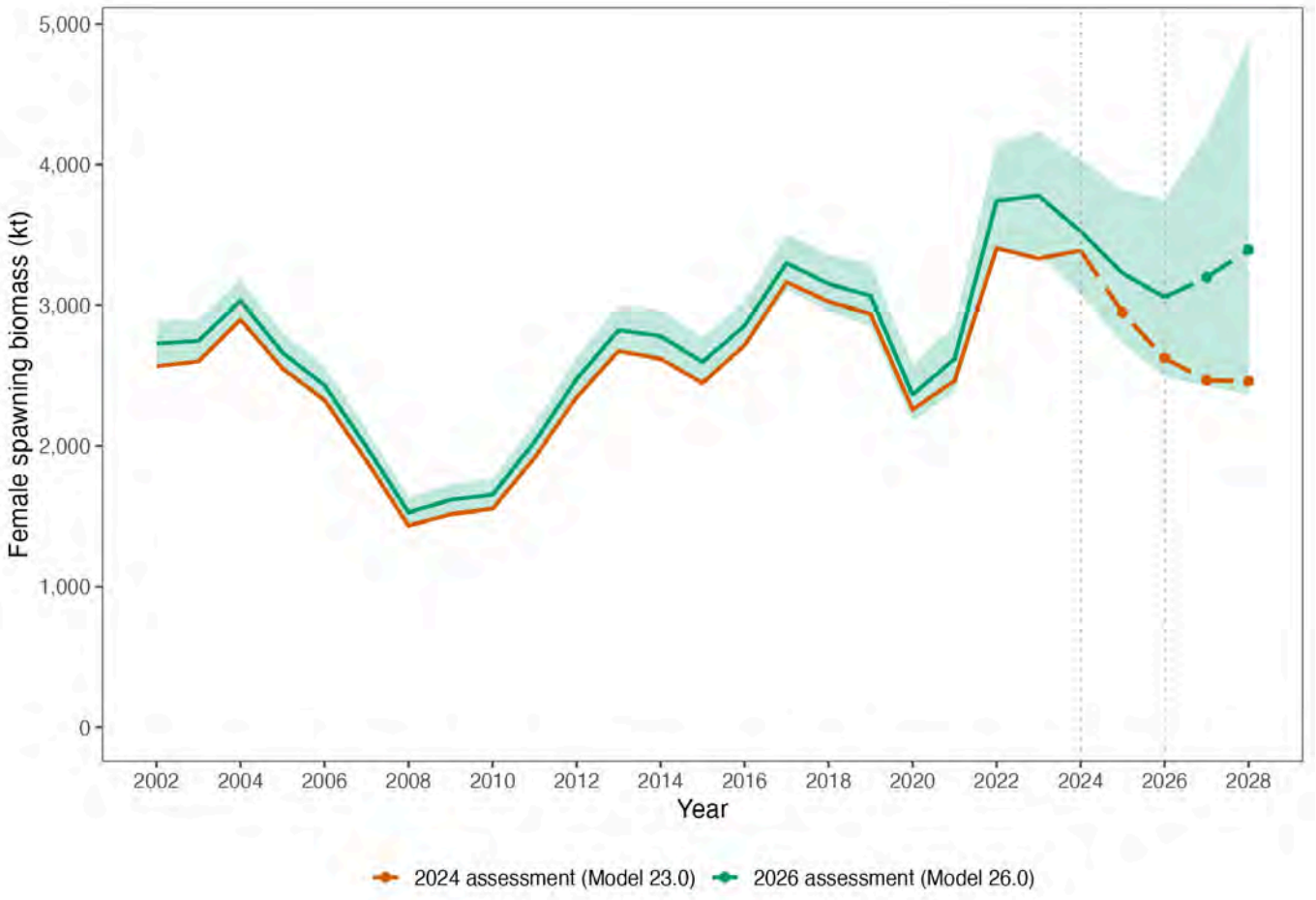


Figure 34:Female spawning biomass estimated and projected by the 2024 assessment (Model 23.0) and the 2026 assessment (Model 26.0), through 2028. Solid lines show estimates; dashed lines and points show Scenario 2 projections. The 2024 series reproduces published Tables 26 and 32, with planned catches of 1,350 kt in 2025–2026 followed by maximum ABC. The current projection uses 1,375 kt in 2027–2028. Shading shows approximate 95% log-scale delta-method intervals for current assessment-parameter uncertainty, conditional on fixed weights and mean future recruitment; independent future recruitment and weight-estimation uncertainty are excluded. No corresponding 2024 uncertainty band is shown. Dotted lines mark the assessment endpoints, 2024 and 2026.

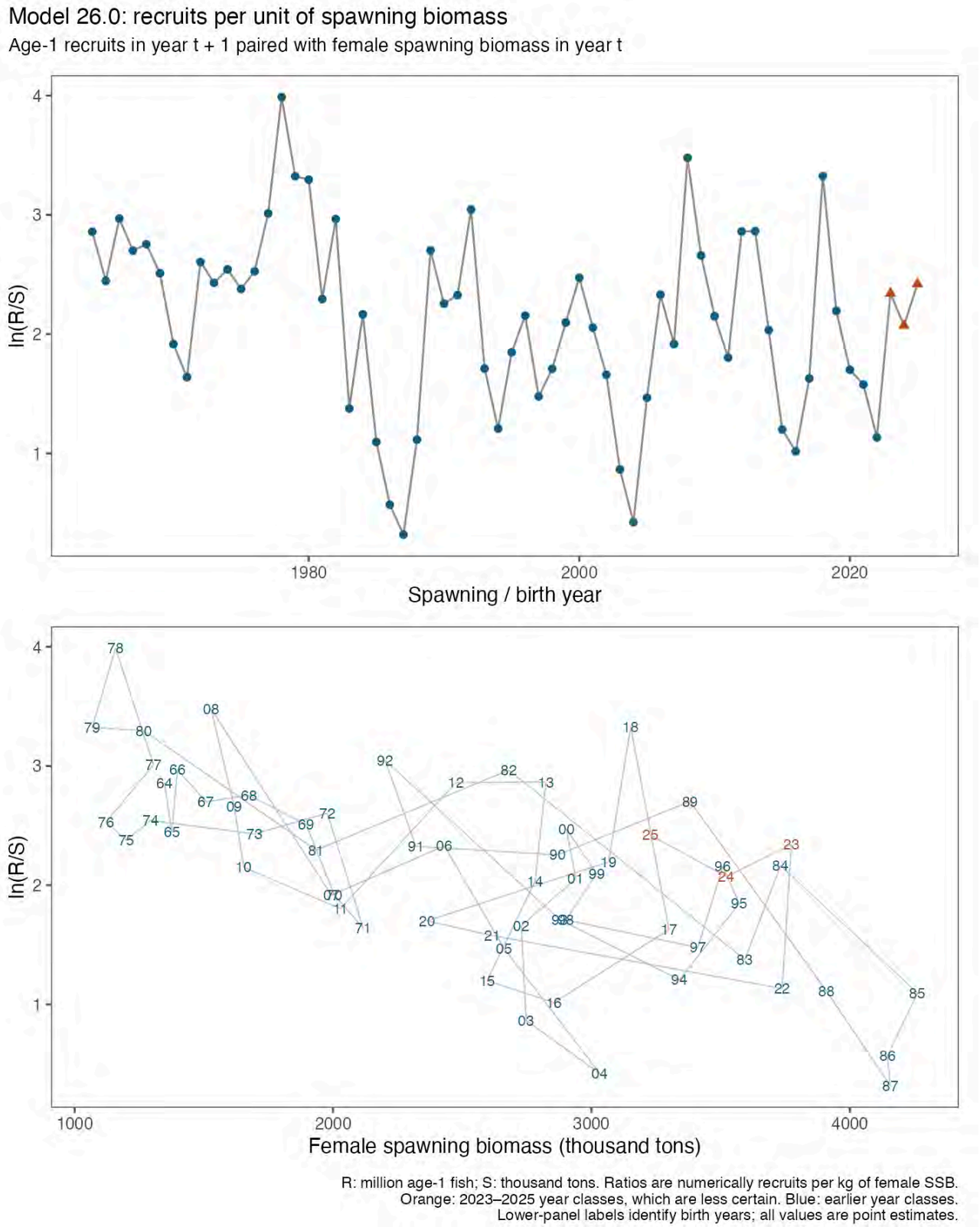


Figure 35: Model 26.0 log recruits per spawner. Age-1 recruits in year t+1 (million fish) are divided by female spawning biomass in year t (thousand tons), then natural-log transformed. The numerical ratio is recruits per kilogram of female spawning biomass. Upper panel: birth-year series, 1964–2025. Lower panel: the same ratios against spawning biomass, with two-digit birth-year labels and lines joining consecutive years. Orange identifies the less certain 2023–2025 year classes. The figure shows point estimates of the ratio.

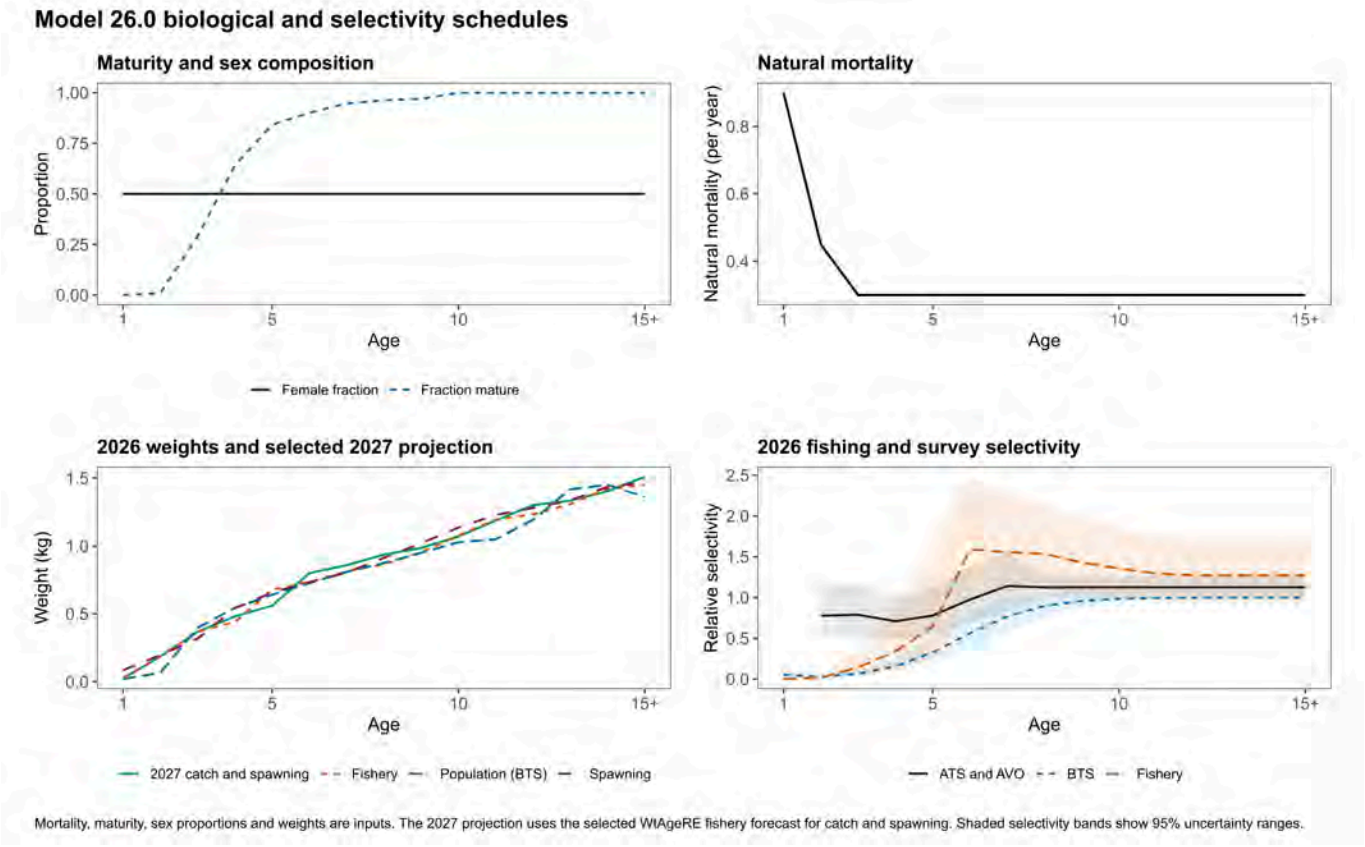


Figure 36: Model 26.0 biological and selectivity schedules. Maturity, female fraction and natural mortality are inputs. The weight panel distinguishes the 2026 population (BTS), spawning and fishery schedules from the selected 2027 fishery forecast used for both catch and spawning in projections. The 2026 fishery estimates and 2027 forecast come from the standalone WtAgeRE fit omitting 2026 BTS weight observations; population and historical spawning weights retain their separate treatments. Fishing and survey selectivity curves have approximate 95% asymptotic ranges; ATS and AVO share their estimated curve. Schedules have no fitted-parameter bands.

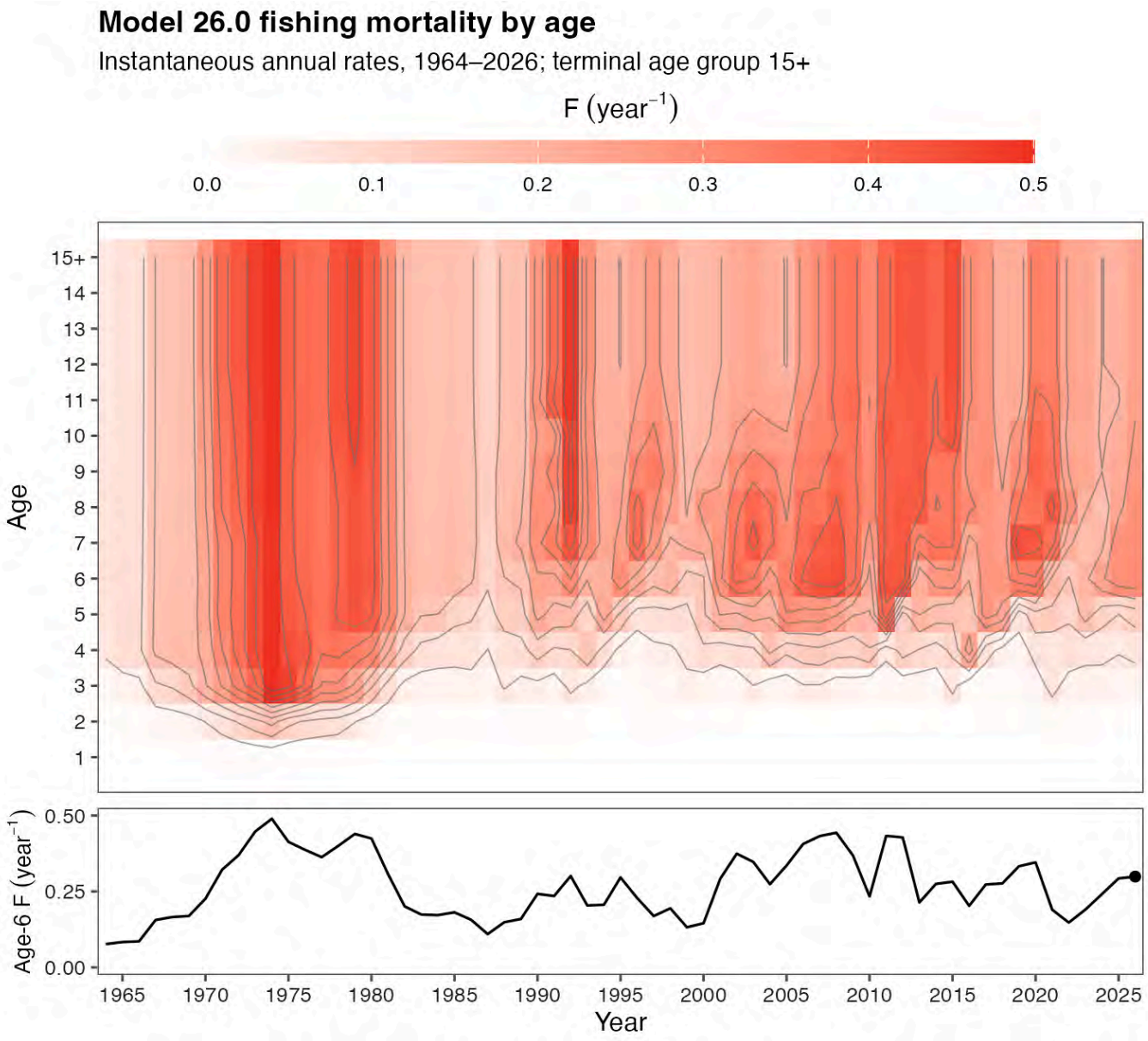


Figure 37: Model 26.0 instantaneous fishing mortality by age through 2026. Tiles and contours showed the same realized total fishing mortality rates; 15+ is the terminal age group.

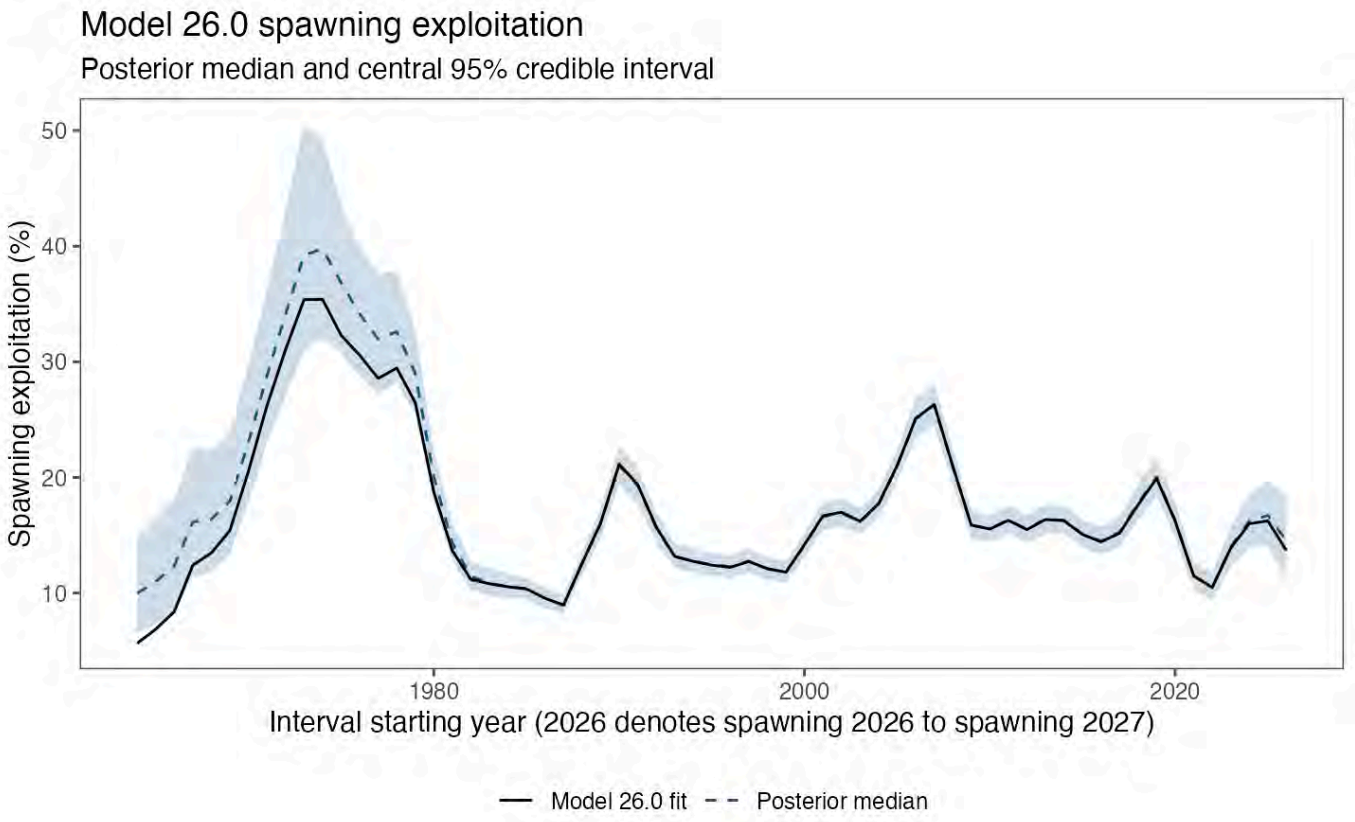


Figure 38: Model 26.0 spawning exploitation for spawning-to-spawning intervals starting in 1964–2026. Black lines showed the Model 26.0 fit; dashed blue lines and shading show MCMC posterior medians and central 95% credible intervals from 5,000 draws. Spawning exploitation is 100 × (1 − next-spawning female biomass with fishing / next-spawning female biomass without fishing). Each paired calculation starts from the same spawning-date population. The terminal interval assumes 1.375 million t catch in 2027, within-draw mean 1978–2023 recruitment and mean 2023–2025 selectivity, and the deterministic fishery-weight schedule. Biology is fixed. The terminal posterior median is 14.5333%, with interval 11.2075–18.3700%.

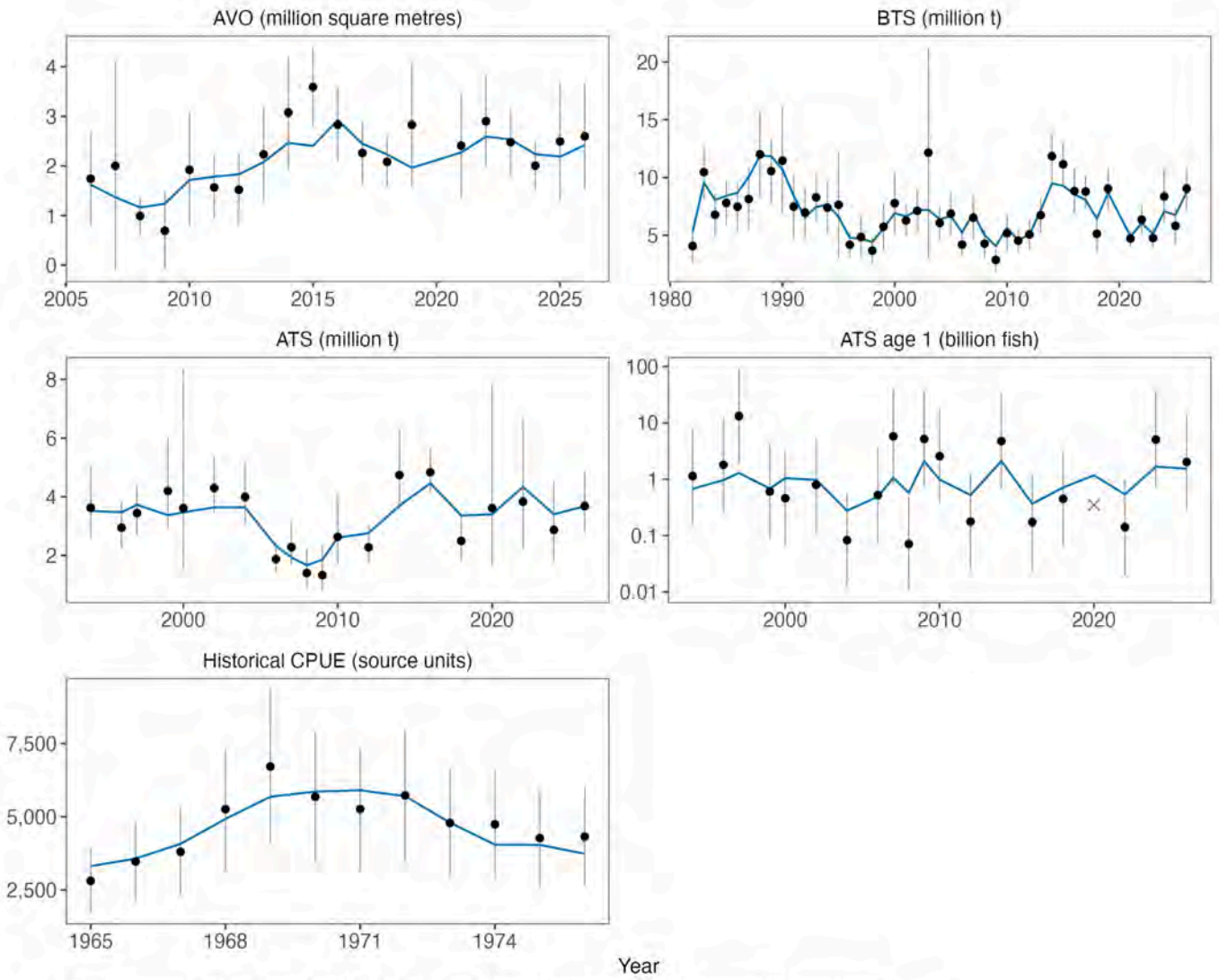


Figure 39: Observed indices and Model 26.0 fitted predictions. Black points show observations, lines show fitted predictions, and bars show approximate 95% observation-error ranges. BTS observation errors include covariance among survey years. The ATS age-1 panel uses a logarithmic scale in billions of fish; the 2020 age-1 placeholder is distinguished from the real 2020 USV biomass observation.

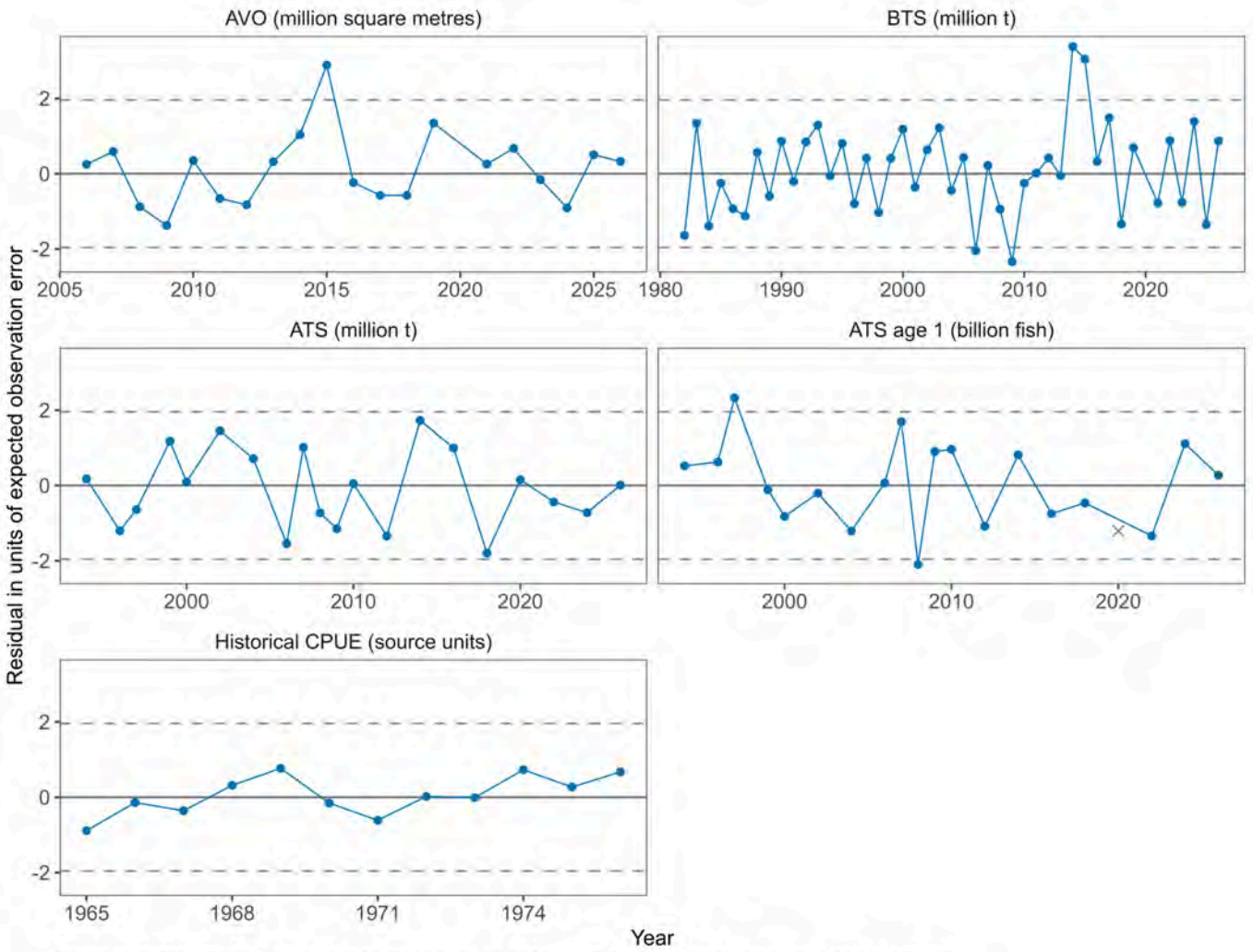


Figure 40: Model 26.0 index residuals relative to the selected observation errors, with BTS accounting for covariance among survey years. Dashed lines mark the standard-normal 95% reference range. The 2020 ATS age-1 placeholder is distinguished and excluded from observed-index summaries; the 2020 USV biomass remains an observation.

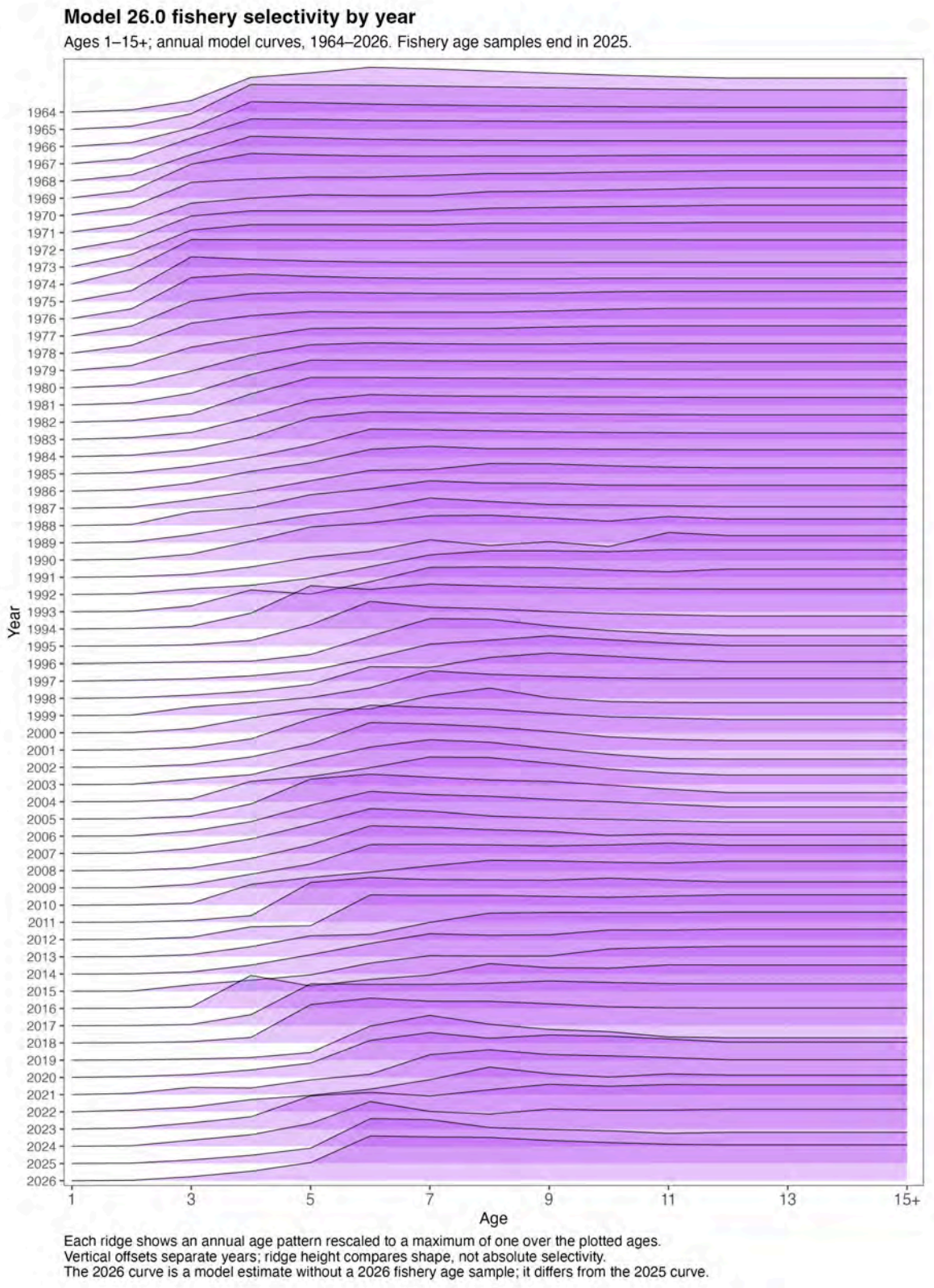


Figure 41: Annual fishery selectivity at ages 1–15+ from Model 26.0. Each ridge shows the estimated age pattern for that year.

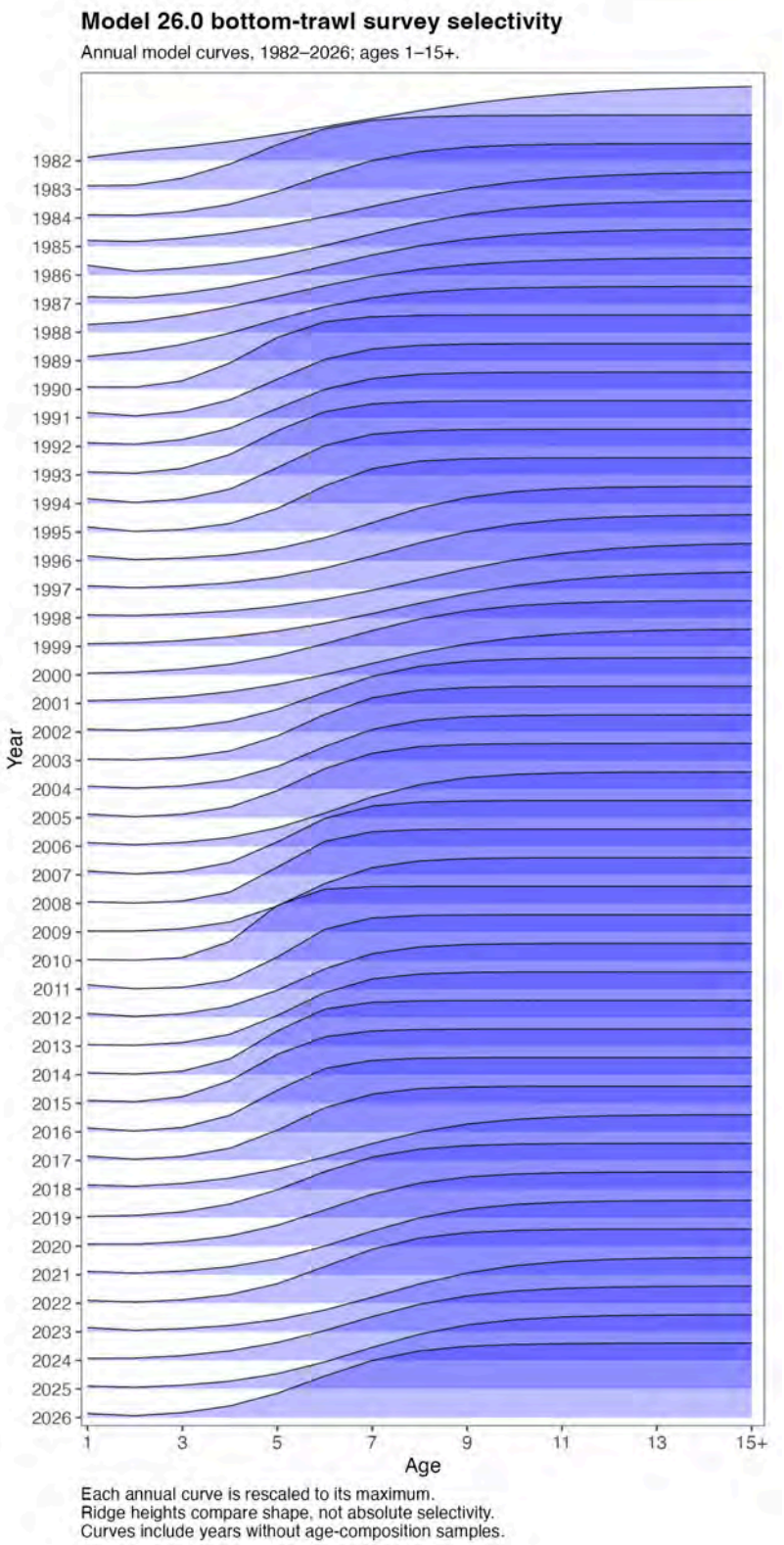


Figure 42: Annual bottom-trawl survey selectivity at ages 1–15+ from Model 26.0. Each ridge is divided by its maximum over the displayed ages. Model curves are also shown for years without age-composition samples.

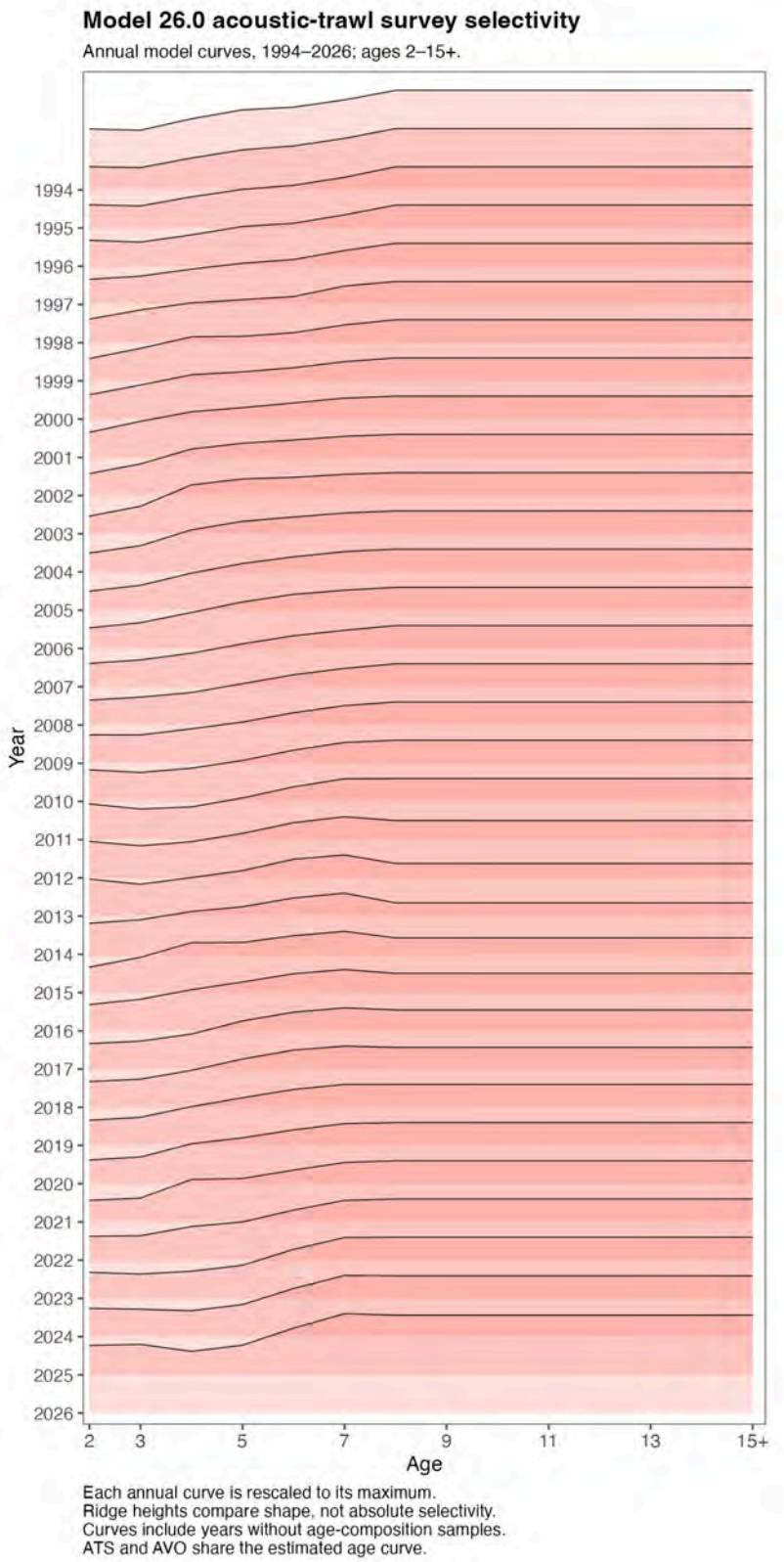


Figure 43: Annual acoustic-trawl survey selectivity at ages 2–15+ from Model 26.0. ATS and AVO share the estimated curve; age 1 is excluded. Curves are also shown for years without age-composition samples.

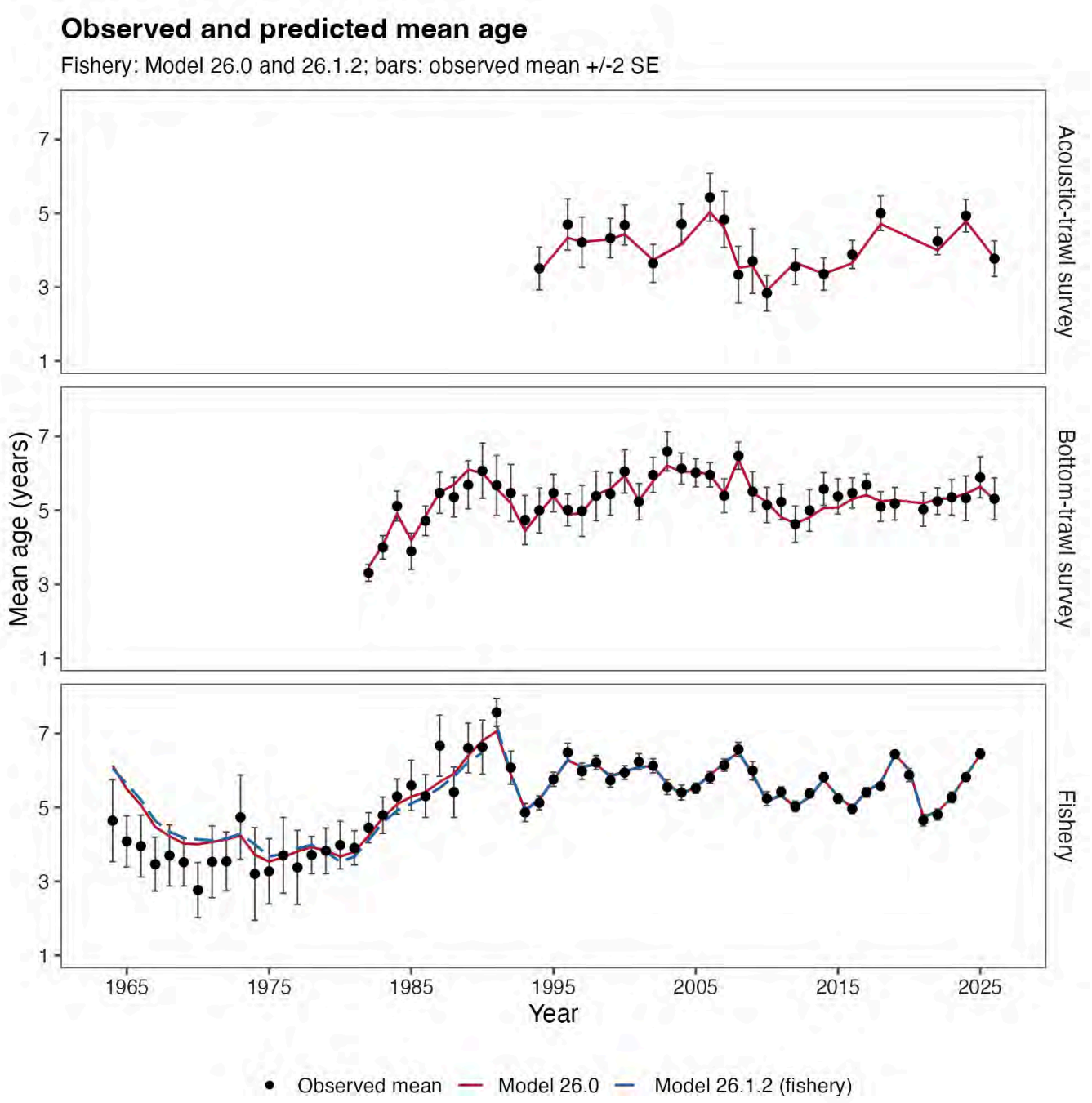


Figure 44: Observed grouped mean age for ATS, BTS and fishery with Model 26.0 predictions and the Model 26.1.2 fishery prediction. Bars are the observed mean ±2 SE, where SE = sqrt(sum[p_obs × (age score − observed mean)^2] / N), using the selected observed proportions and likelihood input N. Ages 1–14 and 15+ are scored 1–15; ATS excludes structural age 1 and the retained 2020 substitute. The alternative prediction is evaluated at its fitted conditional selectivity-state modes. Bars show uncertainty in the observations.

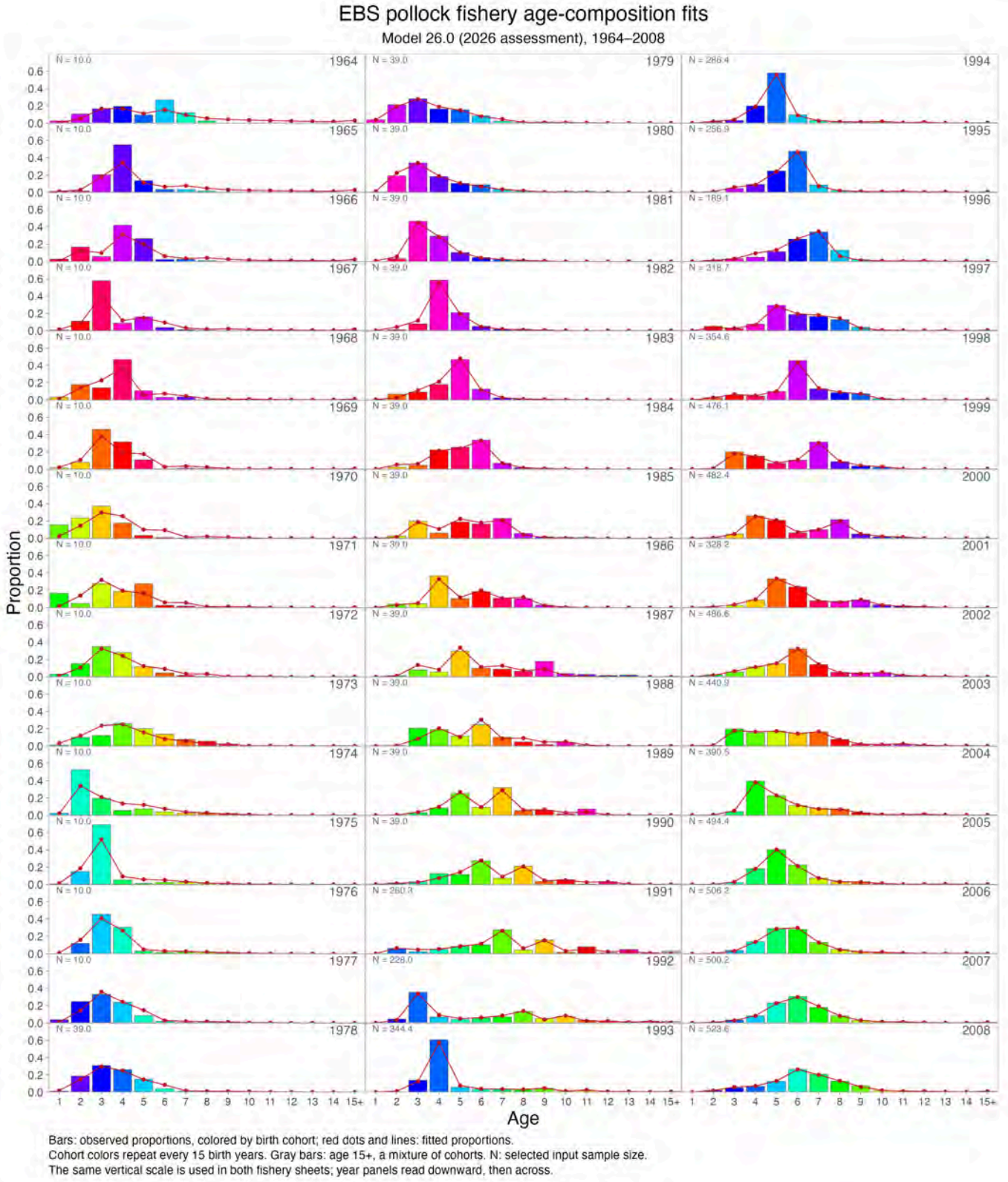


Figure 45: Fishery observed age proportions (cohort-colored bars) and Model 26.0 fitted proportions (points joined by lines), 1964–2008. Annual panels are arranged down columns and then across, with a common proportion scale. Each panel shows its year and likelihood sample size N. Age 15+ combines older cohorts.

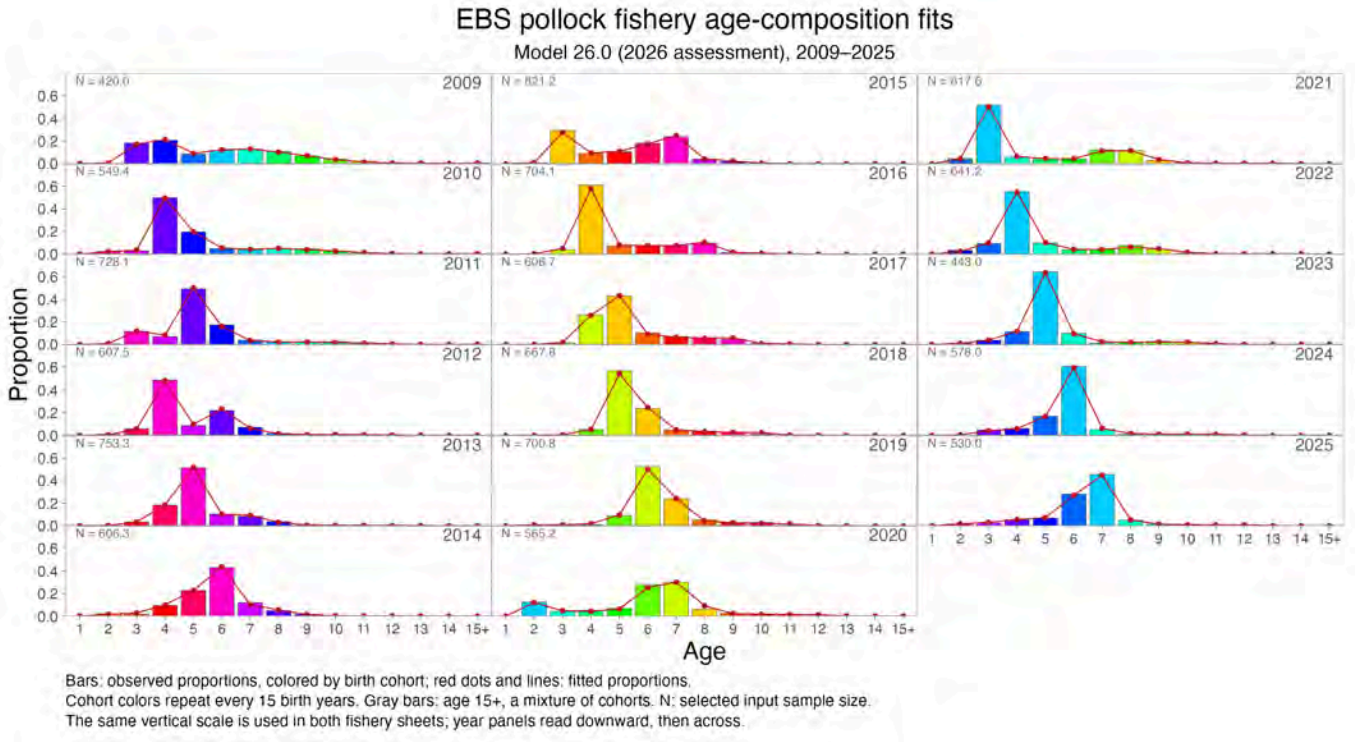


Figure 46: Fishery observed age proportions (cohort-colored bars) and Model 26.0 fitted proportions (points joined by lines), 2009–2025. The proportion scale and cohort colors match the earlier-year figure. Each panel shows its year and likelihood sample size N; age 15+ combines older cohorts.

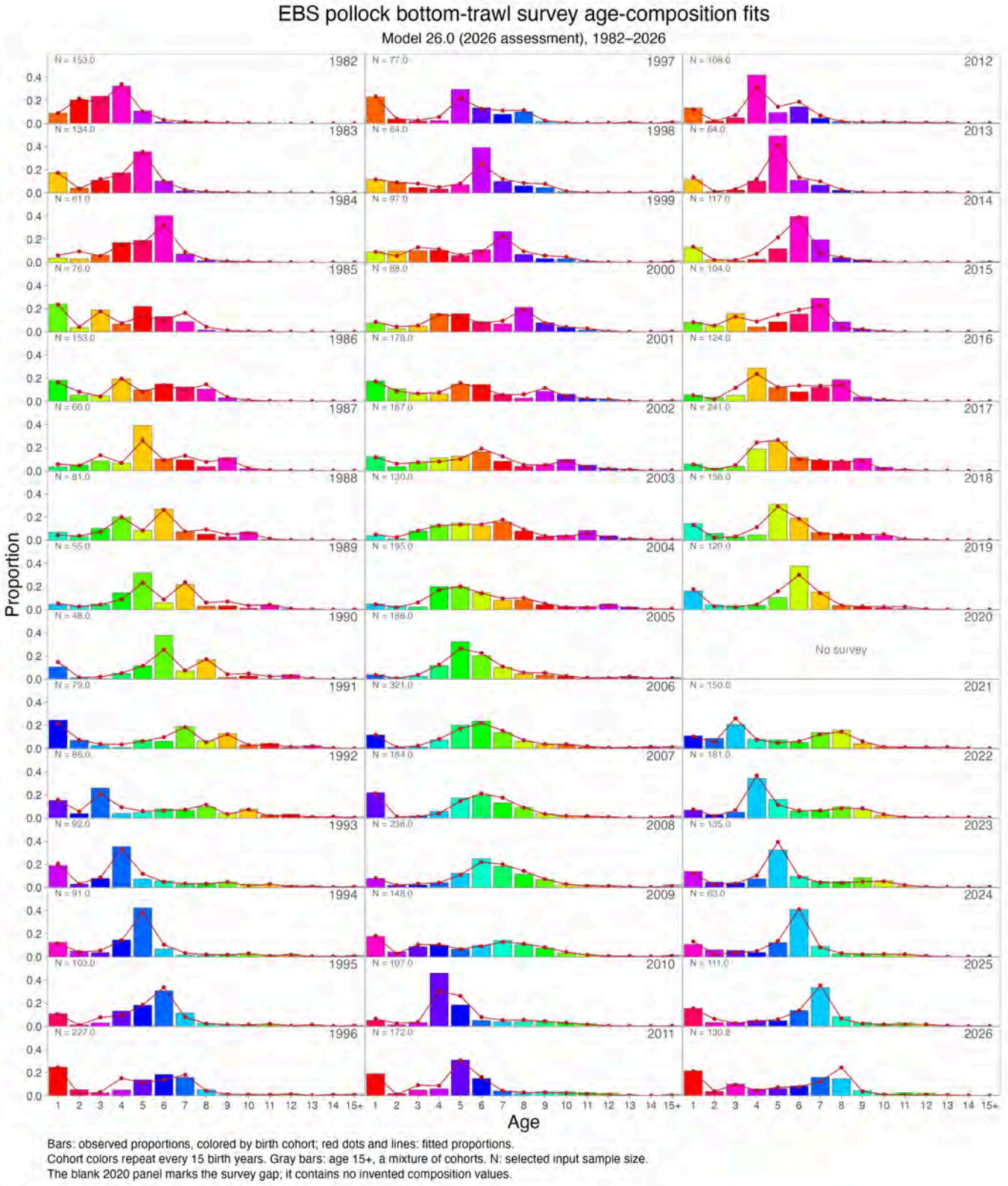


Figure 47: Bottom-trawl survey observed age proportions and Model 26.0 fitted proportions, 1982–2026. Annual panels share a proportion scale; the 2020 panel marks the absence of a survey. Labels give likelihood sample sizes. Age 15+ combines older cohorts.

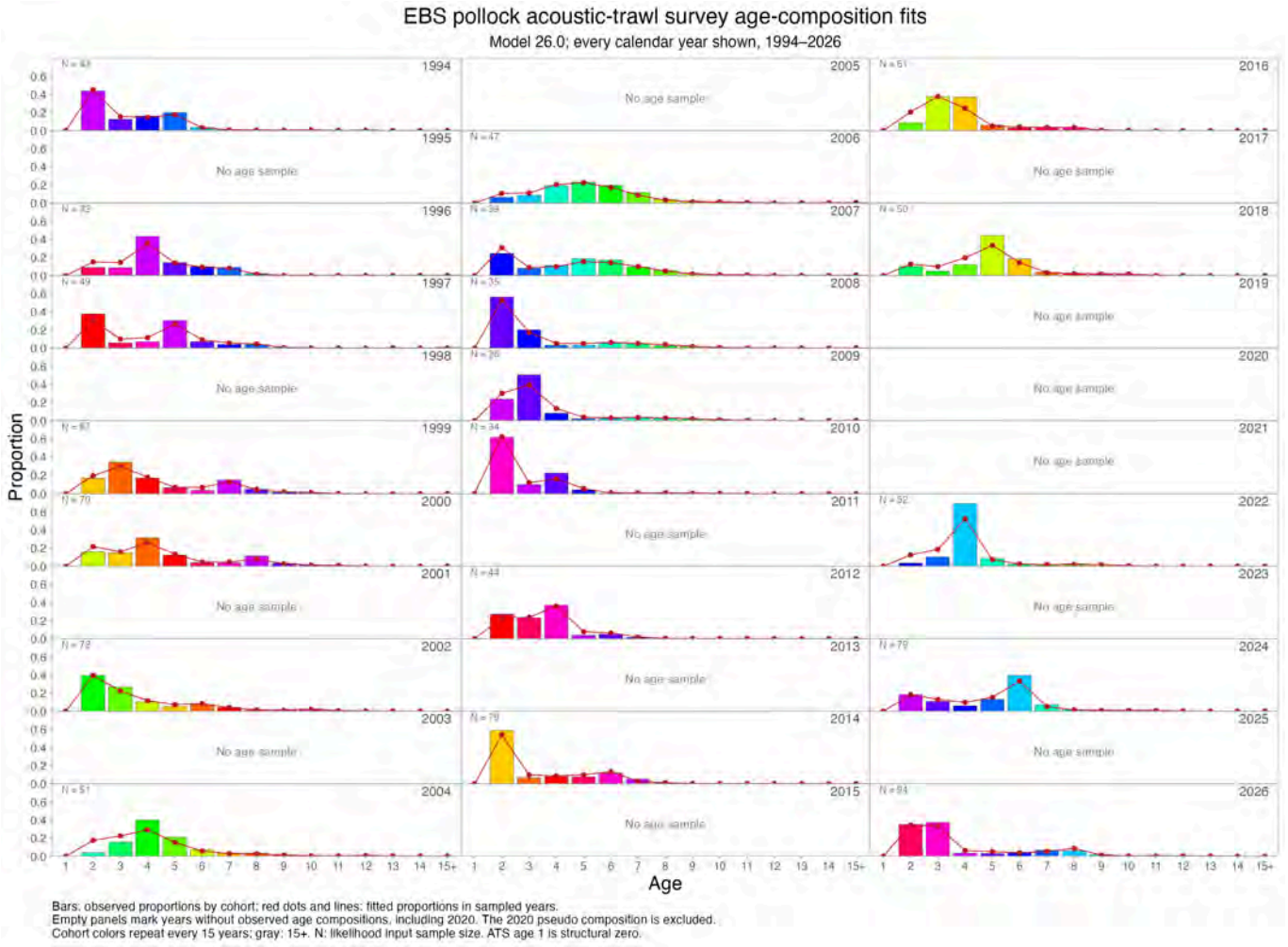


Figure 48: Acoustic-trawl survey observed and Model 26.0 fitted age proportions, 1994–2026. Empty panels mark years without age-composition observations. The 2020 placeholder composition is excluded. Panels show observed proportions, fitted proportions and likelihood sample sizes on a common scale.

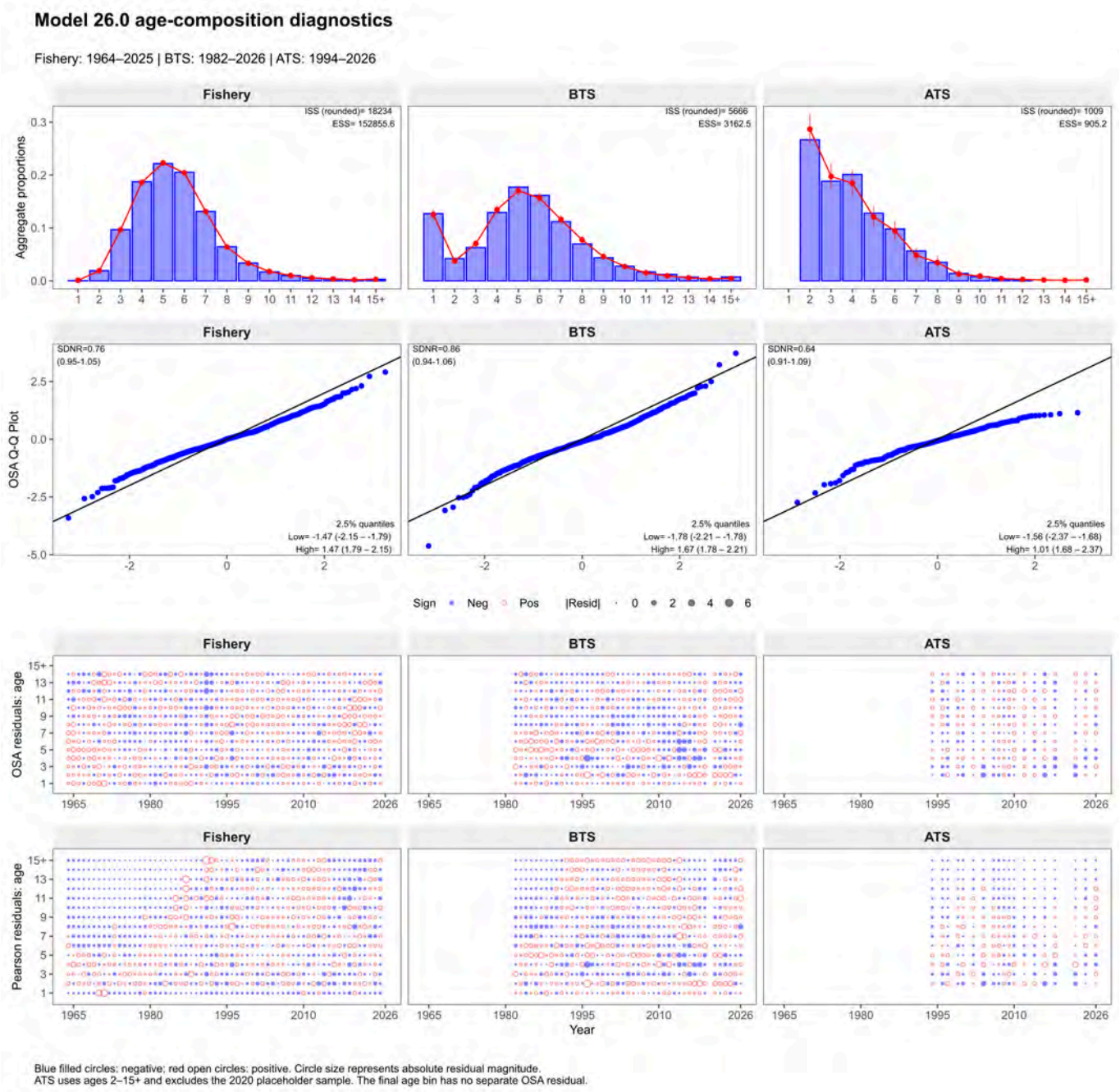


Figure 49: Standard afscOSA v0.0.1 diagnostics for Model 26.0, with fishery, BTS and ATS columns. Rows show aggregate observed and fitted compositions with 95% conditional observation ranges, normal-reference QQ plots with SDNR and tail summaries, OSA residual bubbles, and Pearson residual bubbles. ATS age 1 and the 2020 placeholder composition are excluded. Aggregate ranges condition on the fit; parameter and posterior predictive uncertainty are outside their scope.

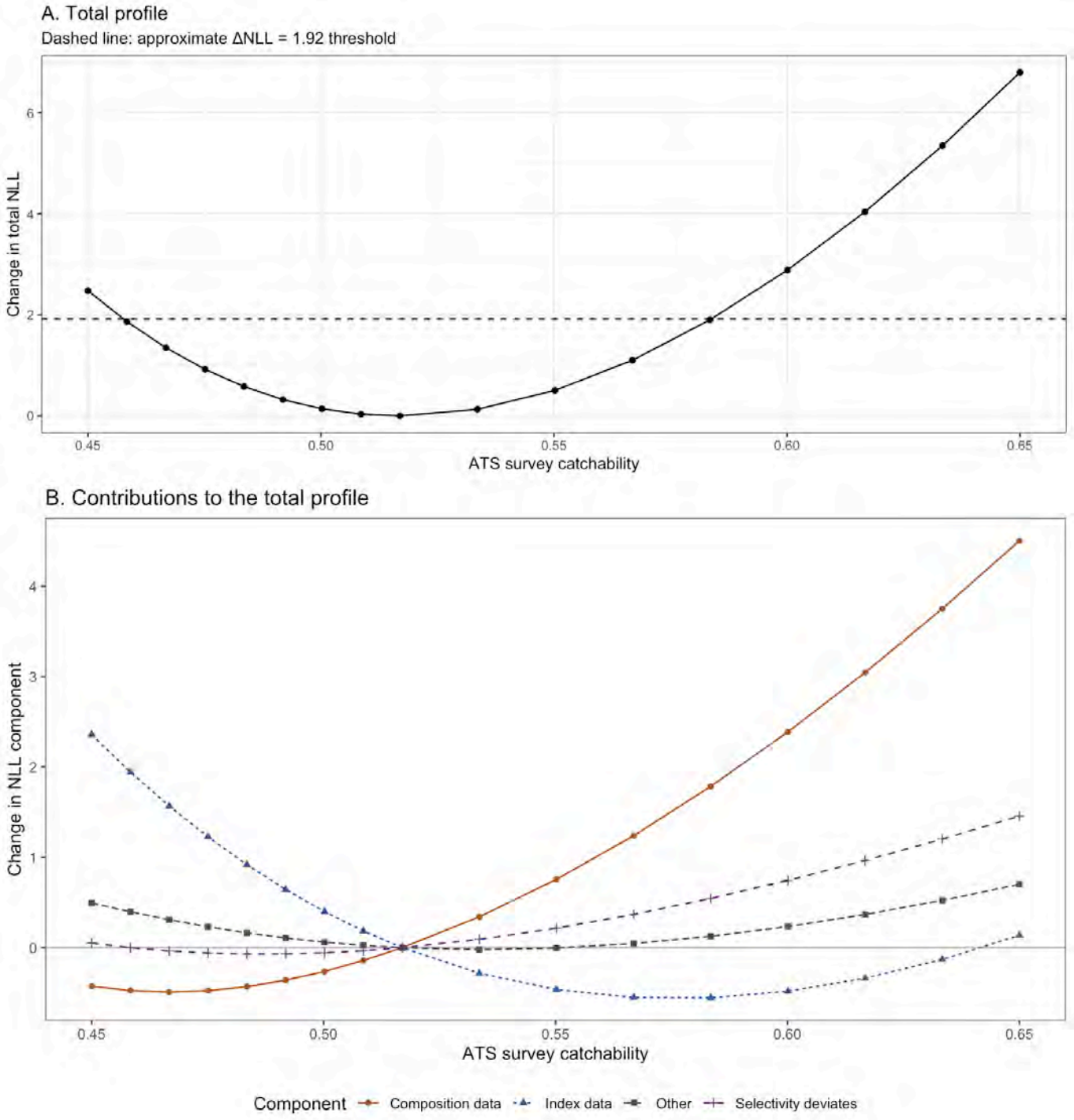


Figure 50: ATS catchability likelihood profile for Model 26.0. Seventeen fixed catchability values span 0.45–0.65, including the fitted value 0.51694. Panel A shows the change in total negative log likelihood; the dashed line marks 1.92. Panel B shows composition data, index data and selectivity-deviate contributions; Other pools the remaining components. All other active parameters were re-estimated at each fixed q.

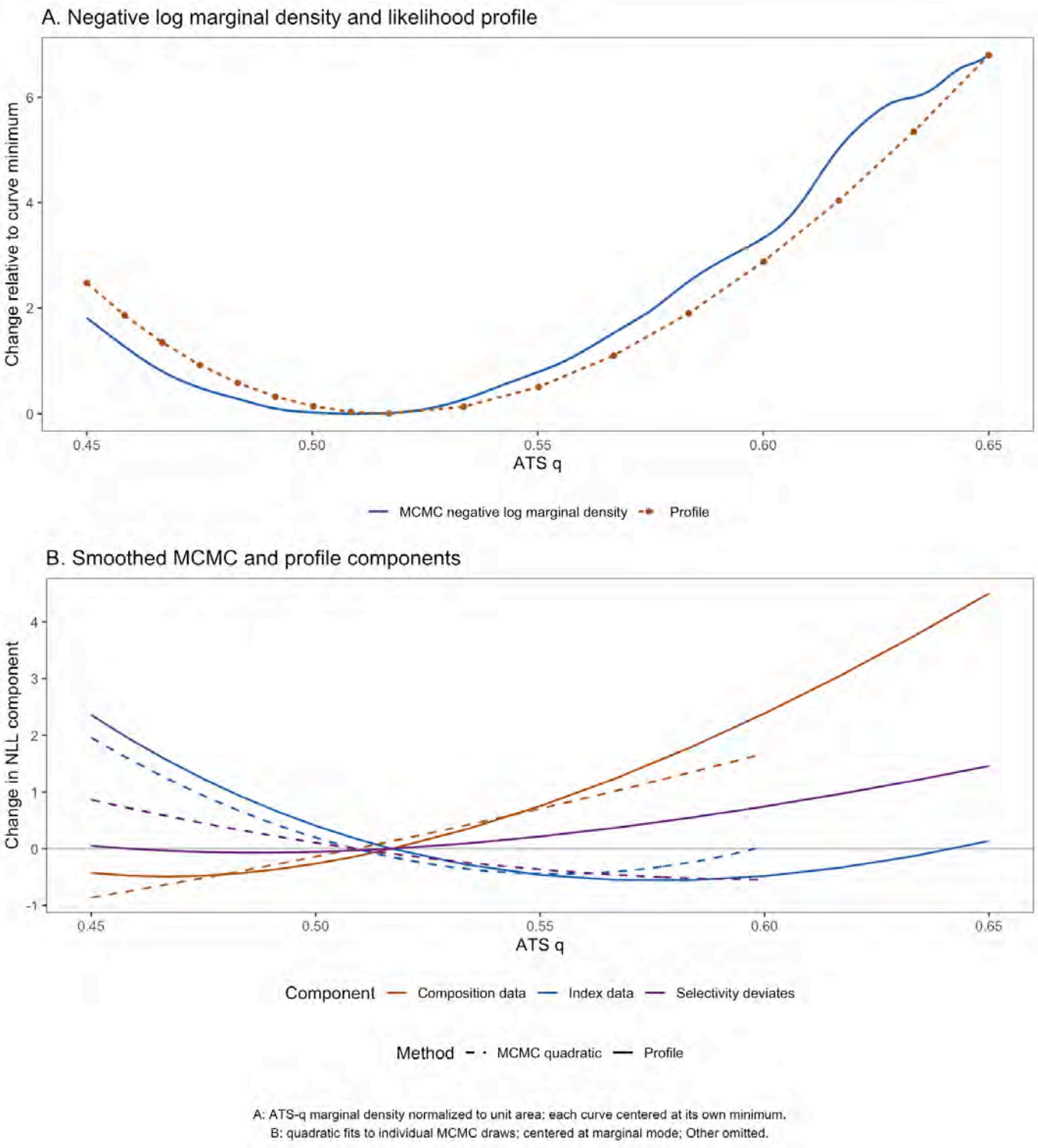


Figure 51: ATS-q negative log marginal density and likelihood profile for Model 26.0. Panel A compares the negative log of the MCMC marginal density, normalized to integrate to one, with the optimized profile NLL. Each curve is measured relative to its own minimum over ATS q. The marginal density uses a kernel estimate from all 5,000 saved draws. Panel B pairs weighted quadratic regressions fitted directly to all 5,000 MCMC component values with profile NLL contributions for composition data, index data and selectivity deviates. The smoothers use individual draws and are displayed over the central 99% of sampled ATS q. MCMC curves are centered at the ATS-q marginal mode; profile components retain the profile minimum as their reference. These smoothers describe conditional mean native objective components; the negative log marginal density has no unique additive decomposition into those components. Other is omitted.

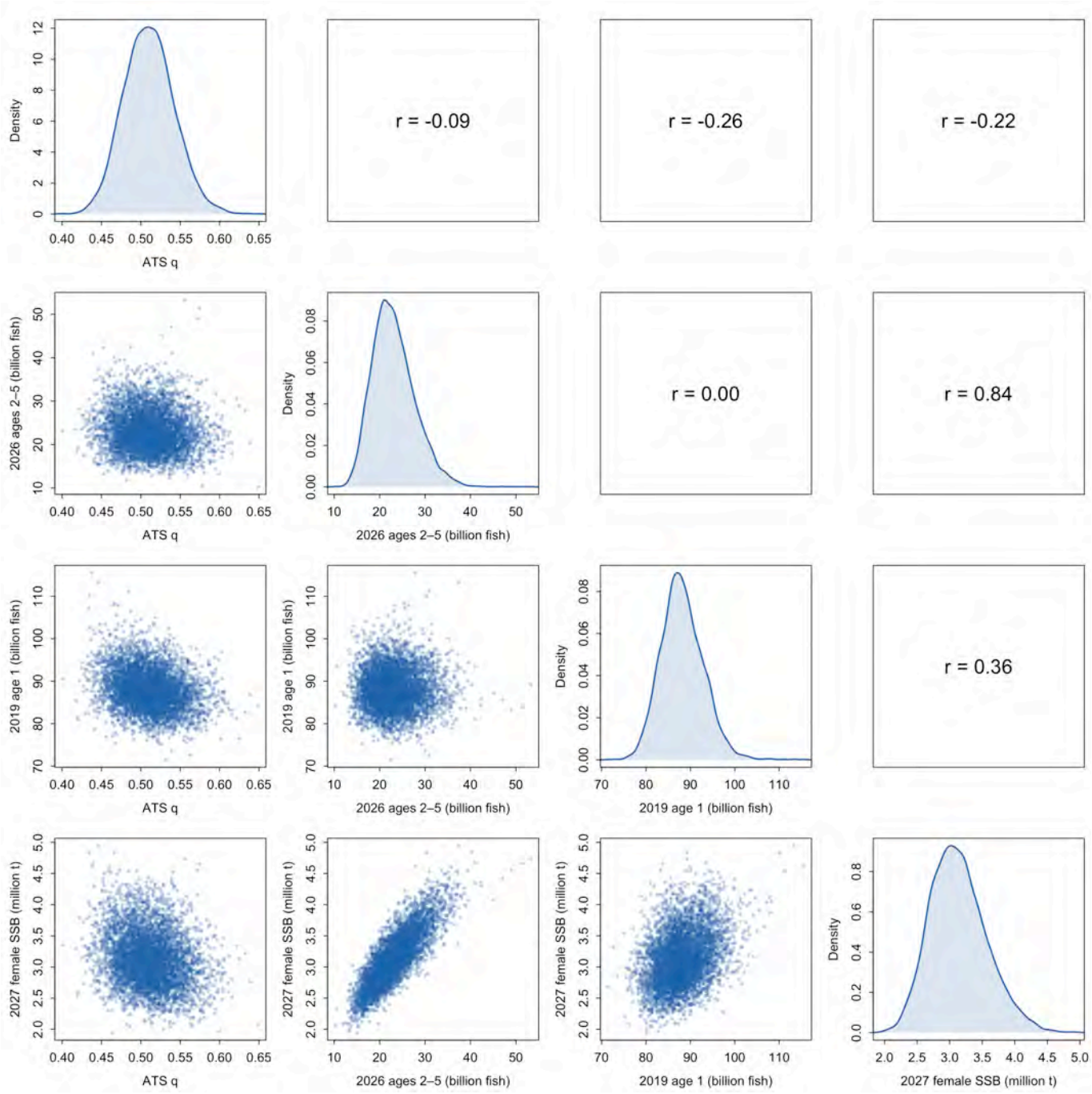


Figure 52: MCMC pairs plot of ATS catchability, 2026 abundance at ages 2–5, age-1 abundance in 2019 (the 2018 year class), and projected 2027 female spawning biomass for Model 26.0. Lower-triangle panels show paired values from 5,000 MCMC draws; upper-triangle panels give posterior Pearson correlations. Diagonal panels showed marginal densities. Abundances are in billion fish and female SSB in million tons. The 2027 projection uses 1,375 kt catch, mean 2023–2025 fishery selectivity and within-draw mean 1978–2023 recruitment, with biological schedules fixed.

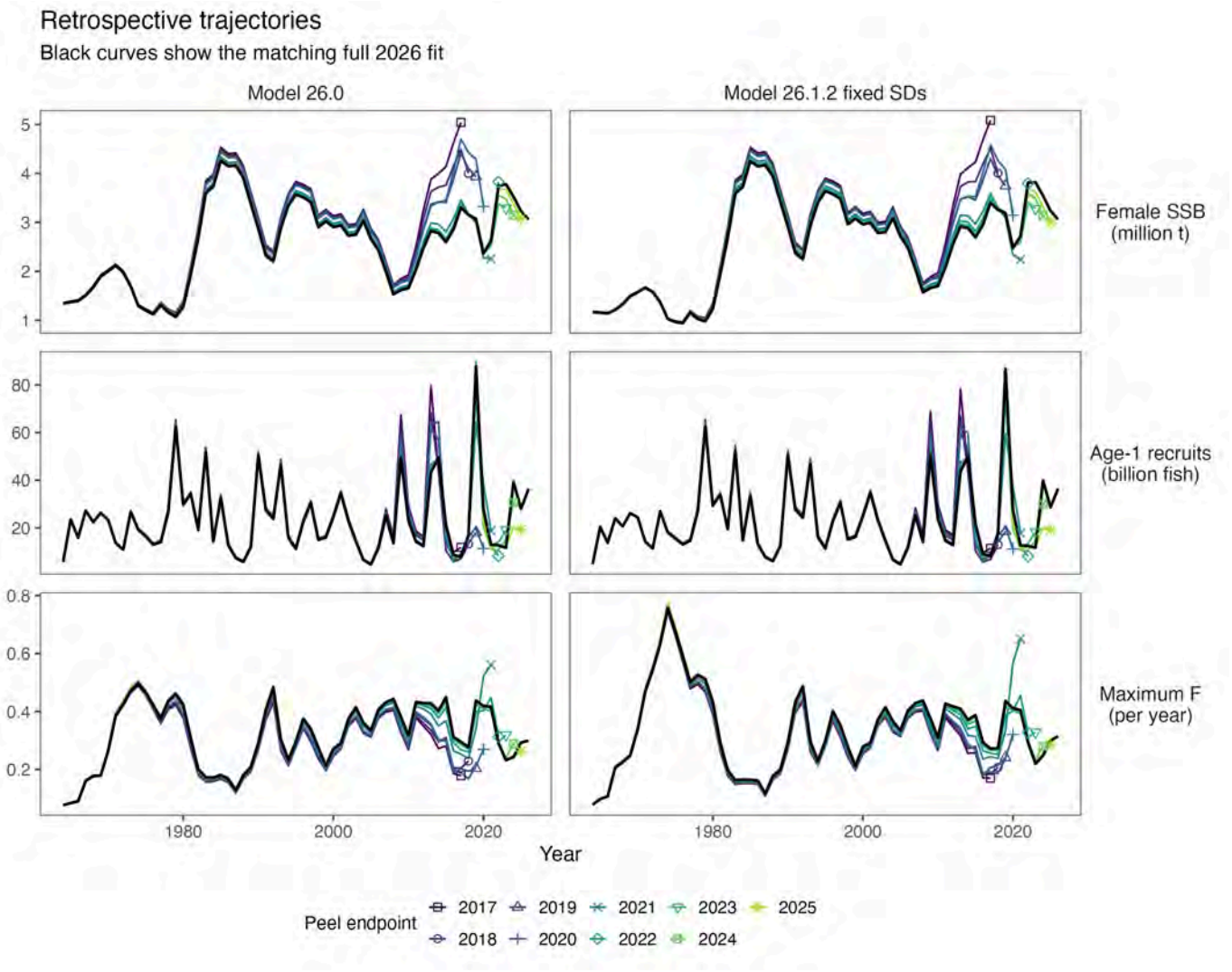


Figure 53: Retrospective trajectories for Model 26.0 (left) and Model 26.1.2 with fixed process SDs (right). Black lines showed each analysis's matched full 2026 reference; colors identify the nine peels ending in 2017–2025, and symbols mark their endpoints. Female spawning biomass is in million tons, age-1 recruitment is in billion fish, and maximum fishing mortality across ages is per year. Recruitment is indexed by the calendar year fish enter age 1. Panels show point estimates.

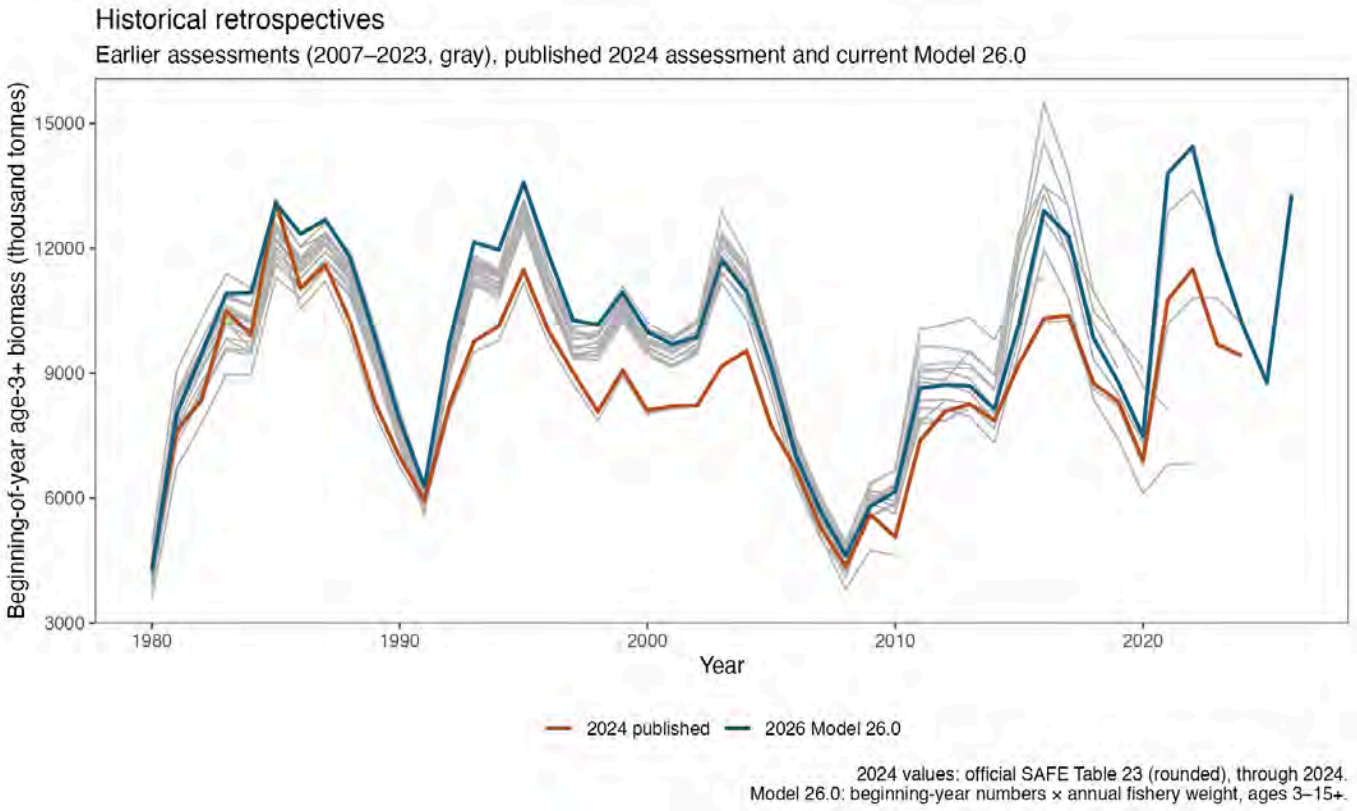


Figure 54: Historical retrospectives of beginning-of-year age-3+ EBS pollock biomass. Gray lines show archived 2007–2023 assessments; orange shows the official 2024 SAFE Table 23 estimates through 2024; blue shows Model 26.0 estimated through 2026. Biomass sums beginning-of-year numbers at ages 3–15+ multiplied by the corresponding annual fishery weights at age, using the Model 26.0 fit. Historical series use assessment-specific biomass definitions and may include next-year estimates. The 2024 tabulated values are rounded. No new assessment fit was produced in 2025. These are point estimates from successive assessments, encompassing changes in data, methods and biological inputs.

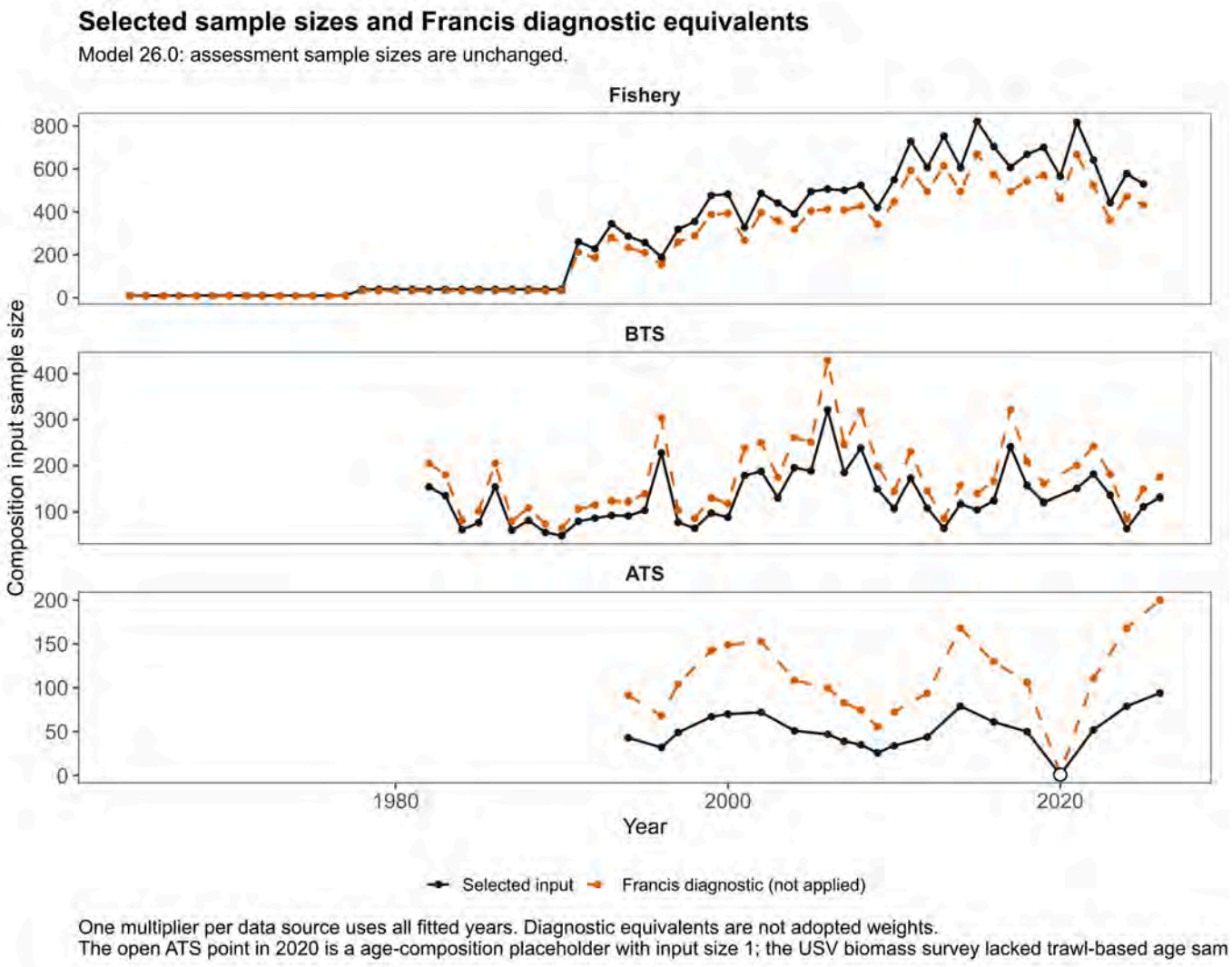


Figure 55: Annual age-composition sample sizes used in Model 26.0 and their Francis diagnostic equivalents for the fishery, BTS and ATS. The comparison evaluates weighting; the assessment input weights are unchanged.

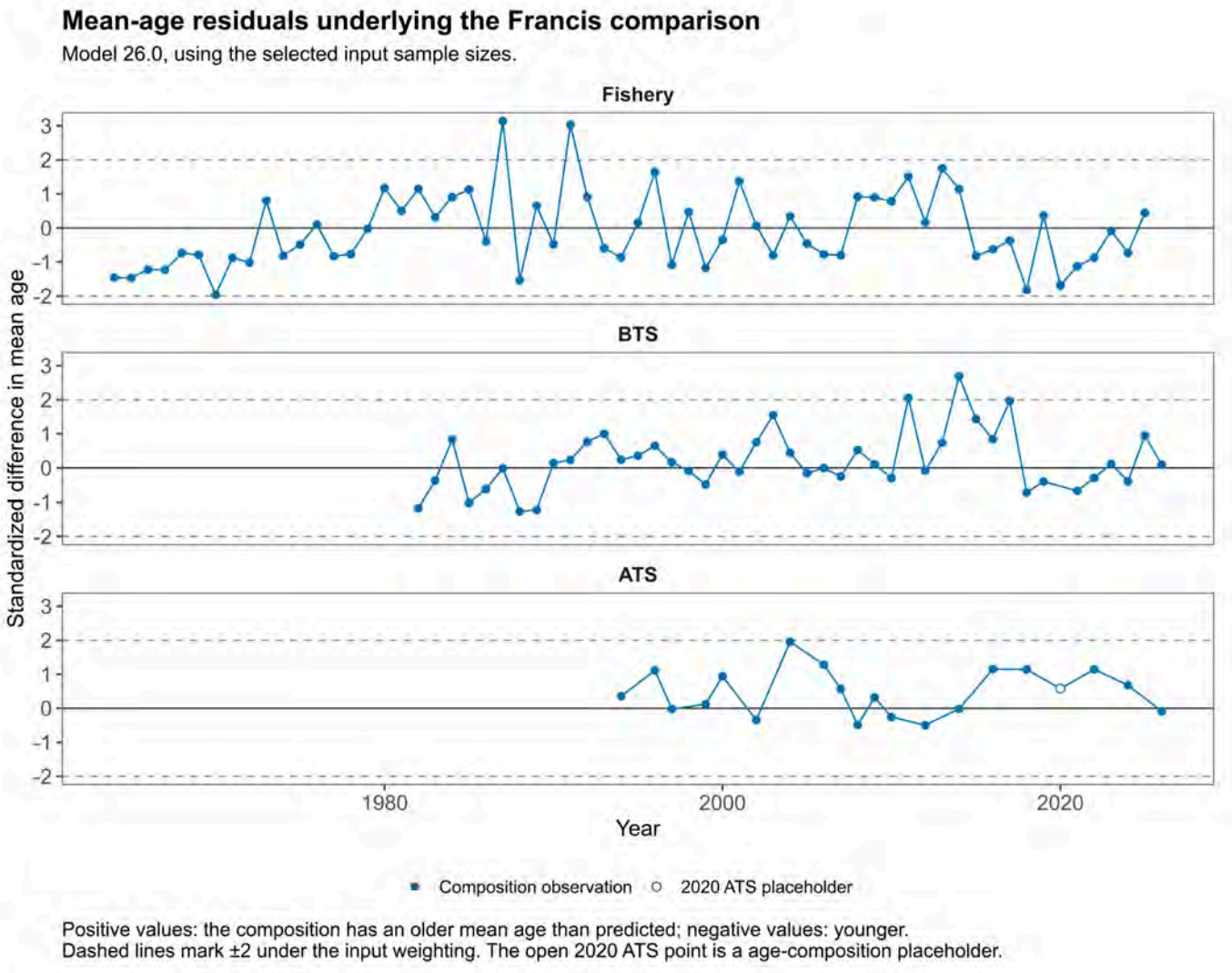


Figure 56: Standardized mean-age residuals used in the Francis diagnostic comparison for Model 26.0, with the selected input sample sizes. Positive values indicated older observed than predicted mean age.

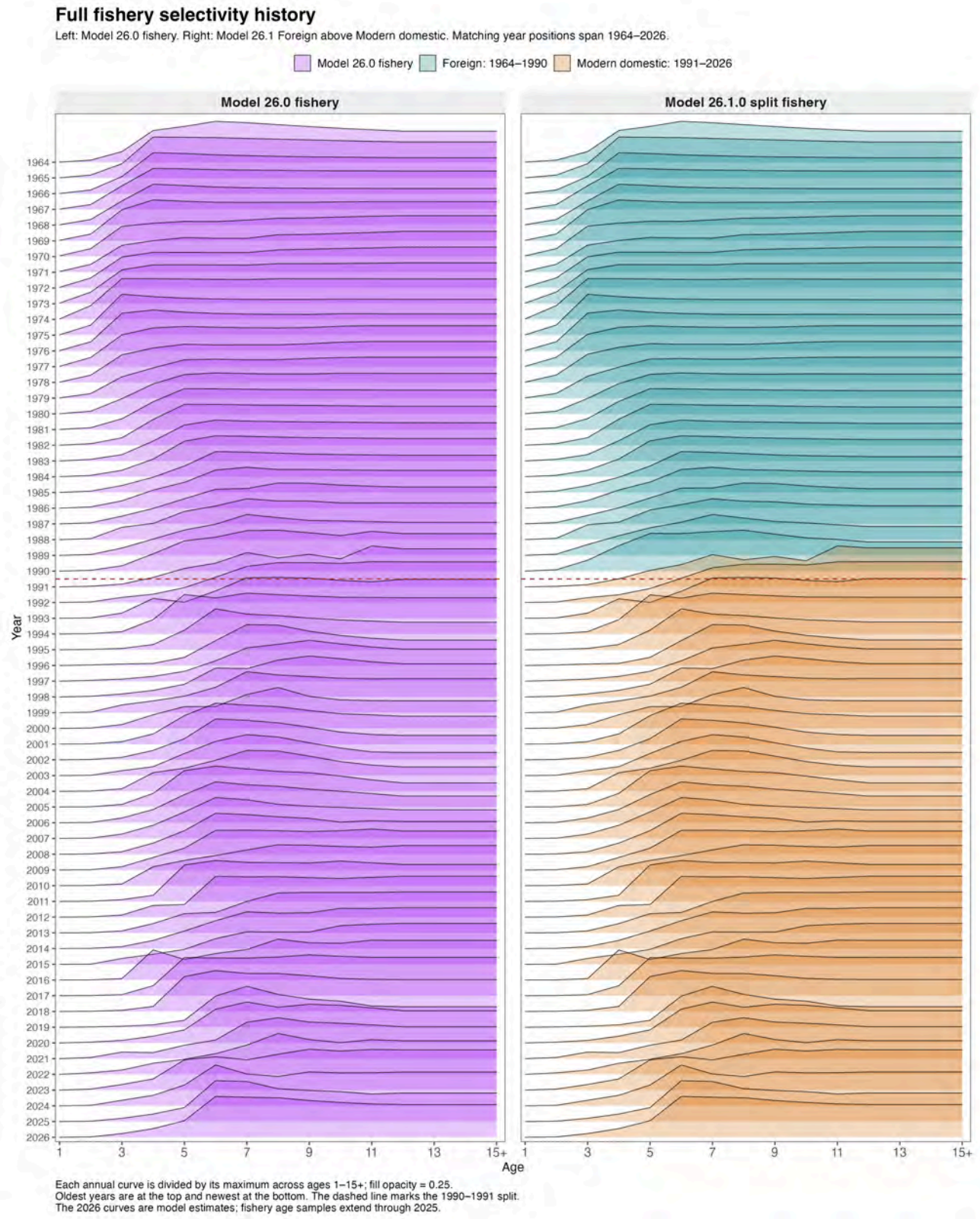


Figure 57: Annual fishery selectivity from Models 26.0 and 26.1.0. The split configuration separates Foreign and Modern domestic fisheries.

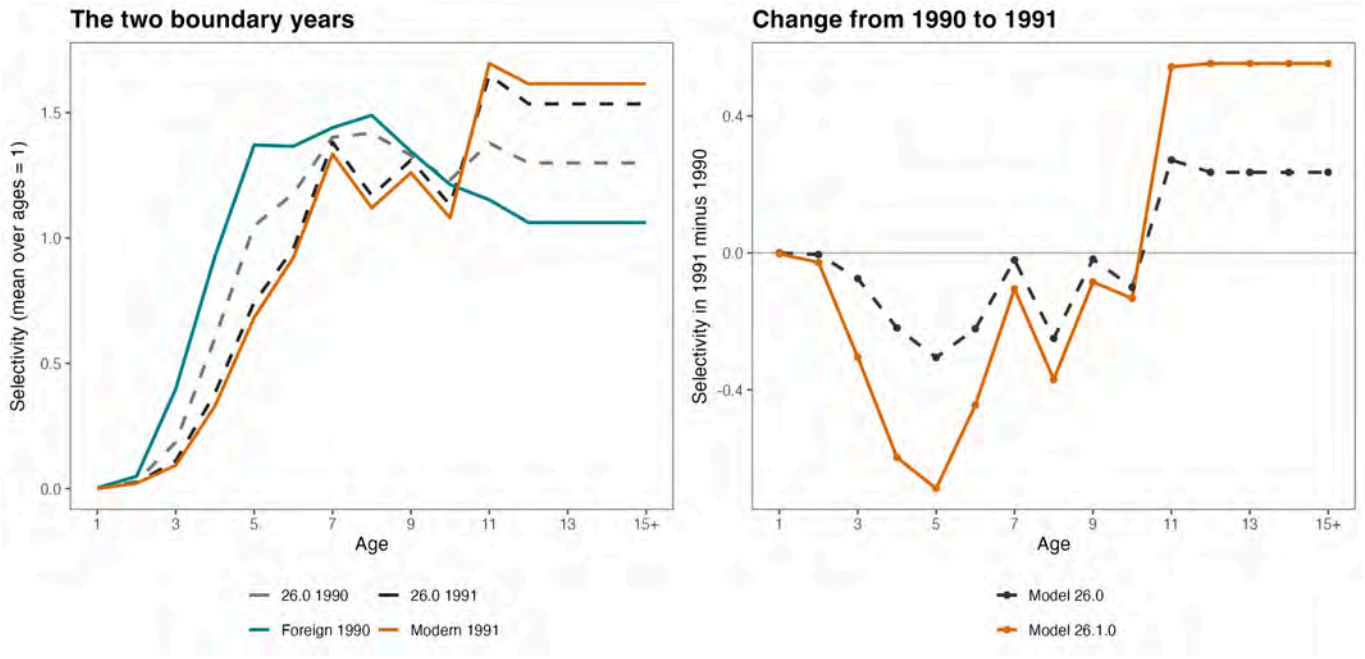


Figure 58: Fishery selectivity before and after the fleet split, with signed 1991-minus-1990 differences by age for Models 26.0 and 26.1.0.

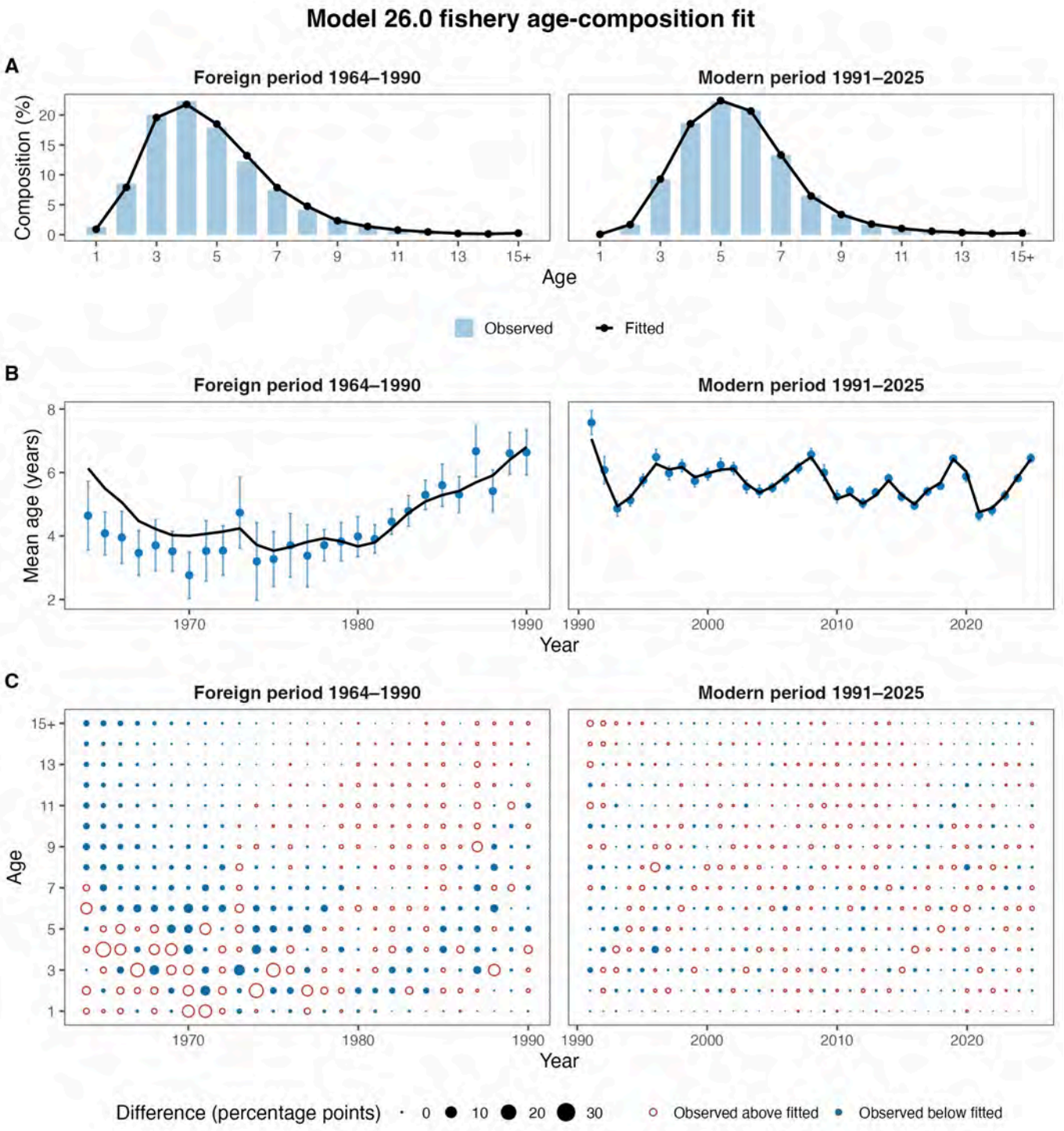


Figure 59: Model 26.0 fishery age-composition fits, displayed separately for the Foreign (1964–1990, left) and Modern domestic (1991–2025, right) periods for comparison with Model 26.1.2. Model 26.0 fitted one fishery. Row A compares sample-weighted observed age proportions (bars) with fitted proportions (black lines). Row B compares observed annual mean ages and approximate 95% sampling intervals with fitted mean ages. Row C shows observed minus fitted proportions in percentage points: open red circles indicate observations above the fit, and filled blue circles indicate observations below it. Bubble area shows the difference magnitude on the same scale as the Model 26.1.2 figure. Mean ages treat 15+ as age 15.

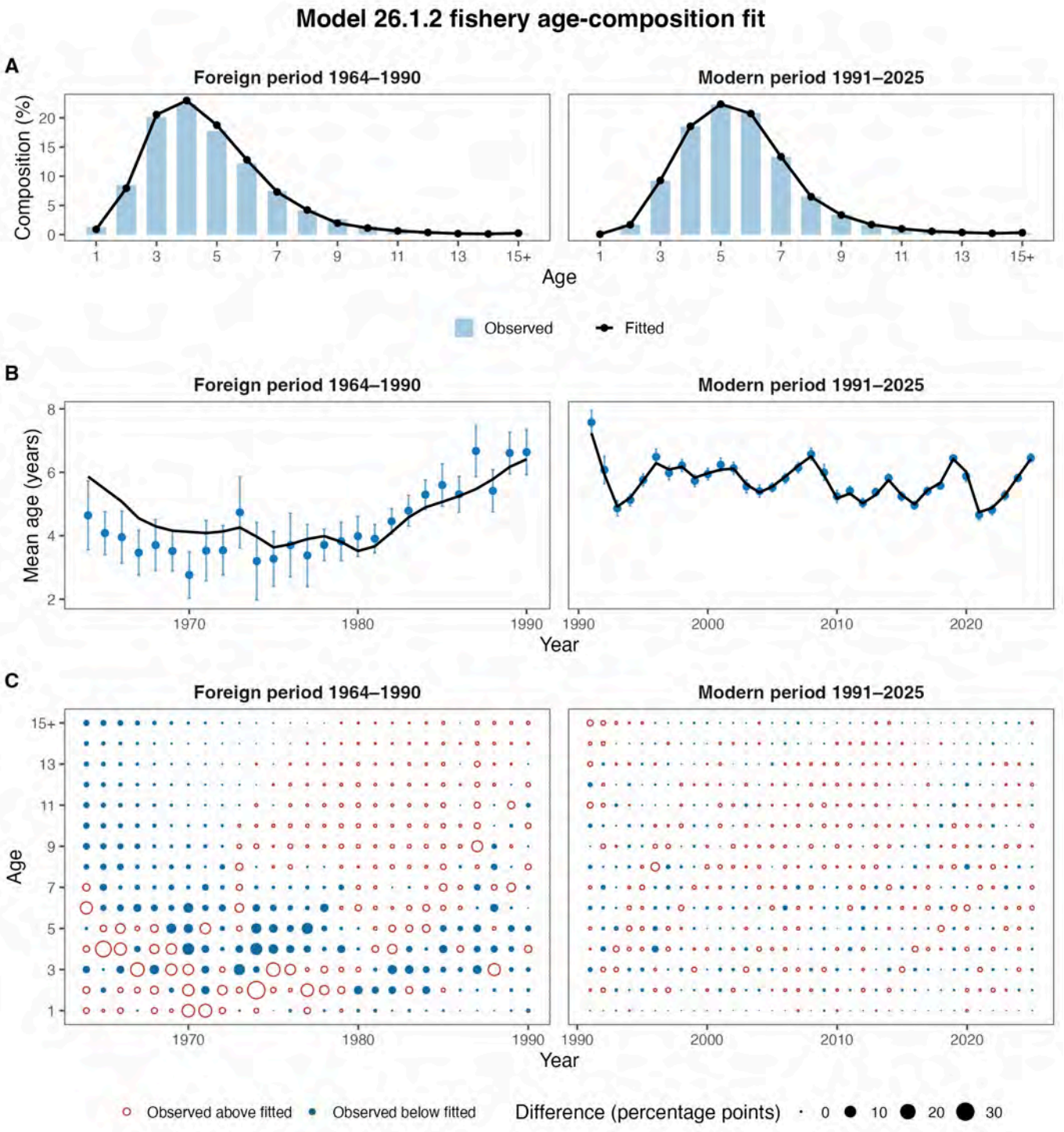


Figure 60: Model 26.1.2 fishery age-composition fits from the conditional fit with fixed process SDs. Columns show the Foreign and Modern domestic fisheries. Row A compares sample-weighted observed and fitted age proportions; row B compares observed annual mean ages and approximate 95% sampling intervals with fitted mean ages; row C shows observed minus fitted proportions in percentage points. Observations, likelihood weights, age ranges and bubble scale match the Model 26.0 figure. Mean-age intervals describe observation sampling uncertainty; fitted curves are point estimates. Mean ages treat 15+ as age 15.

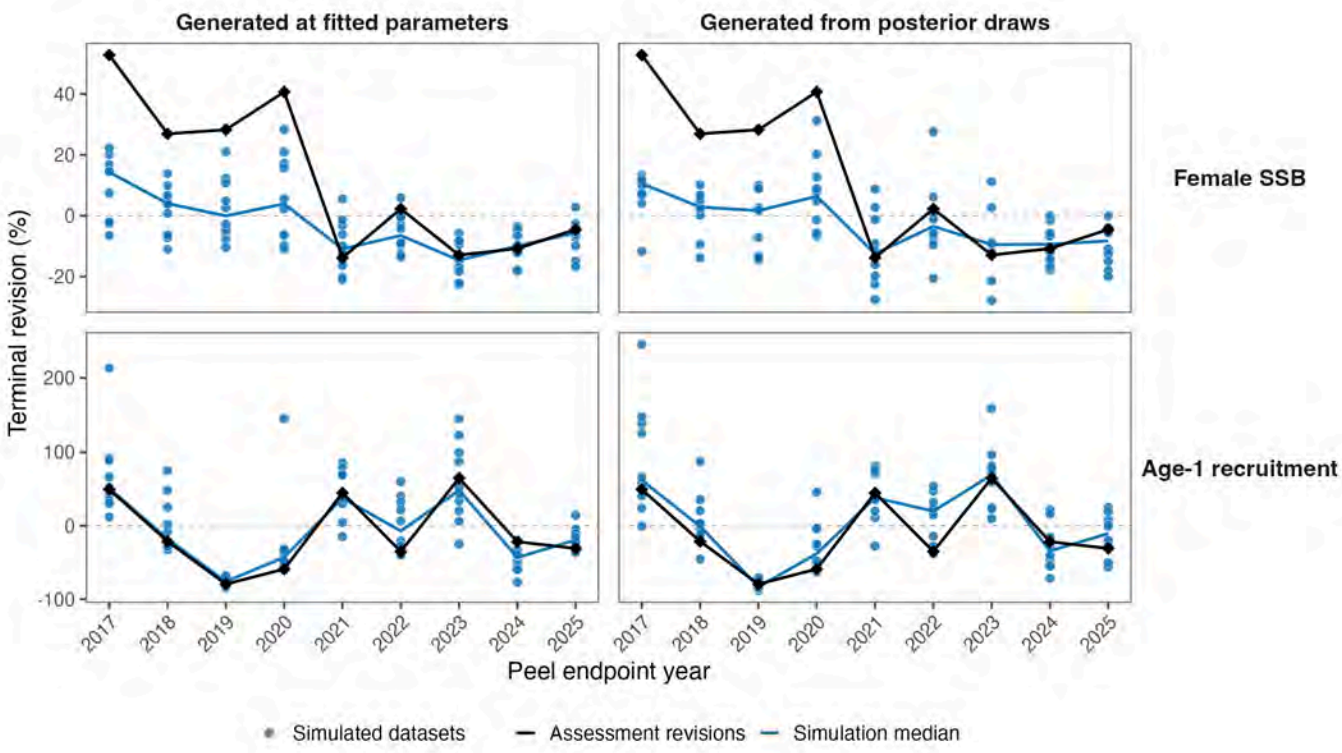


Figure 61: Conditional simulation-retrospective revisions for Model 26.0. Columns show ten datasets generated at the fitted parameters (left) and ten generated from regularized posterior parameter draws (right). Rows show female spawning biomass and age-1 recruitment. Blue points identify individual simulated datasets, blue lines join their medians, and black diamonds and lines show observed-data revisions. For a peel ending in year y, revision is $100 \times$ [peel estimate in year y / its own full 2026 fit estimate for year y $-$ 1]. Both columns use the same vertical scale within a quantity.

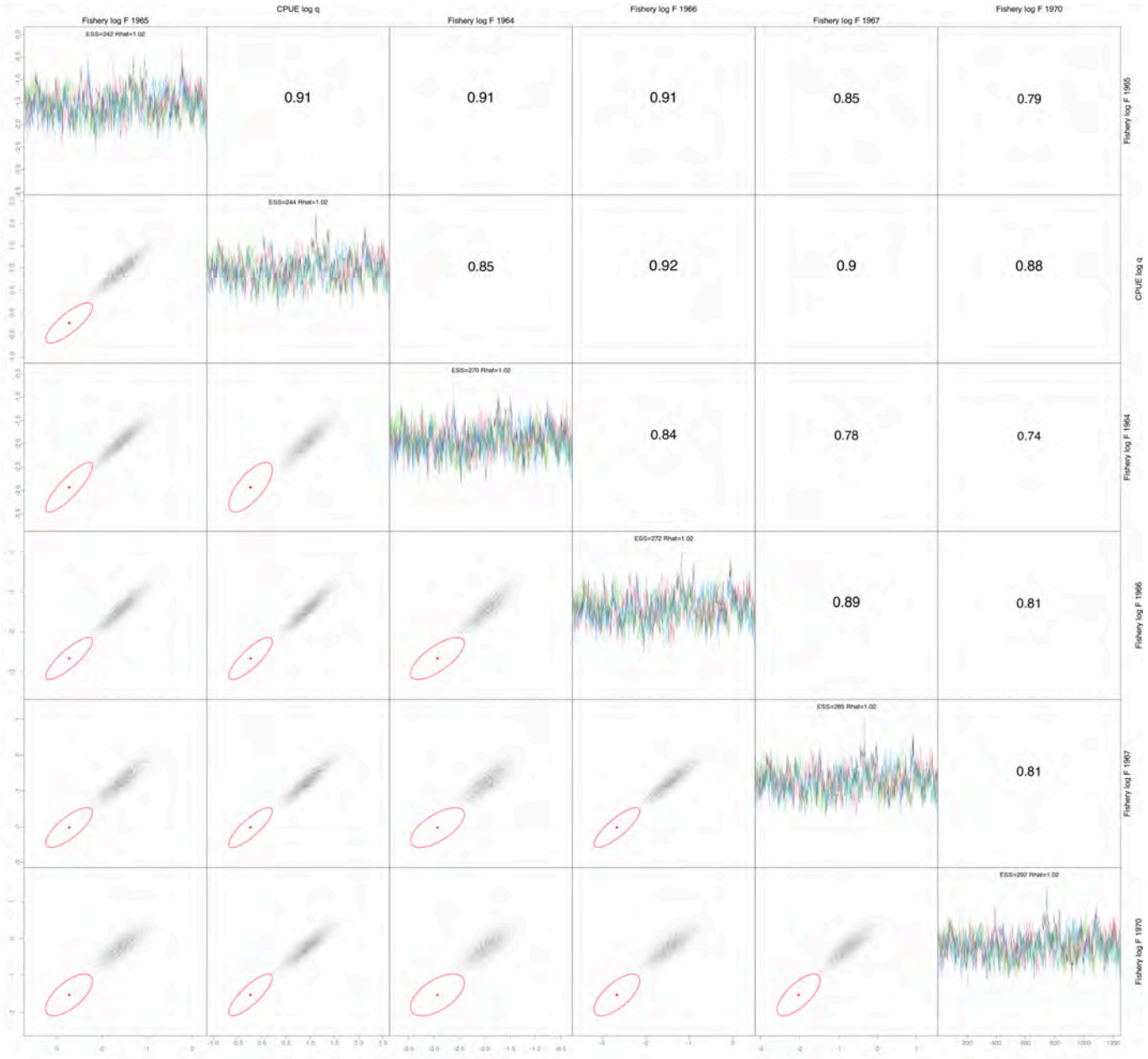


Figure 62: Native SparseNUTS pairs diagnostic for the six parameters with the lowest bulk effective sample size in the newly fitted regularized Model 26.0 posterior. Lower panels show all 5,000 retained draws in black, the saved regularized native MAP as a red dot, and the 95% bivariate Normal approximation from the matching full inverse augmented Hessian as a red ellipse. Upper panels report pooled posterior Pearson correlations. Diagonal panels showed four retained chain traces, bulk ESS and R-hat. Parameters retain their native coordinate scales. Local ranges are calculated at the regularized MAP, distinct from the production penalized-ML fit.

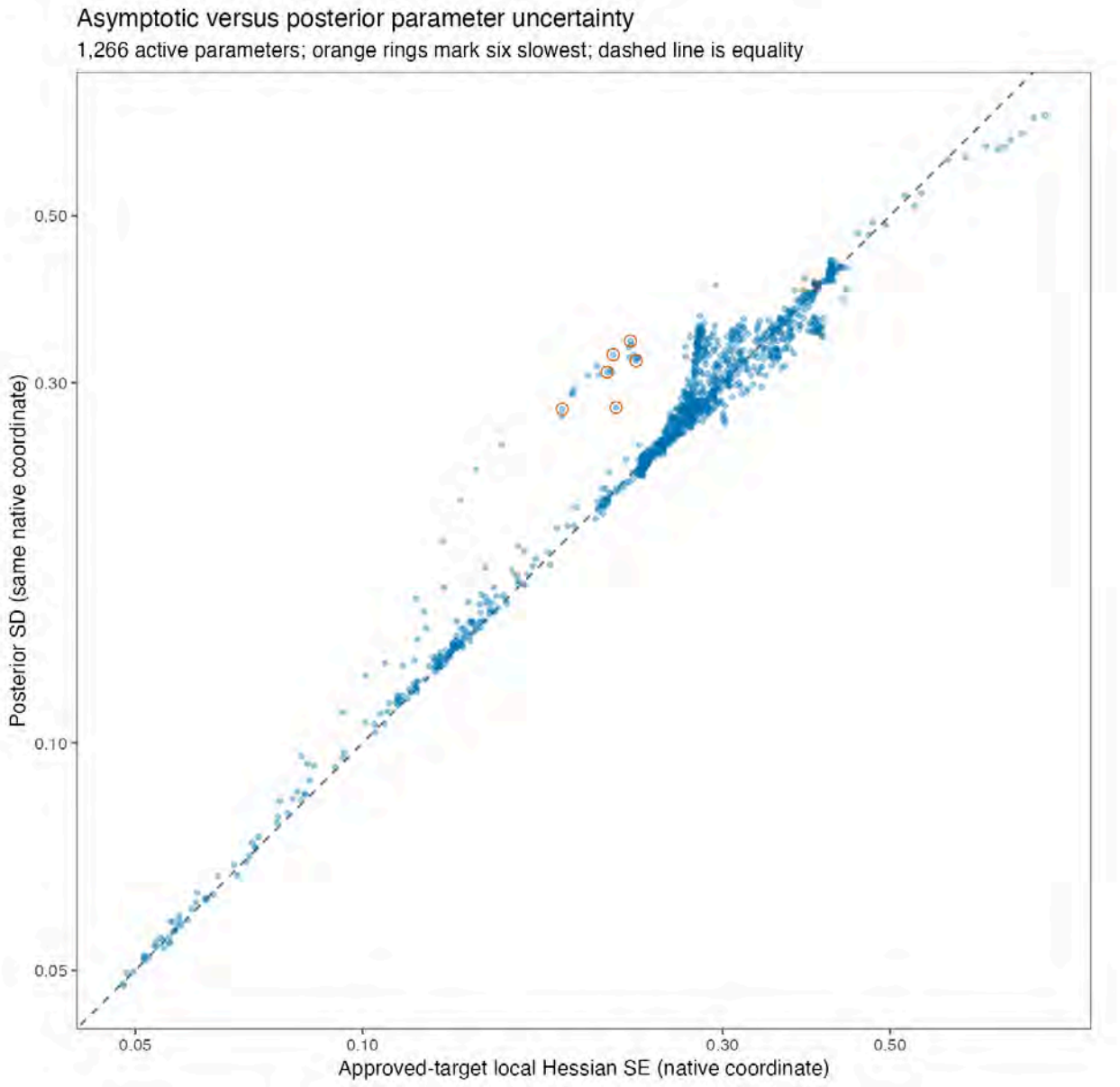


Figure 63: Local Hessian SE and posterior SD on the same parameter scale for all 1,266 active parameters under the same regularized target. Both axes use logarithmic scales; the dashed line denotes equality. Rings identify the six slowest parameters, with posterior-SD/local-SE ratios 1.28–1.52. Coordinate units differ among parameters. MCMC standard errors quantify simulation precision and are separate from the parameter uncertainties shown here.

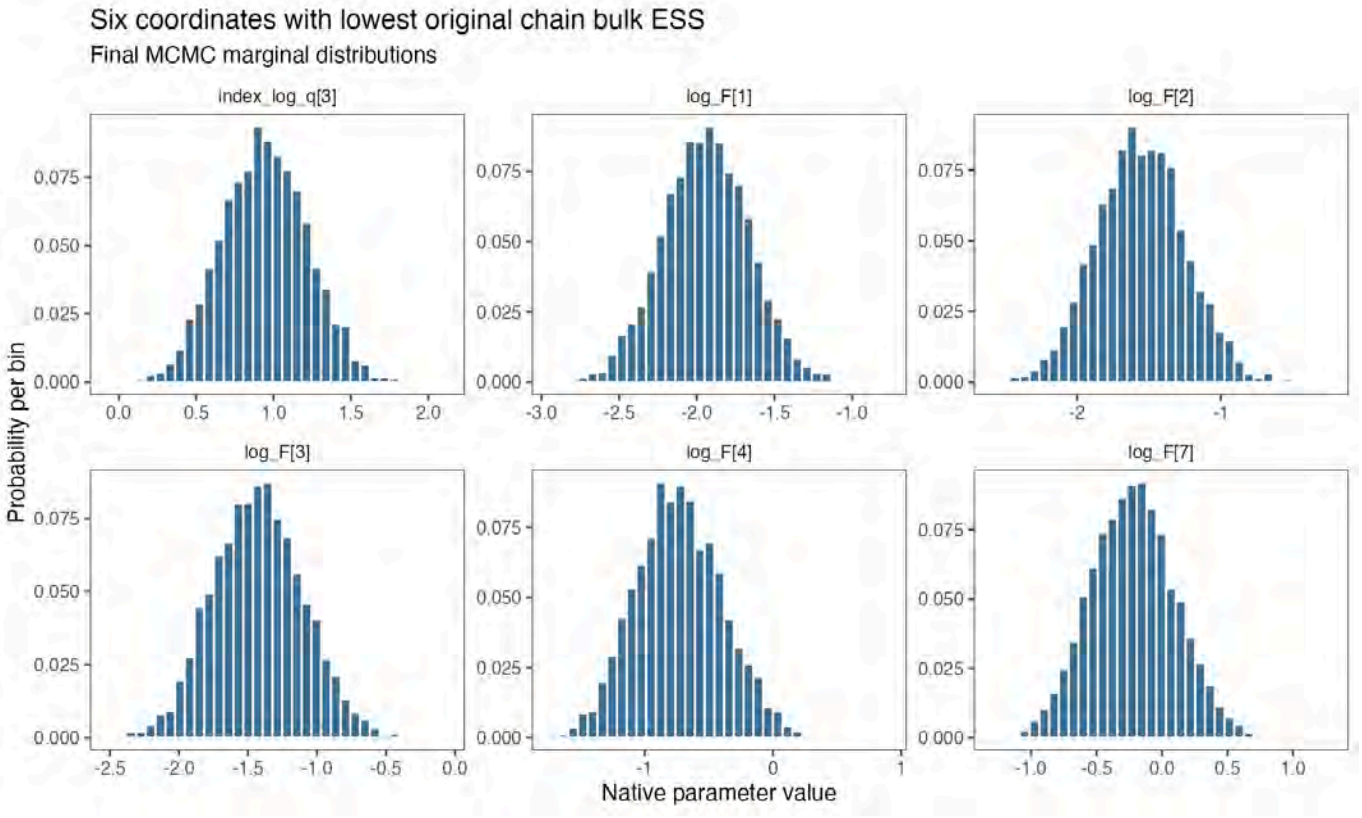


Figure 64: MCMC posterior histograms for the six parameters with the lowest bulk ESS in the original chains. All 5,000 parameter vectors contribute. Bar heights show probability per bin; the panels retain parameter units.

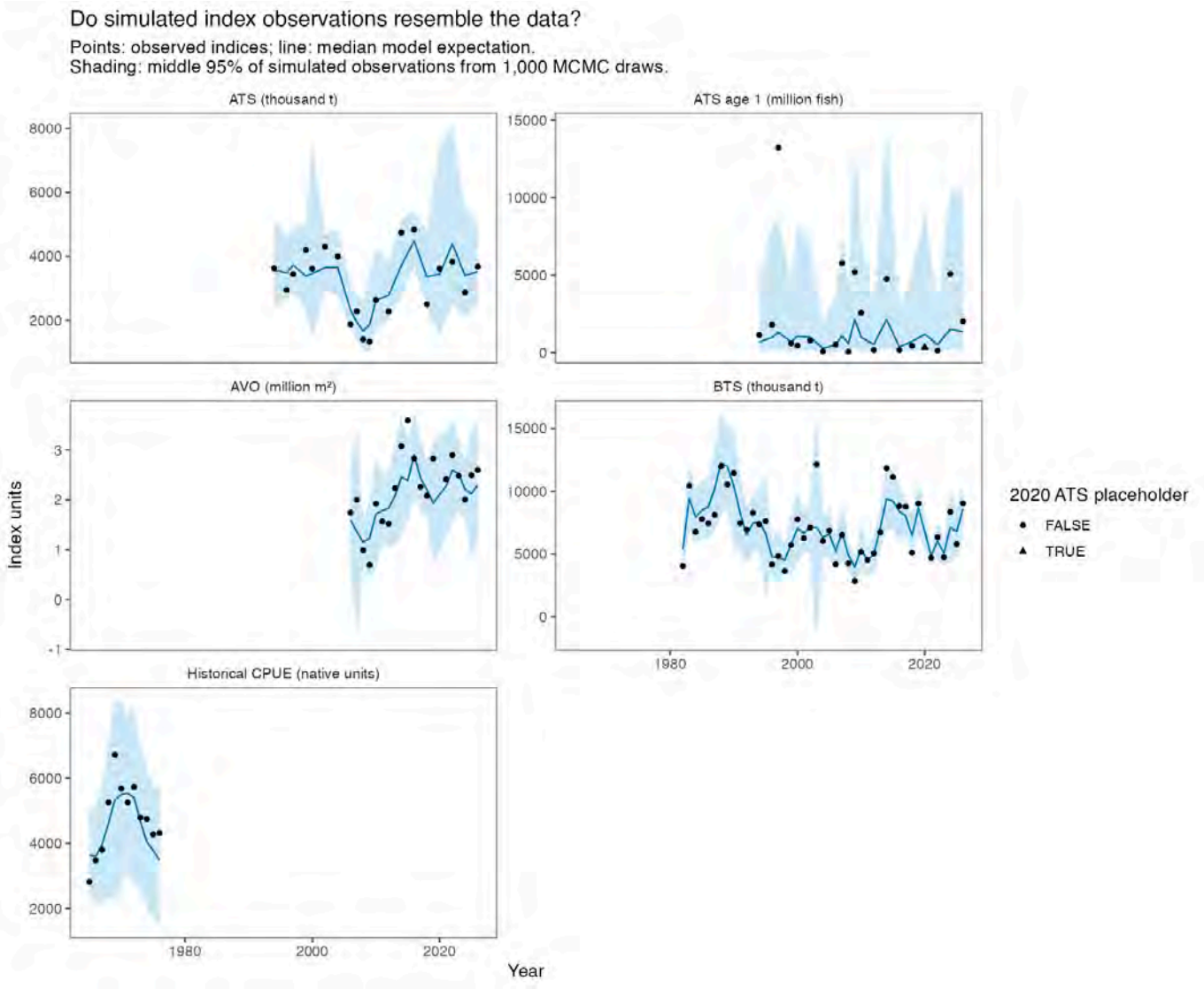


Figure 65: Index checks compare observed survey and historical catch-rate indices with simulated observations generated from 1,000 MCMC draws. Each draw supplied a model expectation; random observation errors are then added using the same error assumptions used to fit each index, including the relationships among BTS errors. Lines show median expectations and shading covers the middle 95% of simulated observations at each year. Circles are observed indices and triangles identify existing substitutes. Some simulated values are negative because the fitted Normal error distributions allow them. The BTS overall mismatch measure exceeds its observed value in 0.2% of simulations, indicating that the model rarely reproduces this feature of the BTS data. Biological inputs remain fixed.

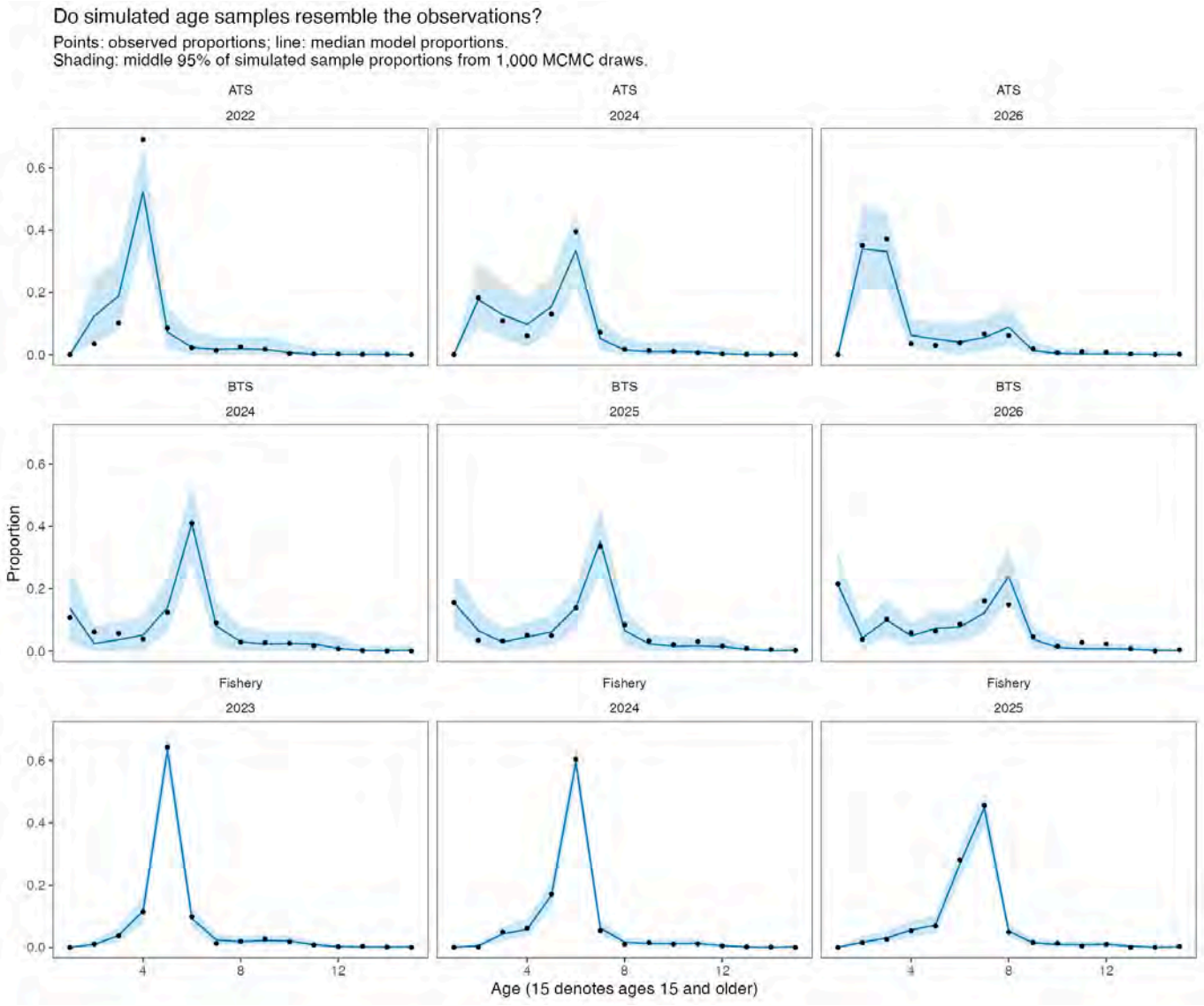


Figure 66: Age-composition checks compare the latest three observed samples from each data source with simulated samples generated from 1,000 MCMC draws. For each draw, fish are randomly assigned to age groups using the model-predicted age proportions and the sample size used in fitting, rounded to a whole number. Lines show median model proportions, shading covers the middle 95% of simulated sample proportions at each age, and points show observed proportions. The shading includes parameter uncertainty and the assumed sampling variation. This simulation approximates the age-composition fitting formula, which adds a small constant to age proportions when calculating fit. The 2020 ATS substitute is excluded. Age 15 includes all older fish. Age conversions, weights and other biology remain fixed.

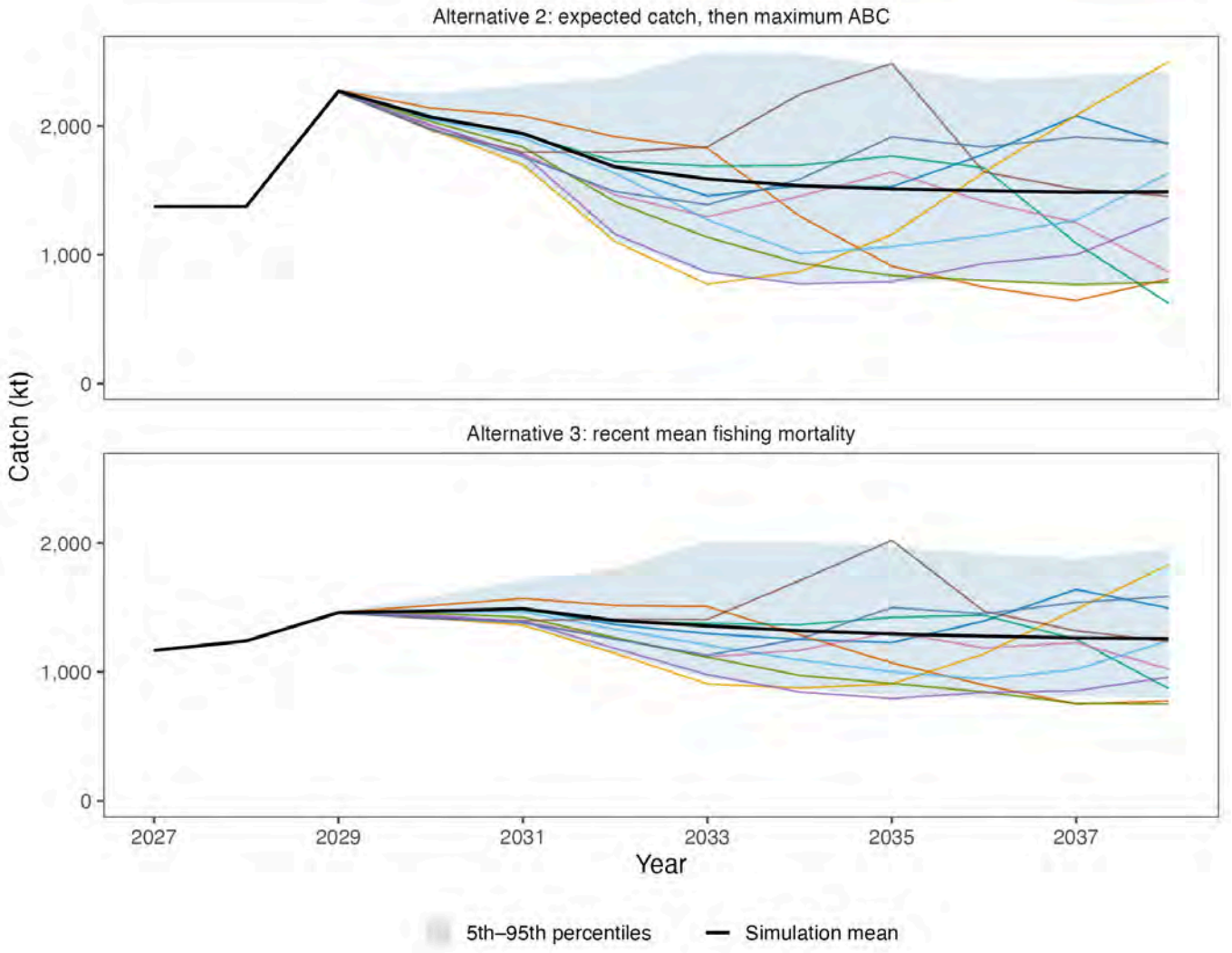


Figure 67: Catch projections for Model 26.0 under Alternative 2 (expected catch, top) and Alternative 3 (recent mean F, bottom). Black lines showed simulation means, ribbons showed the 5th–95th percentiles from 1,000 future-recruitment simulations, and thin colored lines show ten matched trajectories. Colors identify the same recruitment realization in both alternatives and the spawning-biomass figure. Alternative 2 fixes catch at 1,375 kt in 2027 and 2028, then applies the maximum-ABC rule; its paths coincide in the prescribed-catch years. The ribbons represent future recruitment variation; the advice tables retain historical-mean recruitment.

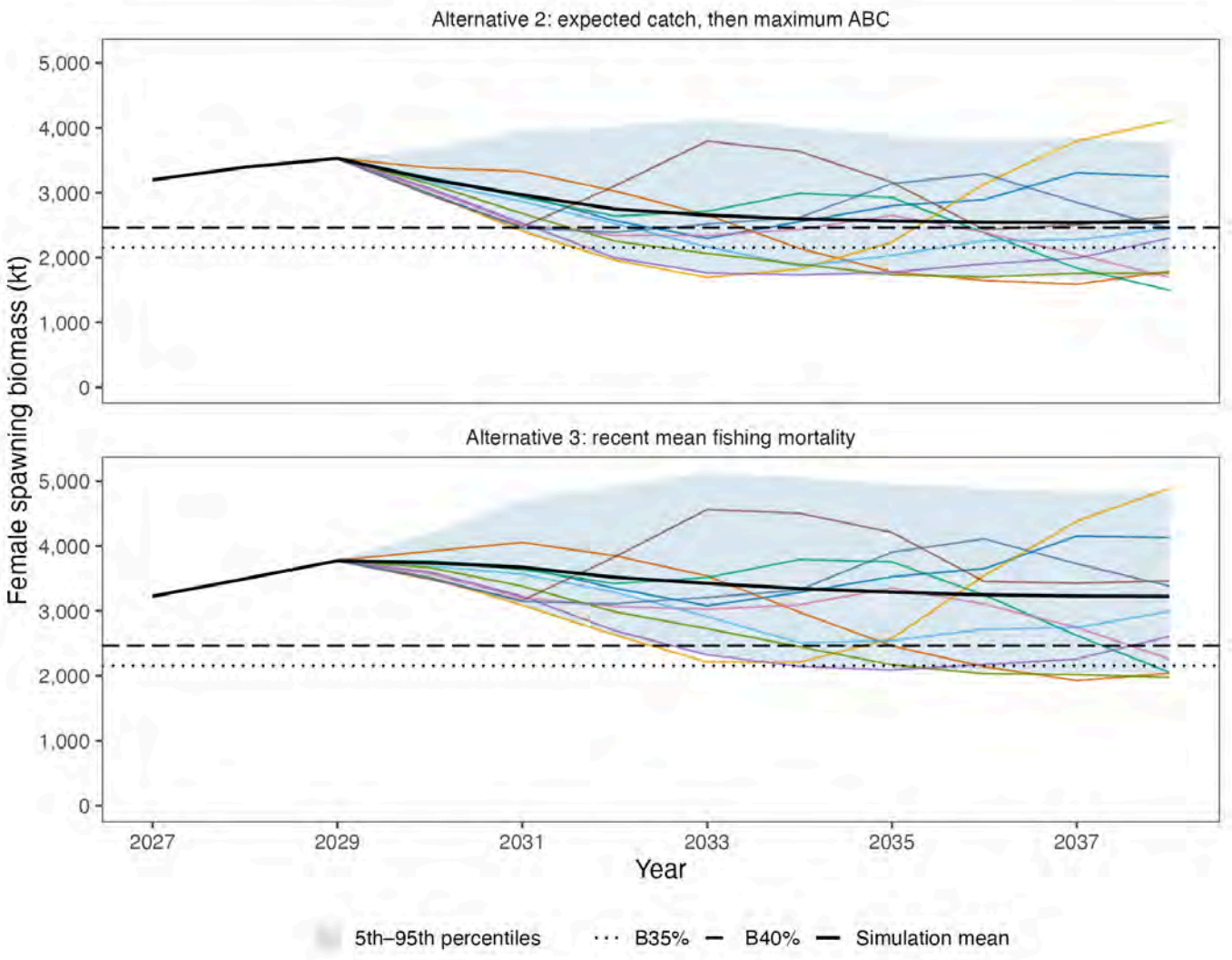


Figure 68: Female spawning-biomass projections for Model 26.0 under Alternative 2 (top) and Alternative 3 (bottom). Black lines showed simulation means, ribbons showed the 5th–95th percentiles from 1,000 future-recruitment simulations, and thin colored lines show the same ten matched trajectories as the catch figure. Future recruitment follows an inverse-Gaussian distribution fitted to the 1978–2023 age-1 entries. These ranges include future recruitment variation only. Dashed B40% and dotted B35% lines mark the primary projection reference points.

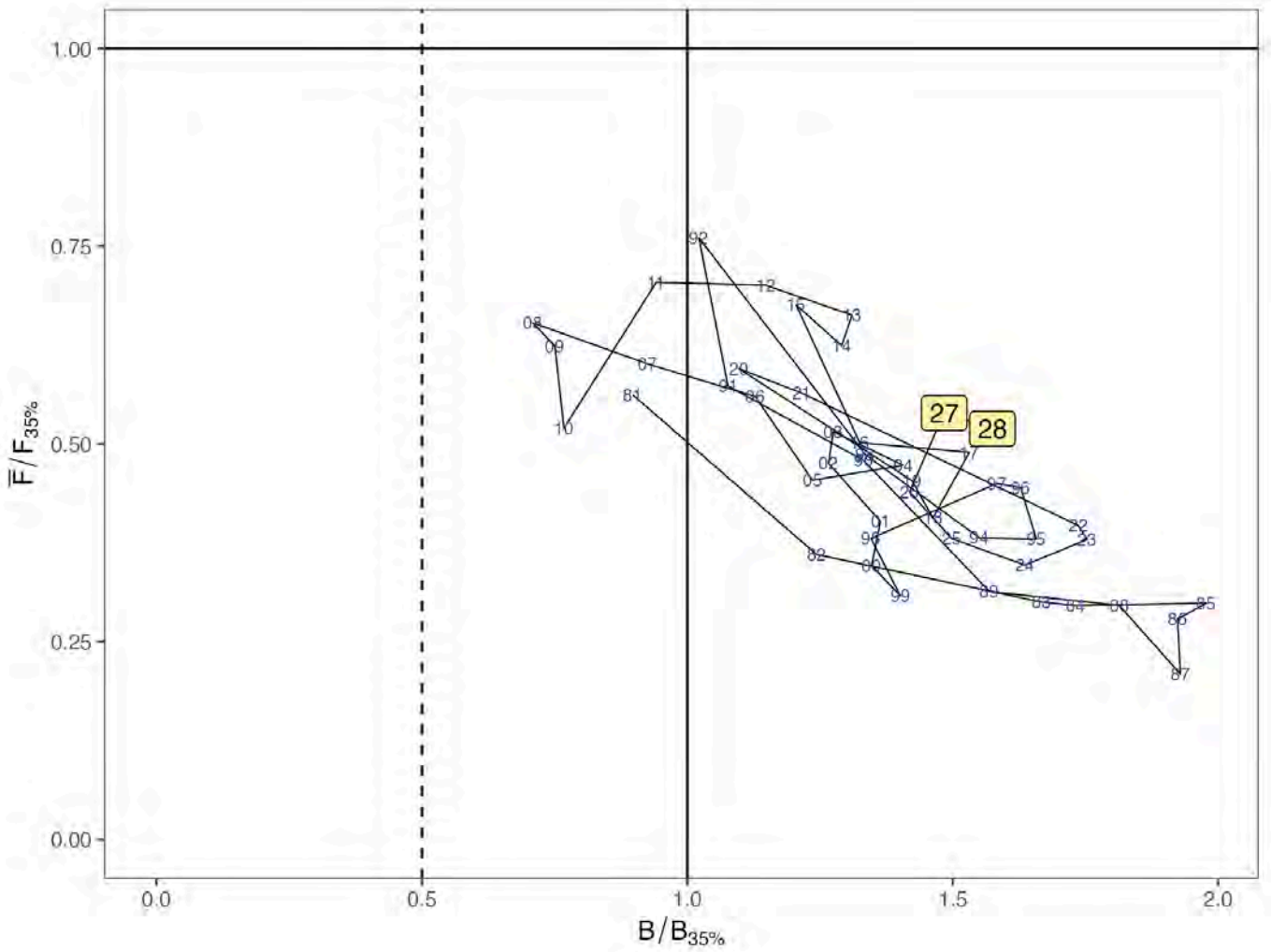


Figure 69: Historical trajectory of Model 26.0 female spawning biomass (B) and mean fishing mortality across model ages (F), 1981–2026, with deterministic Alternative 2 projections for 2027–2028. Ratios use the current primary Tier 3 reference points, B35% = 2.155 million t and F35% = 0.429 per year, held constant across years. Lines connect consecutive years; two-digit labels identify years, and boxed labels with yellow shading identify projections. Solid lines mark ratios of one; the dashed vertical line marks half B35%. Projected catch is 1.375 million t in each year.

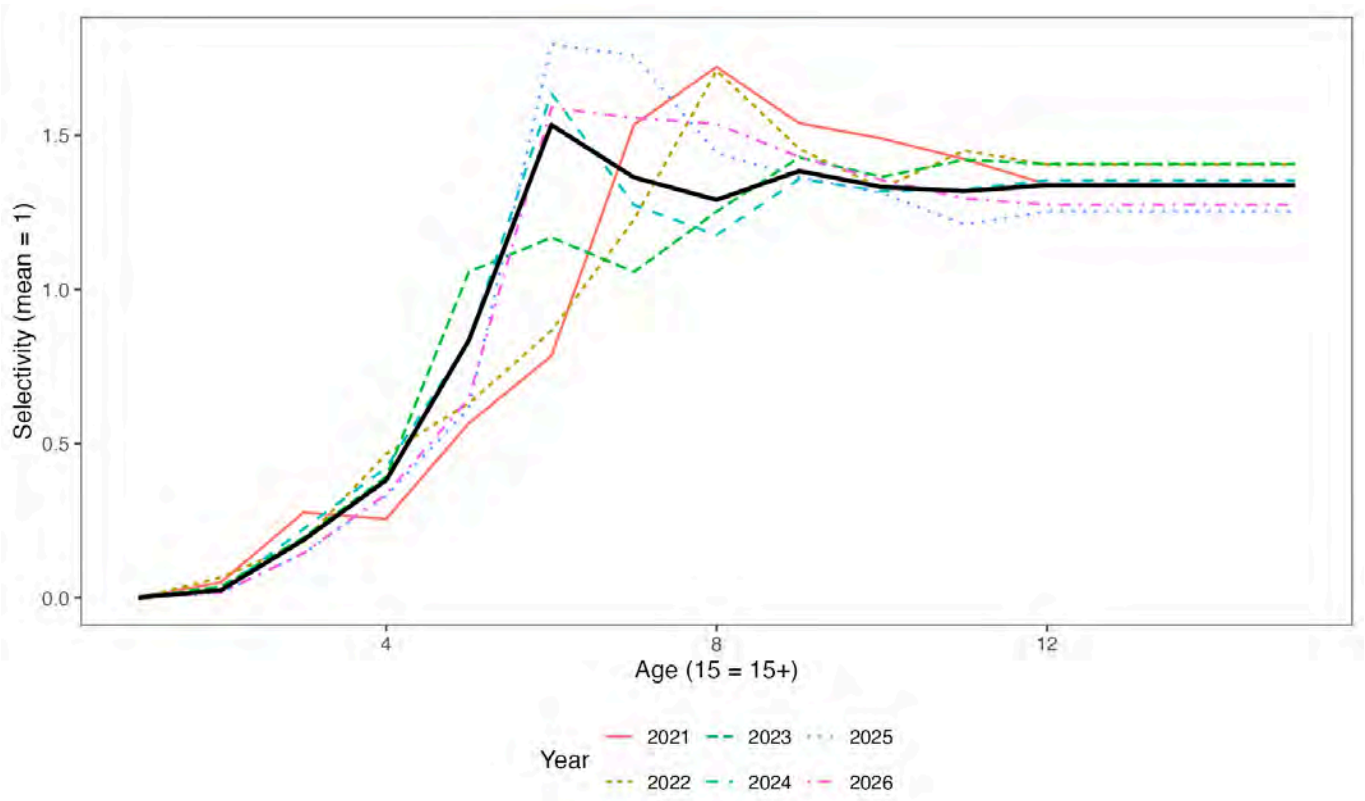


Figure 70: Recent Model 26.0 fishery selectivity curves and the proposed reference based on averaging the unnormalized curves. Curves are scaled to mean one.

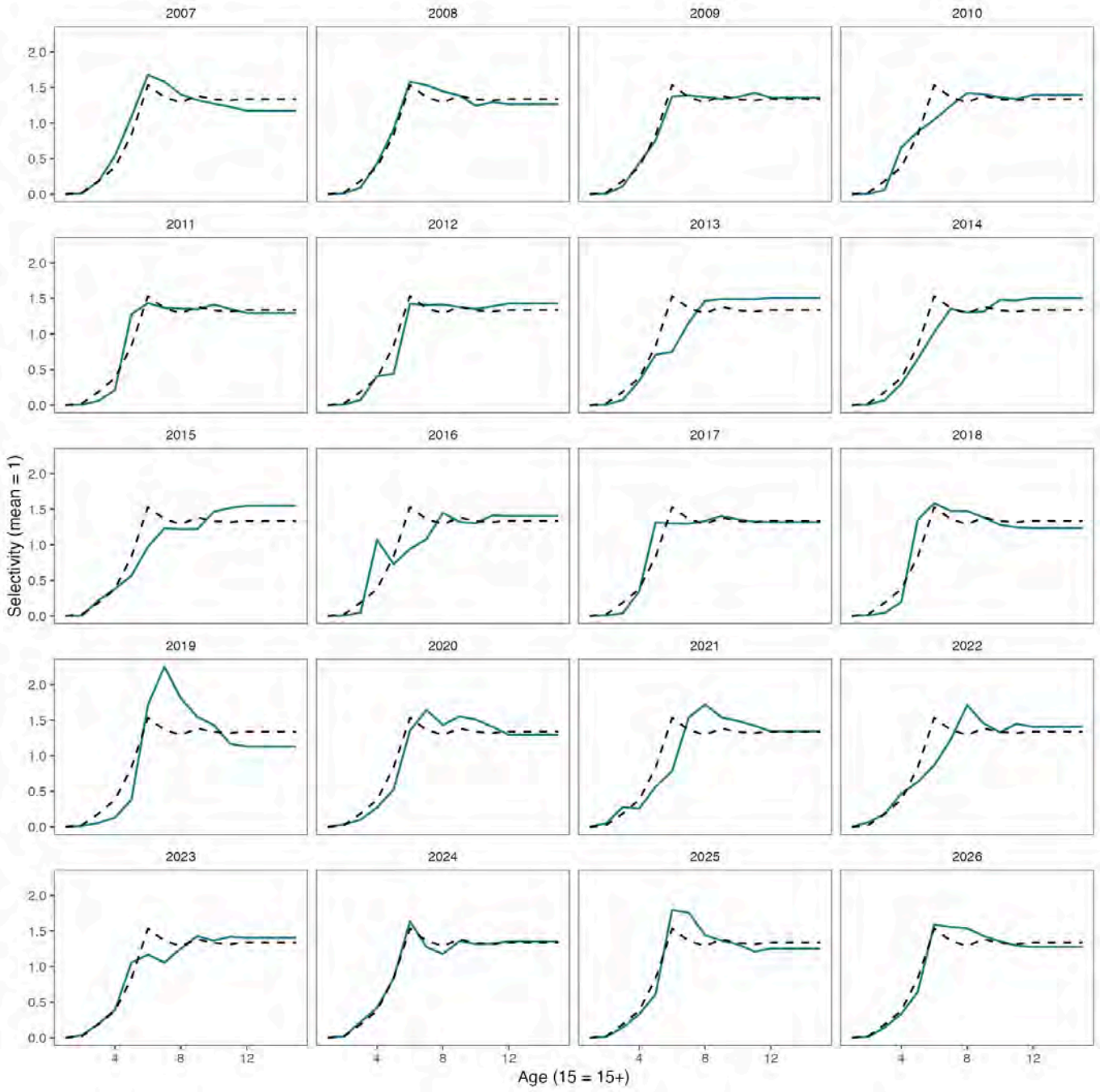


Figure 71: Annual Model 26.0 fishery selectivity curves for 2007–2026, each compared with the proposed 2023–2025 raw-curve average rescaled to mean one. The 2026 curve is estimated without 2026 fishery age compositions.

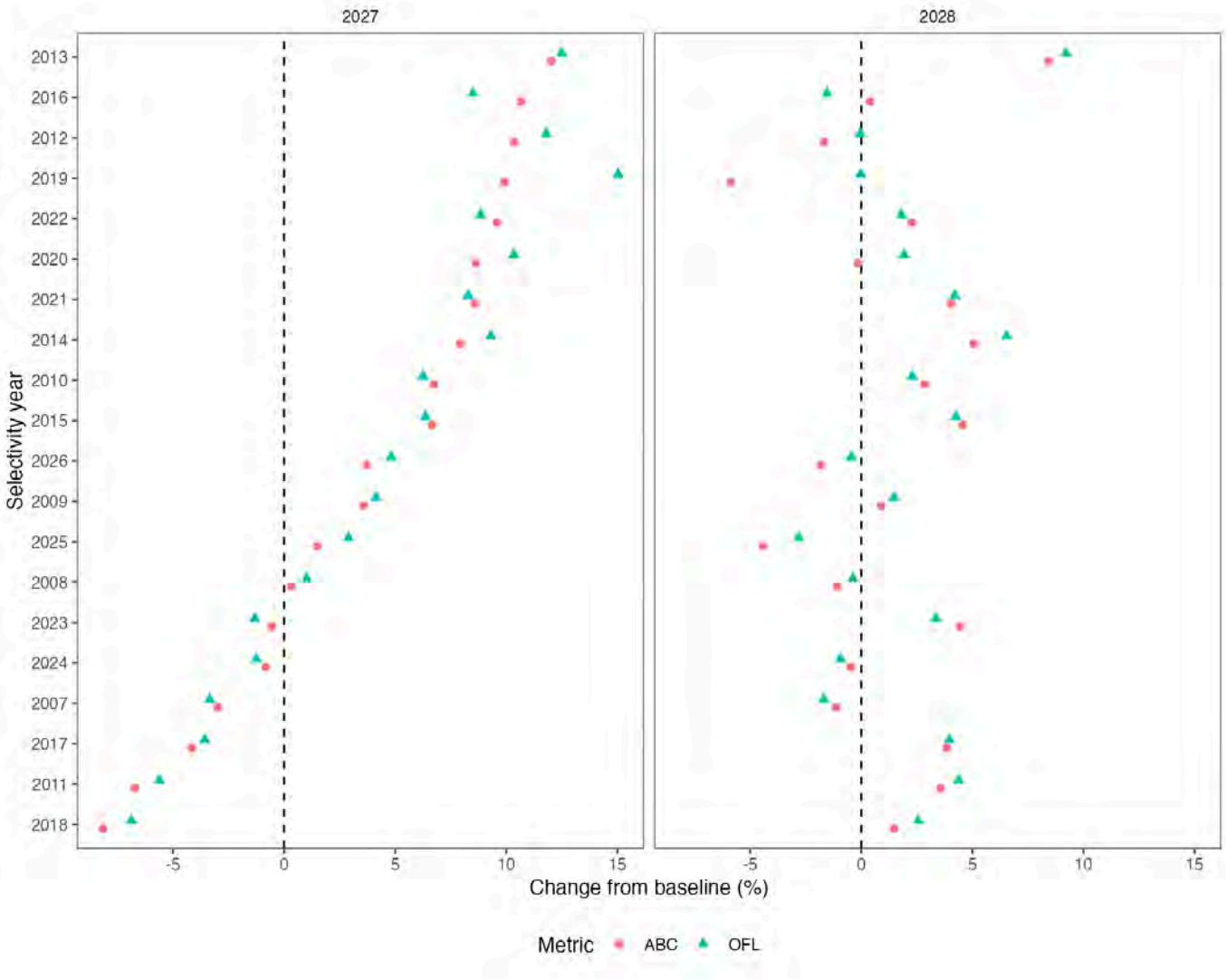


Figure 72: Changes in maximum ABC and OFL under the annual future-selectivity curves relative to the matching Model 26.0 baseline. Rows are ordered by 2027 maximum ABC. These are projection selectivity sensitivities conditional on the same fitted source and projection design.

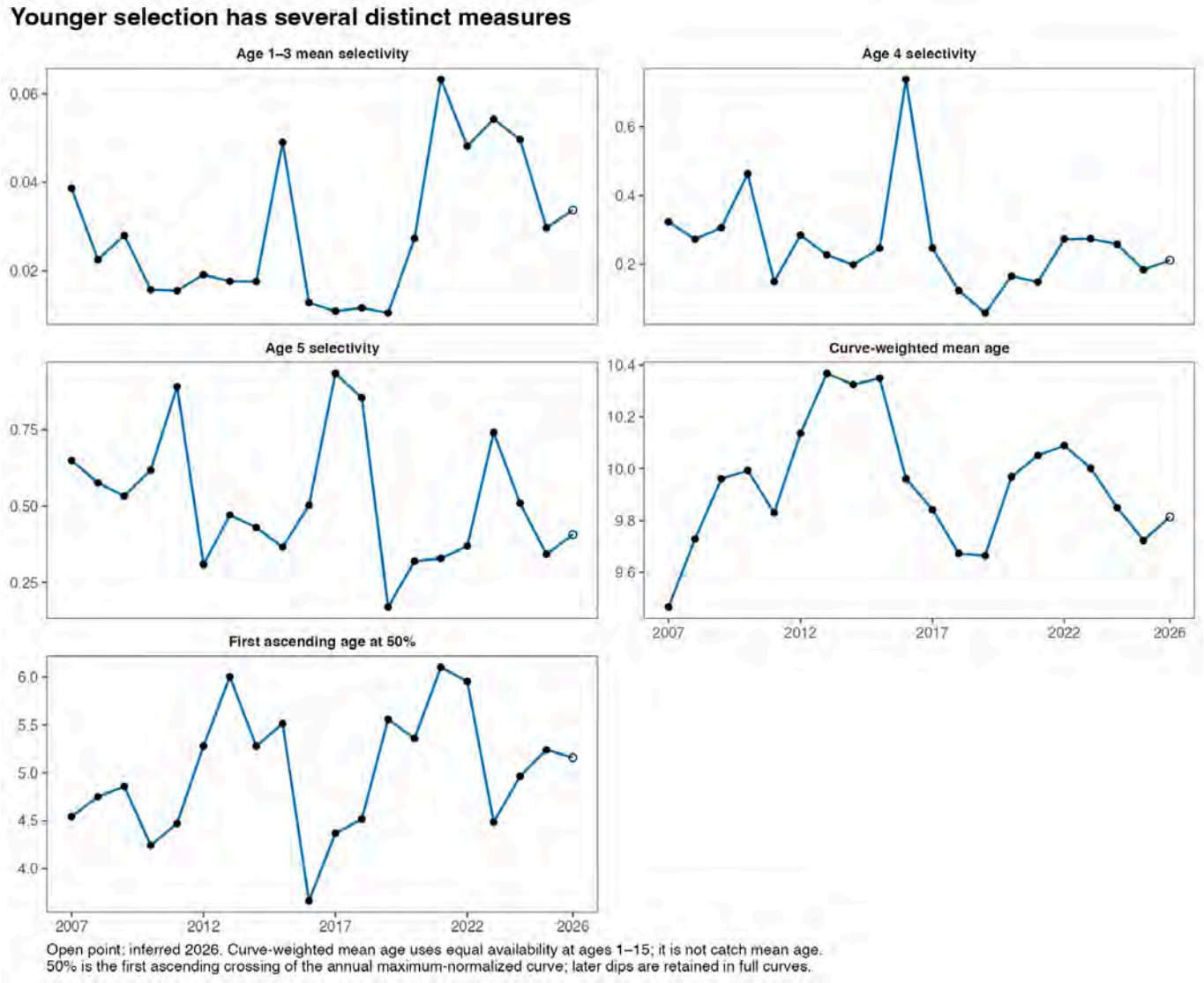


Figure 73: Annual younger-age selectivity measures relative to the annual peak for 2007–2026 from Model 26.0. The 2026 estimate is highlighted. Curve-weighted mean age is a shape measure under equal age weights, distinct from a population-weighted selected age.

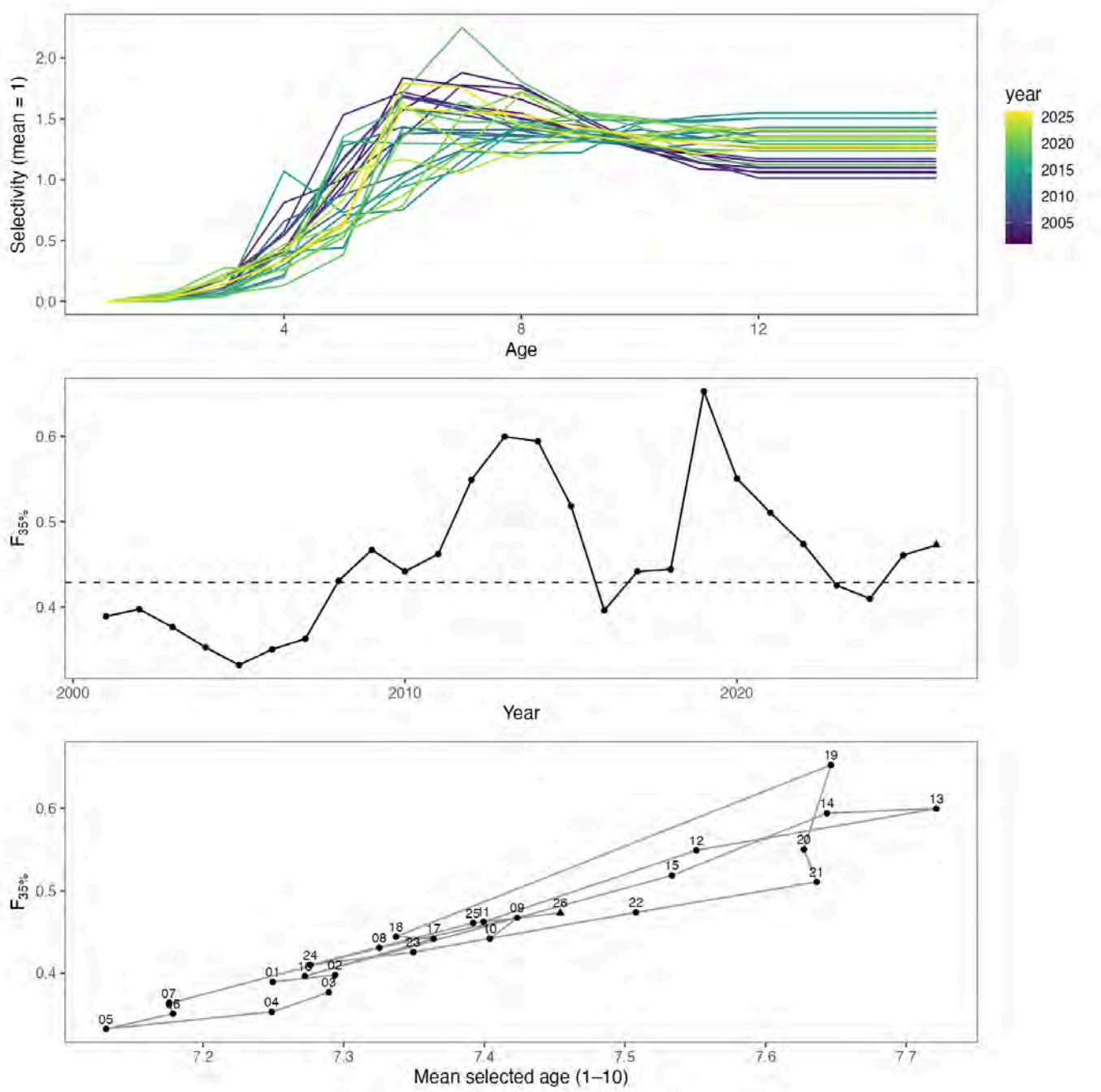


Figure 74: Annual Model 26.0 fishery selectivity and F35% under mean-one selectivity, a proxy for FMSY, for 2001–2026. Mean selected age uses ages 1–10; SPR uses ages 1–14 and 15+, fixed mortality, maturity and the selected projection spawning weights, and quarter-year spawning timing. Curves are normalized to mean one. The 2024 figure plotted FMSY.

Appendices

Appendix A SSC and Plan Team Requests and Responses

The Plan Team requests and assessment responses were summarized in Table A1.

Table A1 Responses to SSC and Plan Team Requests

SSC and Plan Team requests			
ID	Recommendation	Response	Response status
PT-01	Bring Model 26.0 forward for management use in November and present Model 23.0 for continuity and comparison during the transition to Rceattle.	Model 26.0 estimates, uncertainty, diagnostics, Tier 3 projections and Model 23.0 comparisons are presented. Regularized posterior summaries, predictive checks and observed and simulated-data retrospectives are included. Model 26.1.2 is a sensitivity comparison conditional on fixed Foreign and Modern process SDs of 0.1235 and 0.582. Risk categories are Level 1.	Assessment results and sensitivity comparisons presented
PT-02	Evaluate alternative treatments of age-1 BTS selectivity, including the selectivity penalty and a time-invariant alternative, to assess their influence on the retrospective pattern.	The author proposes no additional age-1 BTS selectivity sensitivities for this assessment. Observed and simulated-data retrospective results are presented; these results do not separately identify the effect of an alternative age-1 selectivity treatment.	No additional age-1 selectivity tests proposed
PT-03	Extend the Model 26.0 self-test with retrospective peels on simulated datasets generated from the fitted model, and examine retrospective patterns in time-varying selectivity estimates.	Two sets of ten simulated datasets use the fitted parameters and ten regularized posterior draws, respectively. Each dataset has a full-2026 fit and nine peels ending in 2017–2025. Observed spawning-biomass rho (+0.121) exceeds every simulated value in both sets. Posterior diagnostics and predictive checks are also presented. The simulations assess population revisions; they establish no single retrospective cause.	Paired simulation retrospectives and posterior predictive checks presented
PT-04	Present retrospective results from Models 23.0 and 26.0 side by side in November.	Matched retrospective runs for Models 23.0 and 26.0 were completed and compared side by side. Both showed similar spawning-biomass retrospective patterns, with nine-peel Mohn's rho of +0.156 and +0.143, respectively (positive values indicate higher estimates in the shorter fits). See the side-by-side comparison and numerical summaries.	Completed; requested comparison provided
PT-05	Further examine the influence of BTS index volatility and other potential data or ecosystem-related causes on the retrospective pattern.	The author proposes no additional BTS data-influence tests for this assessment. Model and cumulative-data comparisons, observed and simulated-data retrospectives, and posterior predictive checks are presented. The BTS mismatch measure is as large as observed in 0.2% of predictive simulations. These results identify model-data mismatch but establish no ecosystem cause.	Diagnostics presented; no additional BTS influence tests proposed
PT-06	Clearly document age-composition weighting in Model 26.0 and prioritize further evaluation of data weighting given patterns in the OSA diagnostics.	Age-composition information weights and likelihood multipliers are documented by data source and year. Model 26.0 and fixed-SD conditional Model 26.1.2 OSA and mean-age comparisons retain the selected sample sizes. Model 26.1.2 residuals condition on fitted selectivity states and exclude parameter uncertainty. Diagnostic equivalent weights are not applied as new inputs. Alternative-weight fits are outside the scope of this comparison.	Weighting and conditional diagnostics presented; alternative-weight fits remain separate
PT-07	Continue development of material that could contribute to a future EBS pollock Ecosystem and Socioeconomic Profile, as resources allow.	A draft was developed in September and further work is included here following recommended format and guidance.	Draft has been developed and is included as Appendix B.

Note. Responses to the September 2026 BSAI Groundfish Plan Team recommendations. Status distinguishes completed work, decisions about further tests and development of the ESP draft.

Earlier SSC comments and response plan

The matrix below preserved the October 2025 SSC response plan as reproduced in the September 2026 development source. It records proposed actions at that stage; completion and outstanding work were identified in Section 1.4 and the response registers. Its RTMB and Model 25.0 entries were historical planning context rather than the software selection. The September 2026 Plan Team direction establishes Model 26.0 and Model 23.0 as the November main and comparison models; the RTMB and SPoRC work remained part of the development record.

The earlier SSC comments and response plan were reproduced in Table A2.

Table A2 Earlier SSC Comments and Response Plan

SSC comment	Response
Use the 2024 base model as the source for an RTMB implementation, with routine data updates.	Use the accepted Model 23.0 (ADMB) configuration as the scientific source. First check the direct RTMB translation as Model 23.1, then use Model 25.0 (RTMB) for the assessment line begun in 2025. List each new data set and each model change separately. Save the model version, run files, diagnostics, projections, and management quantities used in the report.
Use the updated Groundfish Assessment Program estimates of survey biomass and age composition.	Add the `sdmTMB` biomass estimates and `tinyVAST` age compositions as revised survey data. Record when the estimates were received, the software version, model settings, and input files. Compare the old and new survey series and show whether the change affects the assessment results.
Use FT-NIRS age compositions for the 2025 fishery and surveys.	Document how the FT-NIRS ages were produced, screened, grouped, and assigned to fishery and survey data. Record sample sizes and aging-error matrices. Check the final model input against the source data before fitting the assessment.
Compare traditional microscope ages with FT-NIRS ages and show the effects on model results and management quantities.	Run the same assessment with traditional ages, FT-NIRS ages with one aging-error matrix, and FT-NIRS ages with fleet-specific aging-error matrices. Compare cohort patterns, fits to fishery and survey ages, residuals, recruitment, spawning biomass, reference points, ABC, and OFL. Save the full comparison in the assessment appendix and at a permanent web address.
Revisit the revised AVO index after the new uncertainty analysis has been reviewed.	After review of the final uncertainty method, compare the revised point estimates and uncertainty with the AVO series. Show their effect on model fit, stock estimates, and management quantities before proposing a change to the base model.
Develop a plan with the BSAI Groundfish Plan Team for moving beyond ADMB.	Use the model history and numbering plan above. Compare RTMB, Rceattle, and SPoRC with the same data and a common set of tests. Ask the Plan Team to agree on the tests before selecting the model software for future assessments. Keep the accepted assessment model as the control until a replacement gives stable estimates, sound uncertainty, acceptable retrospective results, and reproducible projections.
Examine the effect of including Russian catches.	First confirm the source, area, years, units, species identification, and uncertainty of the Russian catch estimates. Then run clearly defined catch scenarios. Explain the assumptions about stock movement and population boundaries and show the effects on stock size, reference points, ABC, and OFL.
Explore time-varying natural mortality, selectivity, age-composition weighting, and cohort and temperature effects on weight-at-age.	Study each topic separately. State the scientific question before fitting a model. For each change, show model fit, parameter uncertainty, retrospective results, projections, and effects on management advice. Keep poorly estimated or unstable models as research results.
Continue work with CEATTLE estimates of natural mortality and consider Rceattle for time-varying mortality.	Test time-varying natural mortality as a sensitivity analysis. Check whether the model can separate mortality changes from recruitment, selectivity, and survey effects. The full set of assessment needs will guide the choice of model software.
Explain how the recruitment penalty affects the estimated 2018 year class and why the likelihood profile favored a larger recruitment estimate.	Prepare a likelihood profile for the 2018 recruitment deviation. Show how the recruitment penalty and each data source change across the profile. Explain which parts of the model favor a larger year class and how the estimate affects spawning biomass, reference points, ABC, and OFL.

SSC comment	Response
Clearly identify the models proposed for the assessment, including model numbers.	Use Model 23.0 (ADMB) for the accepted 2024 source, Model 23.1 (RTMB) for the direct translation check, Model 25.0 (RTMB) for the line begun in 2025, and Model 26.0 (Rceattle) for the line begun in 2026. Use the same short names in the report, presentations, run folders, tables, and archive. For every model, list its purpose, parent model, data set, model changes, software version, and review status. State clearly which model is recommended for management advice.
Archive the October and December SAFE documents and presentations.	Archive the October 2025 material that exists and add a short note explaining that the funding lapse prevented the November and December SAFE package. For future reviews, save the Quarto source, rendered reports, presentations, model files, data list, software versions, and file checksums in one dated release.

Note. Responses to the October 2025 SSC comments on EBS pollock. The SSC comments are summarized from pages 27 to 29 of the final October 2025 SSC report.

Appendix B Ecosystem and Socioeconomic Profile of Eastern Bering Sea Walleye Pollock

This draft Ecosystem and Socioeconomic Profile (ESP) for EBS pollock brings together substantial work completed to date and provides a starting point for future ESP Team discussions. An AI agent helped compile and coordinate material from disparate information sources and research activities. Over the next year, the EBS pollock ESP Team will formalize its membership and begin meetings that engage a broader group of scientific experts to develop the profile. Please contact Jim Ianelli and Kalei Shotwell with questions or for further details about this document or the EBS pollock ESP.



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2. Responses to SSC and Plan Team Comments on ESPs in General
3. Responses to SSC and Plan Team Comments Specific to EBS Pollock
4. Introduction
5. Indicator Synthesis
6. Indicator Assessment
7. Data Gaps and Future Research Priorities
8. Conclusion
9. Literature Cited
10. Tables
11. Figures

Executive Summary

The Ecosystem and Socioeconomic Profile (ESP) connected stock-specific environmental, biological, fishery, and community information with assessment interpretation and management questions. Its sequence of focus, synthesis, analysis, and communication provided a structured way to evaluate proposed indicators (Shotwell et al. 2023). This draft focuses initially on recruitment to age 1, then identified processes affecting juvenile survival to age 3, adult growth and condition, survey interpretation, and fishery performance.

The ESP distinguished two DSEM applications. The archived Rceattle pilot evaluated birth-year SST and age-1-year cold-pool proxies (Ianelli et al. 2026). A separate age-1 DSEM working paper analyzes 18 ecosystem series alongside an age-1 response estimated by the assessment. Regional age-0 energy density provided an additional measured-condition series (Page and Maselko 2026).

Acceptable Biological Catch Considerations

Candidate Predictive Indicators

Fall age-0 total energy, prey quality and abundance, and juvenile–predator overlap were priorities for testing. Field studies connect fall total energy with age-1 recruits per spawner, and laboratory experiments identify body size and energy reserves as determinants of survival during food deprivation (Heintz et al. 2013; Sogard and Olla 2000). Studies of pollock recruitment and spatial predation identify juvenile overlap with adult pollock and arrowtooth flounder as another important pathway (Mueter et al. 2006; Spencer et al. 2016).

The regional energy-density series contain 21 southeastern Bering Sea (SEBS) and 15 northern Bering Sea (NBS) annual means within 2002–2025, measured in kJ/g dry mass. The latest values, for 2025, were 19.23 and 20.84 kJ/g dry mass for SEBS and NBS, respectively. Both were lower than their 2024 observations; a 2026 energy-density observation was absent. Sampling metadata, observation uncertainty, and forecast evaluation remain prerequisites for a predictive role (Page and Maselko 2026).

Contextual Indicators

Sea ice, seasonal temperature, cold-pool extent, plankton and euphausiids, age-0 abundance and condition, adult condition, weight-at-age, and predator overlap form the initial contextual set. The relevant biological question was whether each cohort encounters adequate prey, accumulates energy before winter, and survives subsequent predation. The poor 2007 cohort illustrates why a favorable temperature category alone can give an incomplete account: low summer production and poor age-0 condition occurred during a cold year (Gann et al. 2016).

The 2026 physical and prey indicators show a mixed pattern relative to their own observed-period means. Sea ice and cold-pool extent were above those means; SST and bottom temperature were below. The open-water bloom indicator was lower, while chlorophyll a was higher. Spring small and large copepods and summer small copepods were below their respective means; summer large copepods were slightly above.

Fishery Informed Indicators

Candidate indicators include age and size composition of catch, fishery weight-at-age, season and area of harvest, standardized fishery catch rates, catch and quota utilization, and salmon bycatch measures. Their interpretation must account for fishing choices, allocation and avoidance behavior, processing demand, and reporting coverage. These indicators may reveal operational changes or sampling differences that help interpret assessment inputs. Their proposed inclusion in this ESP required a defined management question.

The draft supported evaluation of ecosystem and fishery concerns in the SAFE risk table. Any resulting change in risk classification or ABC must be documented by the assessment authors using the completed annual synthesis and assessment results. ABC and OFL remain unchanged by this contribution.

Total Allowable Catch Considerations

Verified economic context covers BSAI catch, participation, ex-vessel and first-wholesale statistics through 2024, and U.S.-national trade through 2025 (Catch and Market Context). These scopes differ from the BS assessment stock and from each other. A speculative 2026 interpretation was that firmer product unit values could support gross returns, while operating costs and product mix could offset those gains unevenly among vessels, processors and communities. 2026 margins and community outcomes remain uncertain. This interpretation was qualitative.

Responses to SSC and Plan Team Comments on ESPs in General

A summary of potential SSC/PT comments on ESPs in general included: distinguish predictive from contextual indicators, evaluate competing mechanistic explanations, document DSEM diagnostics, and coordinate economic and community information with existing Council products. This pollock contribution addresses those questions by defining indicator roles, documenting the fitted pilot and its diagnostic limitation, and proposing an explicit socioeconomic inventory.

Responses to SSC and Plan Team Comments Specific to EBS Pollock

December 2024 SSC, EBS Ecosystem Status Report (page 3): the SSC recommended pollock-focused DSEM work to reconcile contrasting larval, juvenile-condition, and adult signals, and to investigate changed recruitment relationships (North Pacific Fishery Management Council Scientific and Statistical Committee 2024).

Contribution to that work: The starter age-1 DSEM analysis appears in the 2026 EBS Ecosystem Status Report (Siddon 2026).

The assessment website records continuing work on contrasting early-life observations, cannibalism and biomass consumed, multispecies mortality, weight-at-age and condition, and stock distribution across U.S. and Russian waters (EBS Pollock Assessment Team 2026). Its retained earlier responses carry an explicit requirement for verification before use as final results. This draft translates those topics into proposed ESP tasks.

Pollock review topics and proposed ESP contributions were summarized in Table B1.

Introduction

Pollock recruitment reflected survival through several life stages with different food requirements, habitats, and predator exposure. Large differences in egg or larval abundance can be modified by later feeding, growth, transport, and mortality. The first-year review by Duffy-Anderson et al. provided the organizing synthesis for these processes (Duffy-Anderson et al. 2016). The local recruitment review extended that structure through ages 1 and 2 to survival at age 3. In this appendix, age-1 recruitment was the focal response used by the DSEM pilot; survival to age 3 was a separate later-stage outcome that retained the identity of the same birth cohort.

Justification

The ESP creates an evidence trail from a biological or socioeconomic question to an indicator and its proposed use. For EBS pollock, the immediate question was whether early-life information can improve interpretation of uncertain recruitment and future biomass. Additional questions concern adult productivity, changing spatial availability to surveys, fishery operations, and community exposure. The September 2026 document provided the starting framework for developing this appendix (Ianelli et al. 2026).

Data

Age-0 Energy Density

Annual mean energy density of age-0 walleye pollock was available for the northern and southeastern Bering Sea during 2002–2025, in kJ/g dry mass (Page and Maselko 2026). Johanna Page (Vollenweider) provided the data, with Jacek Maselko as a co-contact. The southeastern series contained 21 annual means and the northern series contained 15. Both regions lack observations for 2003, 2013 and 2020; the northern series also lacks 2008–2012 and 2014.

The source inventory and remaining data-assembly needs were summarized in Table B2.

Indicator Synthesis

Ecosystem Processes

Spawning Supply and Transport

Spawning biomass and spawning location influence egg and early-larval supply. Smart et al. found associations between spawning biomass and early stages, with weaker correspondence after early larval development (Smart et al. 2012). Transport and the spatial arrangement of spawning also matter. The biophysical model of Petrik et al. reproduced warm–cold distribution differences most successfully through changes in spawning areas (Petrik et al. 2015). These results supported separate hypotheses for cohort supply, transport, and access to nursery habitat.

Feeding and Fall Age-0 Condition

Prey availability included amount, nutritional quality, and spatial match with fish. Larval copepod concentrations and frontal habitat illustrate why a broad regional biomass index can differ from prey encountered by an individual fish (Smart et al. 2012; Brodeur et al. 2000). Diet studies show that prey use varied with fish size and that pollock and Pacific cod can partition prey (Buckley et al. 2016; Strasburger et al. 2014).

Siddon et al. describe a seasonal shift from larval growth and development toward lipid storage after transformation to the juvenile stage (Siddon et al. 2013). Heintz et al. found higher diet lipid content and age-0 energy density during cold conditions in their study; fall total energy was positively associated with age-1 recruits per spawner (Heintz et al. 2013). Moss et al. also documented differences in age-0 energetic condition and food habits across thermal conditions (Moss et al. 2009). These findings motivate indicators of energy density, body mass, and total energy with explicit measurement definitions. The annual series measures energy density in kJ/g dry mass.

Eisner et al. evaluated large copepods as leading indicators of age-3 pollock abundance for the 2002–2015 year classes, excluding 2013 (Eisner et al. 2020). Their comparison reinforces the value of prey information while identifying a specific cohort range and recruitment age.

Overwinter Survival

Fall condition provided the starting reserves for the first winter. Sogard and Olla's food-deprivation experiments show that greater size, higher initial condition, and colder water can extend survival (Sogard and Olla 2000). Field survival also involves winter feeding, movement, and predators. Laboratory results therefore support a mechanism and its direction, while annual field data were needed to quantify its effect on recruitment.

Sea ice, bloom timing, summer mixing, and temperature influence prey production and energy demand. Sigler et al. connect annual production of copepods, euphausiids, and juvenile pollock with seasonal environmental conditions (Sigler et al. 2016). Gann et al.'s analysis of 2007 identifies a plausible production limitation during a cold year (Gann et al. 2016). The ESP should evaluate these intermediate processes before interpreting a simple warm–cold contrast as a cohort forecast.

Predation and Later Juvenile Survival

Adult pollock can increase juvenile mortality through cannibalism, while arrowtooth flounder and other predators create additional exposure. Mueter et al. identify both food-related and predation-related controls on pollock recruitment, including juvenile–adult overlap (Mueter et al. 2006). Spencer et al. model spatial predation by arrowtooth flounder and show how cold-pool extent can alter predator access to juvenile habitat (Spencer et al. 2016).

The timing of predation matters for the response. A summer overlap or cold-pool observation in year $t + 1$ occurs after the beginning of the cohort's age-1 year. Its use to explain an age-1 entry state required explicit justification or a revised response definition. Such observations may be more directly aligned with survival during age 1 and later ages.

Life stages, processes and priority observations are summarized in Table B3.

Workshop Conceptual Models for Recruitment and Growth

The January 2025 pollock biology and ecology workshop developed preliminary conceptual models for Bering Sea recruitment and growth (Monnahan et al. 2026). Figure B1 organizes reproductive output, seasonal juvenile stages, prey quality, energetic condition, predation, and cold-pool extent. Figure B2 connected population weight-at-age with somatic growth, size-selective mortality, prey, competitors, fishing, and physical conditions. Together they supported an ESP that examined recruitment and growth.

Recruitment pathways: spawning biomass and fecundity inform reproductive output. Seasonal surveys track the cohort from spring age 0 through age 2. Diet, krill, copepods, and prey lipid measurements inform forage quality and juvenile energetic condition; predation indices and cold-pool extent inform later survival. The

diagram highlights both candidate observations and intermediate biological states.

Growth pathways: the model separated growth of surviving fish from changes in population weight-at-age associated with size-selective mortality. Prey availability, density, genetic diversity, and spatial history enter the growth network alongside physical conditions and zooplankton. This distinction supported age- and season-specific weight and condition indicators with explicit survey or fishery sampling definitions.

The cohort sequence in Figure B3 summarized the recruitment mechanisms developed in this draft and extended the survival question to age 3. The workshop diagrams provide a broader set of hypotheses for future indicator development.

Socioeconomic Processes

Biological supply, access to fishing grounds, operating costs, product demand, and processing capacity can jointly affect realized harvest and its value. Those processes may alter where and when vessels fish, the size and age of fish landed, and the distribution of benefits. This component should therefore connect each indicator to a concrete question, such as whether lower quota utilization reflects reduced fish availability, market conditions, processing limits, or avoidance behavior.

The Economic SAFE provided source categories for catch, discards, prohibited species catch, production and value, participation, and effort (Alaska Fisheries Science Center 2026b). This draft proposes species- and sector-specific summaries where the source reports that detail. Community analysis required clear distinctions among landing ports, vessel ownership, workforce residence, processor location, and CDQ beneficiaries. Each described a different form of participation or exposure.

Proposed Indicators

The mechanism table (Table B4) links a driver, a measurable process, and the intended response. Expected directions were hypotheses for the stated pathway. Several upstream physical effects depend on season, prey response, and spatial coverage, so their net sign can change across conditions.

Indicator Assessment

Indicator Selection

Selection starts with a mechanistic explanation, the population or socioeconomic response, and the date when the information becomes available. Candidates then require reliable annual production, adequate spatial and temporal coverage, quantified uncertainty, and additional information beyond the other indicators.

Ecosystem Indicators

The initial set should remain small enough for scientific review: seasonal physical forcing; a documented prey index; fall age-0 size and energetic condition; juvenile–predator overlap or a reviewed mortality product; and adult growth and condition. Larval supply and transport add value when the data cover enough years and the indicators are biologically comparable. Indicator families should be assessed together so correlated temperature, ice, and prey signals receive an interpretation that accounts for shared processes.

The available age-0 energy-density series describe regional energetic condition (Figure B4). The histories of the ecosystem inputs and age-1 response provide context for the DSEM analysis (Figure B5).

Socioeconomic Indicators

Proposed socioeconomic indicator families, measures and management questions were summarized in Table B5.

Catch and Market Context

The broader Bering Sea and Aleutian Islands (BSAI) pollock fishery reported 1.3163 million tons of total catch in 2024 (Table B6). Trawl catcher vessels retained 678.40 thousand tons, with an ex-vessel value of $213.43 million. These economic statistics cover the BSAI; their area and accounting definitions differ from the

BS stock-assessment catch series. Published pollock-target vessel counts were 103 across harvesting sectors and 76 catcher vessels. The counts describe participation in the target fishery and include their source-specific gear definitions.

Published first-wholesale pollock production was 487.89 thousand tons of product weight and $1.4743 billion in 2024 (Table B7). The Economic SAFE excluded confidential components from some aggregates; the combined fillet quantities and derived values for 2021–2022 remain unavailable here. Product mix and market conditions both affect the observed unit values (Abelman et al. 2026).

Global Alaska pollock capture production was 3.573 million tons in 2024 (Table B8, panel A). The United States and Russian Federation accounted for 39.9% and 54.0%, respectively, and BSAI catch represented about 36.8% of the global total. U.S. Alaska-pollock domestic exports totaled 333 thousand tons of products valued at $1.00 billion in 2025, compared with 332 thousand tons and $0.946 billion in 2024 (panel B). These national trade statistics extend through 2025; global catch statistics extend through 2024. Their product weights, nominal export values and legacy import/destination baskets were defined in the table notes (FAO 2026; NOAA Fisheries 2026).

Among the three destination groups shown, selected European countries accounted for the largest export shares throughout 2020–2025 (Figure B6). Meat's share of export volume rose from 45.8% in 2020 to 53.3% in 2025, while its value share rose from 44.0% to 53.0% (Figure B7). The Russian Federation accounted for more than half of global catch in each year from 2020 to 2024 (Figure B8). First-wholesale surimi volume declined from 185.5 to 165.1 thousand tons between 2023 and 2024, while fillet volume rose from 142.9 to 158.6 thousand tons (Figure B9).

Annual Indicator Status

Age-0 Energy Density Through 2025

The latest five available observation years were 2021–2025 (Table B9). In 2025, the SEBS annual mean was 19.23 kJ/g dry mass, 0.64 lower than in 2024. The NBS annual mean was 20.84, 0.09 lower than in 2024 (Page and Maselko 2026). These were descriptive differences between annual means.

Annual Indicator Series

The age-1 DSEM input spans 1964–2026 and contained 18 ecosystem series plus the assessment-derived age-1 response (Figure B5). Seventeen ecosystem series had 2026 values; the energy-density series ended in 2025, and age-1 observations end in 2024.

Standardized departures below equal each value minus that series' mean, divided by its sample standard deviation. Each baseline used all available finite observations, including the latest year, and retained the series' gaps. These baselines were descriptive historical variability, rather than a common fixed climatology, sampling-error intervals or approved biological thresholds.

In 2026, sea ice was +0.89 SD relative to its 1985–2026 baseline of 42 observations. Cold-pool extent was +1.12 SD, SST −0.39 SD and bottom temperature −0.79 SD relative to their separate 1982–2026 baselines of 44 available observations each. Sea ice and cold pool both exceed their 2025 values. SST also increased from 2025 despite remaining below its observed-period mean, whereas bottom temperature fell.

The open-water bloom indicator was −1.54 SD and chlorophyll a was +0.77 SD relative to their separate 1998–2026 baselines of 29 observations each. Both declined from their 2025 values. Spring small and large copepods were −0.45 and −0.66 SD using their separate 2000–2026 baselines of 25 observations; summer small and large copepods were −0.92 and +0.21 SD using their separate 2003–2026 baselines of 22 observations. The mixed physical and prey pattern supported contextual discussion rather than an overall favorable or adverse recruitment classification.

Indicator Analysis

The September 2026 assessment development document presents a pilot DSEM analysis of SST and cold-pool pathways (Ianelli et al. 2026). Tables B10–B11 reproduce its fit comparisons and direct proxy coefficients as an example of analyses that could be provided in the ESP.

Decision Support

A contextual indicator may inform the SAFE risk-table discussion when it identified a documented condition relevant to recruitment, productivity, survey interpretation, or fishery operations. Its influence on a risk category required an explanation of the evidence and uncertainty. A predictive indicator needs forecast evaluation and numerical checks. Incorporation into an assessment likelihood, projections, or a harvest rule required a separate, reviewed implementation and evaluation of effects on biomass, uncertainty, ABC, and OFL.

Socioeconomic Monitoring

Socioeconomic monitoring can build on the main assessment's discussion of fishery conditions, including fishing locations, catch rates, effort, size composition, and bycatch avoidance, alongside economic performance, participation, and community exposure. The catch-decision indicators and probabilities in Tables 55 and 56 provide a framework for comparing alternative catches in terms of fishing mortality, future spawning biomass, age composition, and relative fishing pressure. The fishing-mortality-based effort proxy describes relative pressure; observed vessel effort, catchability, operating costs, and revenues would provide the economic context for interpreting it. Future ESP drafts will pursue incorporating these fishery-condition observations and decision-table comparisons to connect projected stock outcomes with operational and socioeconomic consequences.

Data Gaps and Future Research Priorities

Ecosystem Priorities

One of our priorities was cohort-aligned predator overlap or mortality, with timing that matched the survival interval. Joint juvenile and predator distributions, diet and consumption estimates, and direct fall–spring cohort comparisons would strengthen interpretation.

Transport and nursery delivery, prey timing and lipid content, winter exposure, and annual observation-error estimates remain additional priorities. Climate relationships should be assessed for stability across recent warm conditions and historical regimes. Long-term climate projections in Mueter et al. and Spencer et al. describe conditional scenarios (Mueter et al. 2011; Spencer et al. 2016); their projected effects provided research context rather than annual 2026 indicator values.

Socioeconomic Priorities

Confirm a compact pollock-specific indicator set with economic and social science contributors. Resolve sector and community definitions, annual update capacity, disclosure rules, cost comparability, and a common price base. Evaluate whether incomplete quota utilization or altered fishing patterns had identifiable operational, market, processing, or biological causes. Document the availability date for each product so the ESP distinguished information usable during the specification process from information released later.

Completion Priorities for the 2026 Appendix

Confirm the primary sources, units, seasonal and spatial definitions and observation uncertainty for the working annual series. Review the age-1 DAG and the proposed energy and predator pathways with the ESP and ecosystem teams. Preserve separate timing and scaling for the archived Rceattle pilot and standalone DSEM, and retain the AR1 forecast benchmark when evaluating any expanded model. Reconcile the historical pilot archive and its outstanding numerical checks before using the indicators to support an annual status or risk classification.

Conclusion

The literature supported following cohorts through spawning and delivery, prey and fall age-0 energy, first-winter survival, and later predator exposure. The ESP also considers adult productivity, survey availability and socioeconomic conditions. The regional energy-density series supplied a measured-condition indicator through 2025.

Economic observations extend through 2024 for the BSAI fishery and 2025 for national trade; the 2026 interpretation was qualitative.

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Tables

Table B1 Pollock Review Topics and Proposed ESP Contributions

Review topic	Contribution in this draft	Completion needed
Contrasting larval, age-0 and adult signals	Follow cohorts through prey, condition and survival stages.	Verify source years, survey domains and cohort identity.
Cannibalism and biomass consumed	Distinguish overlap, diet occurrence, consumption and mortality.	Add reviewed consumption estimates with uncertainty.
Multispecies mortality	Treat age-specific predation as a candidate indicator.	Identify model version, predator coverage and sensitivity.
Weight-at-age and condition	Include growth and energetic context by age and season.	Update survey and fishery products and assess comparability.
U.S.–Russian distribution	Track survey domain and movement assumptions.	Use verified spatial products and explicit stock boundaries.

Note. Pollock review topics and proposed ESP contributions. Topics are paraphrased from the assessment website; final responses require the original review record.

Table B2 Source Inventory for the EBS Pollock ESP

Data group	Source and definition	Status in this contribution
Assessment states and survey inputs	EBS assessment; BTS, ATS and AVO products with age, season and spatial coverage.	Historical development material verified; align with the final 2026 SAFE run.
Temperature and cold pool	Seasonal SST; survey-derived cold-pool extent and temperatures.	Historical standardized pilot inputs archived; 2026 indicator update pending.
Prey and age-0 fish	BASIS/EcoFOCI and associated studies; size, biomass, diet and energetic measurements.	Literature reviewed; consolidate prey, size and sampling uncertainty.
Age-0 energy density	Page and Maselko annual NBS and SEBS means; 2002–2025; kJ/g dry mass.	Regional series received; season, weighting, uncertainty and cohort alignment require confirmation.
Predation	Diet observations, overlap products and multispecies model estimates.	Mechanisms synthesized; reviewed annual products required.
Catch and fishery behavior	Catch accounting, observer and fishery products; consistent season and area definitions.	Indicator specification proposed; extraction and quality review pending.
Economics and communities	Economic SAFE and approved species-level economic and community products.	Inventory proposed; latest complete years and disclosure rules require confirmation.

Note. Source inventory for the EBS pollock contribution. Availability describes this draft's verified inputs and proposed data assembly.

Table B3 Life-Stage Synthesis for Eastern Bering Sea Pollock

Stage and timing	Processes and evidence	Priority observations
Spawning and eggs, t	Spawner output, location and transport establish early supply.	Maturity, spawning timing, egg abundance and distribution.
Larvae, t	Prey encounter, growth and delivery to nursery habitat modify supply.	Local prey, larval size and growth, transport and habitat match.
Age 0, summer–fall t	Size and lipid storage determine energy available before winter.	Mass, energy density, total energy, diet quality and prey biomass.
First winter, t to t+1	Reserves, demand, feeding and predation determine early survival.	Fall–spring cohort comparison and winter exposure.
Ages 1–2, t+1 to t+2	Spatial overlap, cannibalism and other predation affect later survival.	Juvenile and predator distributions, diets and mortality.
Adults, later years	Growth, maturity, condition and distribution affect productivity and observation.	Weight-at-age, condition, maturity and comparable spatial indices.

Note. Life-stage synthesis for eastern Bering Sea pollock. The same cohort is followed from birth year t to ages 1 and 3.

Table B4 Proposed Mechanisms and Responses

Driver and mechanism	Expected relation and timing	Evidence and candidate measurement
Spawner output → early supply	Positive toward egg supply in birth year t; later survival modifies the effect.	Smart et al. 2012; SSB, eggs and spawning location.
Prey quality and match → fall energy	Positive toward age-0 energy in t.	Heintz 2013; Siddon 2013; prey lipid, biomass and fish–prey match.
Fall size and energy → winter survival	Positive toward age-1 survival in t+1.	Heintz 2013; Sogard and Olla 2000; mass, energy density and total energy.
Summer mixing → production and prey	Conditional through nutrient supply and prey production in t.	Gann 2016; wind mixing, stratification and nutrients.
Spawning and transport → habitat match	Spatially dependent effect before and during age 0.	Petrik 2015; Smart 2012; transport and nursery-delivery indices.
Predator overlap → juvenile mortality	Negative toward subsequent cohort survival in t+1 and t+2.	Mueter 2006; Spencer 2016; overlap, diet and mortality.
Cold pool → predator access	Hypothesized benefit through separation; depends on predator and stage.	Spencer 2016; common-domain cold pool and overlap.
Late-summer SST → energetic conditions	Hypothesized negative relation with age-1 recruitment after birth-year exposure.	Mueter 2011 and pilot; seasonal SST is a broad proxy.

Note. Proposed mechanism table. Direction refers to the stated response; evidence supports hypotheses rather than a universal coefficient.

Table B5 Proposed Pollock Socioeconomic Indicators

Indicator family	Proposed measure	Management question
Participation	Active vessels, processors and deliveries by sector and season.	Where is participation changing, and which operations face exposure?
Fishery performance	Retained catch, TAC utilization and standardized effort measures.	How do fishing conditions and operating choices affect realized harvest?
Value and product mix	Ex-vessel and first-wholesale value, prices and product shares.	How do product demand and prices affect value from the catch?
Costs	Fuel, labor or other comparable cost measures where available.	What evidence indicates changes in operating margins?
Community exposure	Pollock dependence, employment and participation under approved definitions.	Which communities and CDQ beneficiaries are exposed, and through which pathways?

Indicator family	Proposed measure	Management question
Bycatch and access	Chinook and chum observations, defined rates, season and sector.	How do bycatch conditions and avoidance affect access and operations?

Note. Proposed pollock socioeconomic indicators and the questions they address. All require defined indicators and assessment data.

Table B6 BSAI Pollock Catch, Participation and Ex-Vessel Economics, 2020–2024

Measure	Unit	2020	2021	2022	2023	2024
Total catch, all harvesting sectors	1,000 t round weight	1,370.4	1,378.1	1,108.7	1,314.5	1,316.3
Retained catch, all harvesting sectors	1,000 t round weight	1,358.4	1,363.9	1,094.9	1,299.2	1,298.6
Pollock-target vessels (all harvesting sectors)	Vessels	117.0	116.0	114.0	105.0	103.0
Retained catch, trawl catcher vessels	1,000 t round weight	725.0	718.2	570.0	678.2	678.4
Ex-vessel value, trawl catcher vessels	US$ million (nominal)	233.7	242.8	242.0	244.0	213.4
Ex-vessel unit value, trawl catcher vessels	US$/lb (nominal)	0.1	0.2	0.2	0.2	0.1
Trawl catcher-vessel share of retained catch	%	53.4%	52.7%	52.1%	52.2%	52.2%
Pollock-target catcher vessels	Vessels	88.0	84.0	84.0	77.0	76.0

Note. BSAI denotes the Bering Sea and Aleutian Islands and differs from the BS-only assessment catch series. Total catch includes retained and discarded federal and state catch; retained catch and vessel counts cover federal TAC fisheries. The pollock target is assigned by vessel, week, catching mode, NMFS area and gear. Published catcher-vessel counts describe the target-vessel group; only the catch and value rows explicitly marked trawl carry a separate trawl filter. Unit values and shares are derived from rounded published cells; catcher-vessel unit value combines the reported catcher-vessel catch and value across delivery modes. Monetary values are nominal. Values are rounded to one decimal place. Source: Abelman et al. (2026), Tables 4.1, 4.2, 4.9, 4.10 and 4.14 (printed pp. 34–35, 45–46, 48 and 59), using NMFS accounting and production reports and ADF&G COAR data compiled by AKFIN.

Table B7 BSAI Pollock First-Wholesale Products and Values, 2020–2024

Measure	Unit	2020	2021	2022	2023	2024
All products, published volume	1,000 t product weight	492.7	464.1	387.5	480.9	487.9
All products, published value	US$ million (nominal)	1,352.9	1,370.5	1,400.9	1,603.0	1,474.3
All products, unit value	US$/lb (nominal)	1.2	1.3	1.6	1.5	1.4
At-sea share of published value	%	60.4%	61.7%	61.6%	55.6%	57.9%
Fillets, volume	1,000 t product weight	149.4	Unavailable	Unavailable	142.9	158.6
Fillets, share of published value	%	37.4%	Unavailable	Unavailable	40.2%	40.6%
Fillets, unit value	US$/lb (nominal)	1.5	Unavailable	Unavailable	2.0	1.7
Surimi, volume	1,000 t product weight	171.8	187.8	154.8	185.5	165.1
Surimi, share of published value	%	35.2%	42.8%	37.8%	36.0%	32.2%
Surimi, unit value	US$/lb (nominal)	1.3	1.4	1.6	1.4	1.3
Roe, volume	1,000 t product weight	24.7	16.0	13.8	14.7	19.2
Roe, share of published value	%	8.2%	6.5%	7.1%	6.0%	7.5%
Roe, unit value	US$/lb (nominal)	2.0	2.5	3.3	3.0	2.6
At-sea minus shoreside all-product unit value	US$/lb (nominal)	0.4	0.4	0.4	0.1	0.2

Note. BSAI denotes the Bering Sea and Aleutian Islands. Product weight differs from round-weight retained catch. Published aggregates can be incomplete because confidential components are excluded within a table (Economic SAFE §2.2.6). Fillets combine deep-skin and other fillets and exclude minced fish. Fillet volume, value share and unit value are unavailable for 2021–2022 because shoreside deep-skin components are confidential; unavailable cells are not zeros. Unit values and shares use rounded published values. The at-sea-minus-shoreside unit-value difference is unadjusted for product quality and reflects product mix. All dollar values are nominal. Values are rounded to one decimal place. Source: Abelman et al. (2026), Tables 4.16–4.18 (printed pp. 65, 70 and 74), using NMFS production reports and ADF&G COAR data compiled by AKFIN.

Table B8 Global Alaska Pollock Catch and U.S. Trade

Panel A. Global Alaska Pollock Catch and Shares, 2020–2024

Metric	Unit	2020	2021	2022	2023	2024
Global Alaska pollock catch	kt live weight	3,544.3	3,484.2	3,380.4	3,543.5	3,573.5
U.S. share of global catch	percent	41.3%	42.0%	36.3%	40.5%	39.9%
Russian share of global catch	percent	51.6%	50.2%	56.3%	53.5%	54.0%
BSAI share of global catch	percent	38.7%	39.6%	32.8%	37.1%	36.8%

Panel B. U.S. Alaska-Pollock Trade, 2020–2025

Metric	Unit	2020	2021	2022	2023	2024	2025
Export volume	kt product weight	323.5	311.4	274.1	326.3	332.5	333.1
Export value	million nominal USD	941.9	898.9	885.6	1,004.4	945.9	1,002.4
Export unit value	USD/lb product weight	1.3	1.3	1.5	1.4	1.3	1.4
Import value (Alaska + unspecified pollock)	million nominal USD	99.7	96.2	141.3	105.5	65.3	48.7
Net exports (legacy basket)	million nominal USD	842.2	802.6	744.4	899.0	880.5	953.6
Japan export volume share	percent	19.3%	21.0%	21.2%	25.0%	19.7%	15.0%
Japan export value share	percent	20.2%	21.1%	20.1%	22.9%	20.7%	16.6%
China, Taiwan and Hong Kong (legacy aggregate) export volume share	percent	9.7%	6.8%	11.6%	7.7%	13.3%	10.6%
China, Taiwan and Hong Kong (legacy aggregate) export value share	percent	6.5%	5.3%	7.5%	5.2%	8.5%	6.7%
Selected European countries export volume share	percent	37.0%	32.7%	31.4%	32.1%	34.2%	37.1%
Selected European countries export value share	percent	39.4%	36.3%	35.3%	37.9%	38.6%	40.7%
Meat export volume share	percent	45.8%	41.1%	42.7%	40.6%	47.5%	53.3%
Meat export value share	percent	44.0%	40.8%	42.5%	43.4%	48.0%	53.0%
Surimi export volume share	percent	47.0%	53.8%	52.2%	54.3%	46.3%	40.4%
Surimi export value share	percent	42.2%	49.4%	49.1%	47.1%	39.1%	34.1%
Roe export volume share	percent	7.3%	5.1%	5.1%	5.2%	6.2%	6.3%
Roe export value share	percent	13.8%	9.8%	8.4%	9.5%	13.0%	13.0%

Note. These observed historical statistics cover global catch and shares through 2024 and U.S. trade through 2025. Trade statistics remain revisable. Global catch was in thousand tons of live weight. Trade volumes were thousand tons of product weight. BSAI catch was a subset of U.S. catch and included federal and state retained plus discarded catch from both the Bering Sea and Aleutian Islands. Trade covers U.S.-national Alaska-pollock products across their source fisheries. Export values were nominal U.S. dollars on a free-alongside-ship (FAS) export-value basis, distinct from wholesale revenue. Unit values reflect product mix as well as market conditions. Domestic exports exclude re-exports. The legacy import basket combined Alaska and unspecified (NSPF) pollock; legacy net exports subtract that broader basket from Alaska-pollock domestic exports. The legacy statistical aggregate combined mainland China, Taiwan and Hong Kong. The selected European aggregate comprises Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom. It was neither the European Union nor all Europe. Meat combined Alaska-pollock products other than surimi and roe, including frozen whole/headed-and-gutted fish, fillets and other meat. Product shares sum to 100% before rounding. Values were rounded to one decimal place. Displayed net exports were rounded from the saved source totals rather than recalculated from separately rounded export and import values. Sources: NOAA Fisheries FOSS, retrieved 30 October 2026; FAO Global Capture Production release Capture_2026.1.0 (March 2026); Economic SAFE 2025, Table 4.1, p. 34, published 16 March 2026. Source links: NOAA foreign fishery trade data; FAO Global Capture Production; Economic SAFE.

Table B9 Annual Mean Age-0 Pollock Energy Density, 2021–2025

Year	NBS (kJ/g dry mass)	SEBS (kJ/g dry mass)
2021	21.5	20.1
2022	21.5	19.7
2023	21.3	19.8
2024	20.9	19.9
2025	20.8	19.2

Note. Annual mean age-0 pollock energy density for 2021–2025, in kJ/g dry mass. Regions remain separate; sampling uncertainty is pending. Values are rounded to one decimal place. Source: Page and Maselko (2026), DATA sheet.

Table B10 Archived DSEM Pilot Results

Specification	Delta AIC	Residual variance reduction	Maximum gradient	Gradient below 1e-4
Age-0 late-summer SST	0.00	10.5%	1.52e-04	Requires refit
Cold pool + age-0 late-summer SST	1.63	12.0%	5.00e-05	Pass
No-edge reference	2.25	0.0%	5.61e-05	Pass
Cold pool	4.10	0.3%	5.69e-05	Pass

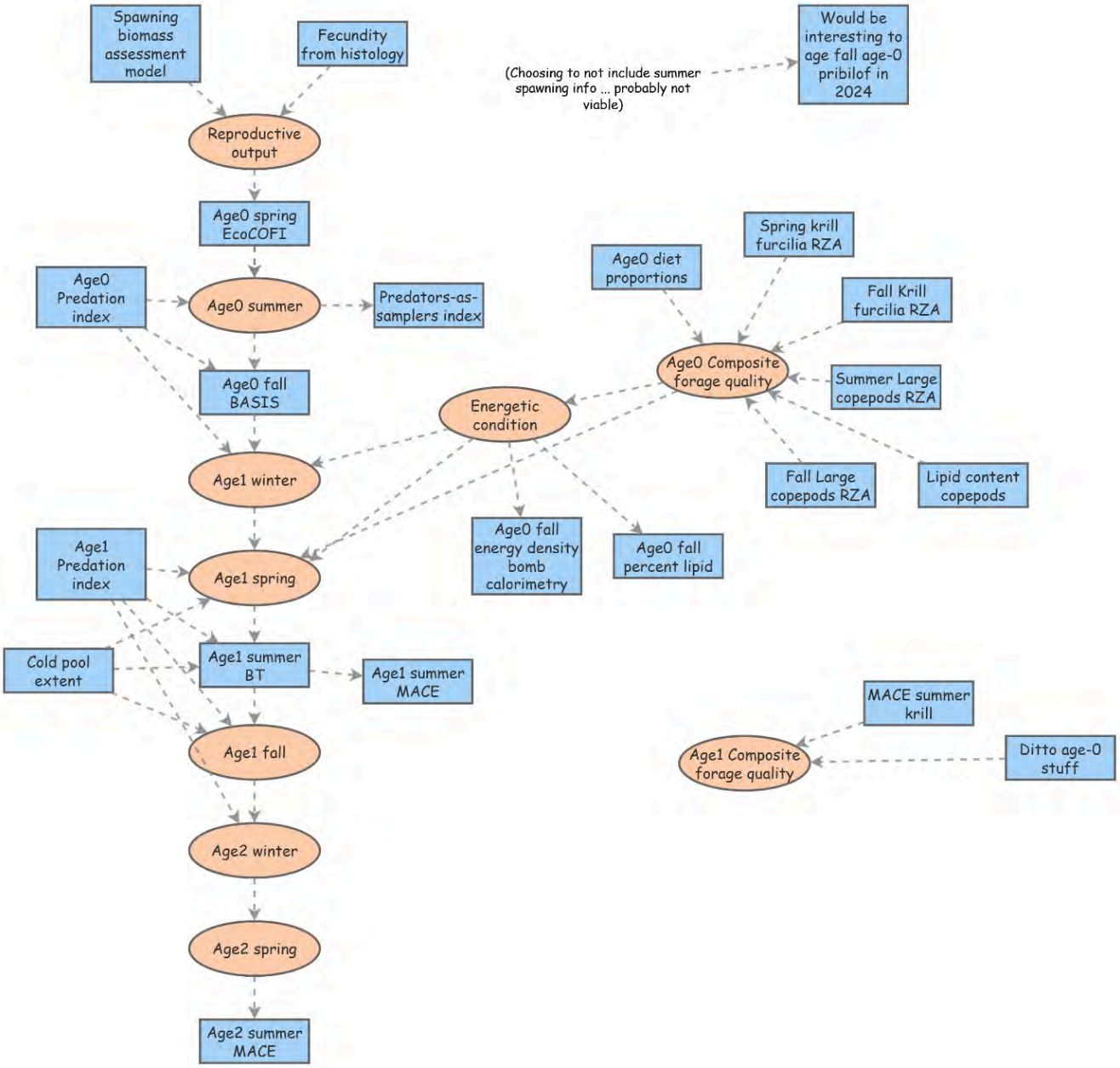
Note. Archived live DSEM pilot results. All Hessians are reported as positive definite. The gradient column applies the strict threshold of 1e-4 independently of the saved OK status.

Table B11 Standardized Direct Proxy Coefficients From the Archived DSEM Pilot

Specification	Pathway	Estimate	95 percent interval
Cold pool	Cold pool	0.041	-0.170 to 0.251
Age-0 late-summer SST	Age-0 SST	-0.222	-0.426 to -0.017
Cold pool + age-0 late-summer SST	Cold pool	-0.069	-0.292 to 0.153
Cold pool + age-0 late-summer SST	Age-0 SST	-0.254	-0.484 to -0.024

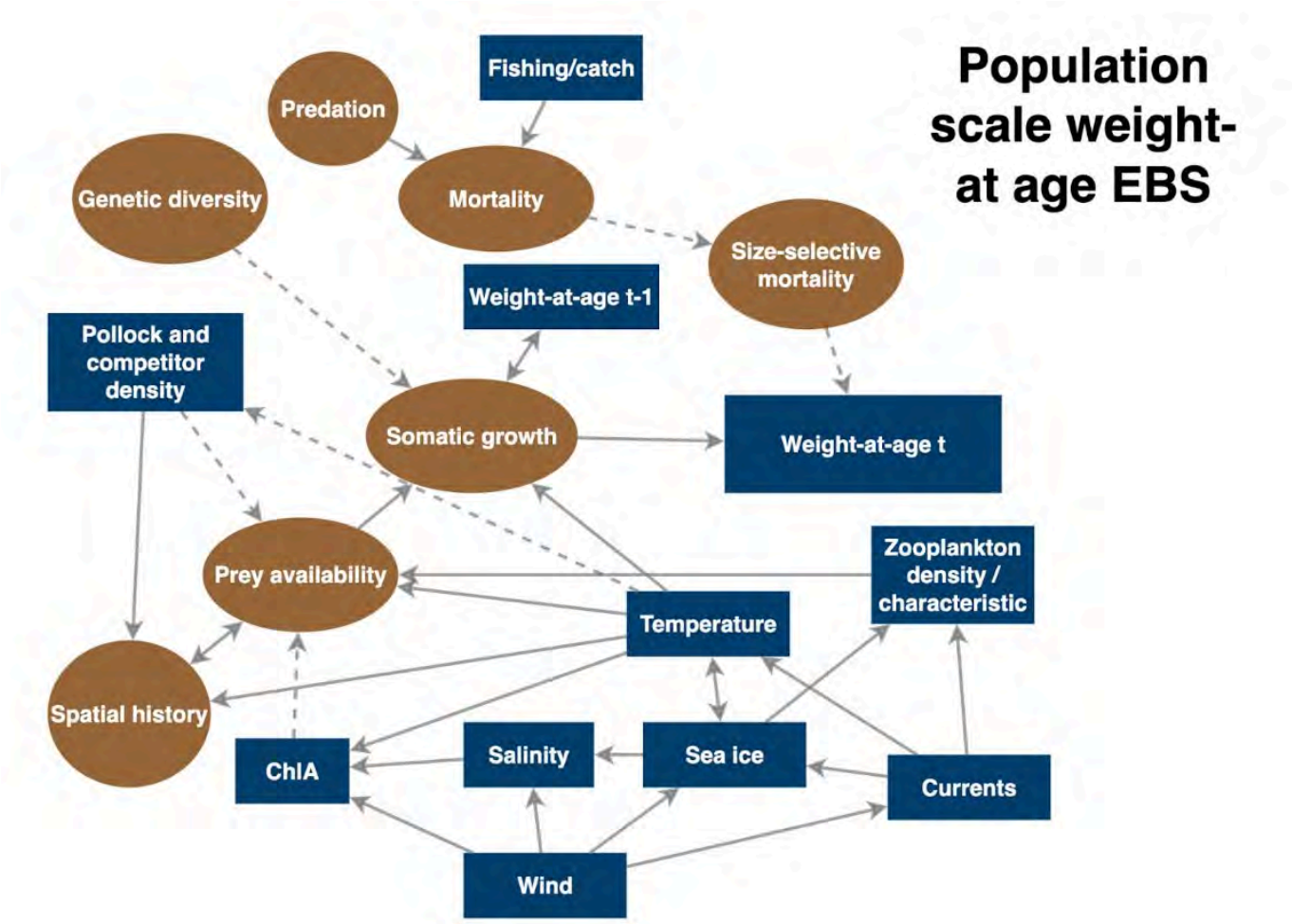
Note. Standardized direct proxy coefficients from the archived live DSEM pilot, with approximate 95 percent intervals. These fitted paths remain provisional research estimates.

Figures



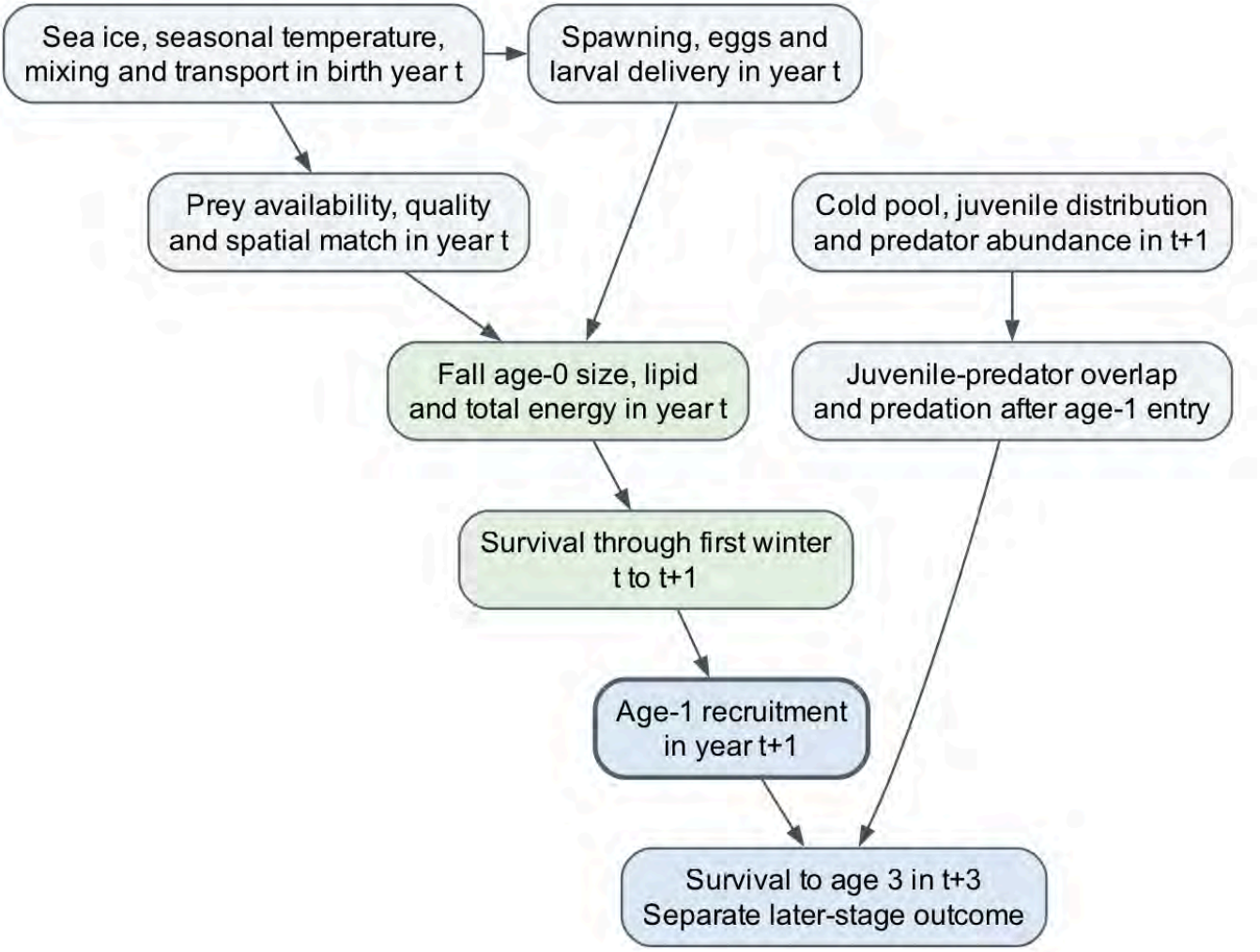
Note. Preliminary Bering Sea recruitment conceptual model reproduced from Monnahan et al. (2026), original Figure 1, printed page 19 (PDF page 27). Source: AFSC Processed Report 2026-09 (Monnahan et al. 2026).

Figure B1 Preliminary Bering Sea Recruitment Conceptual Model



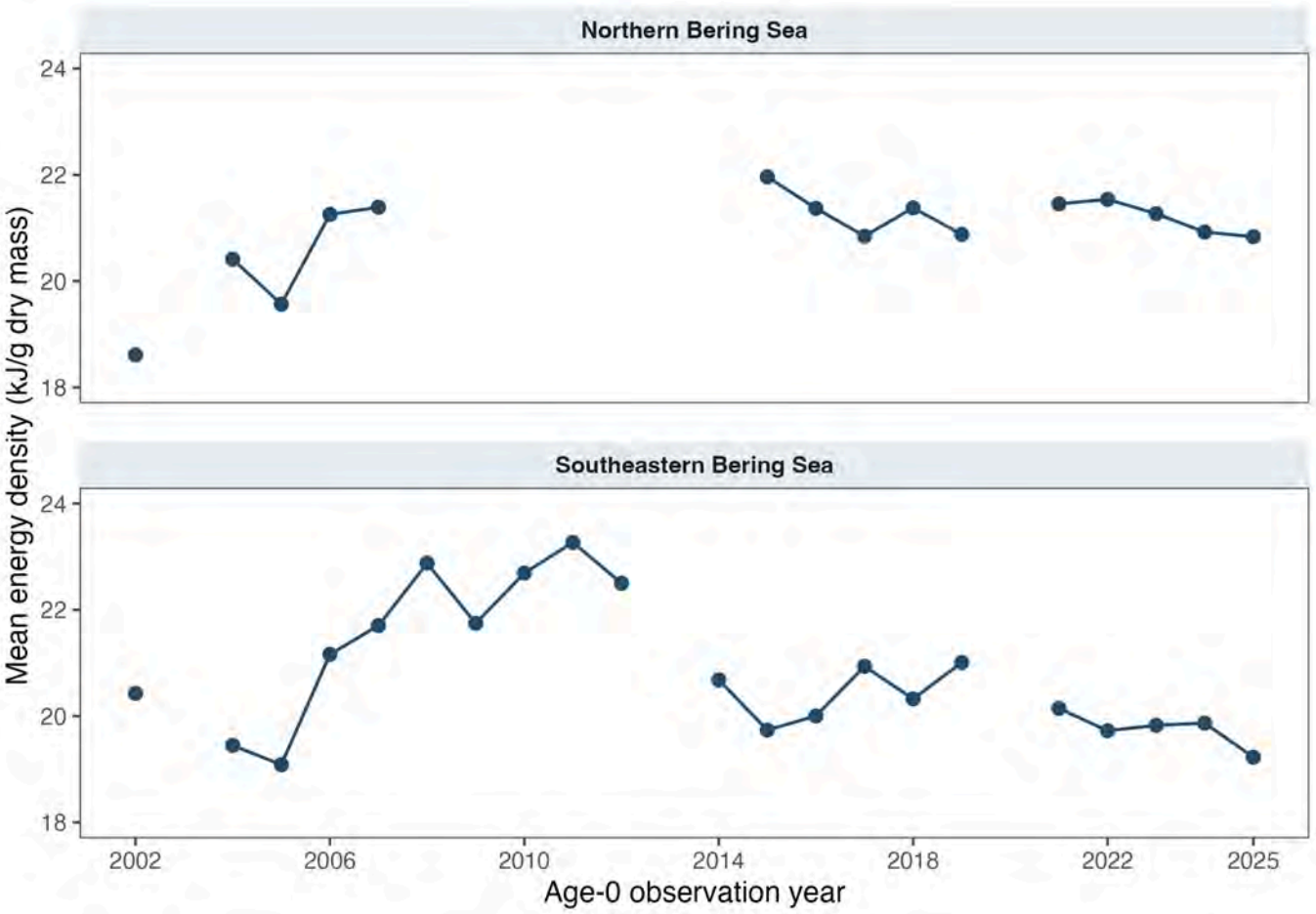
Note. Preliminary Bering Sea growth conceptual model reproduced from Monnahan et al. (2026), original Figure 2, printed page 20 (PDF page 28). Source: AFSC Processed Report 2026-09 (Monnahan et al. 2026).

Figure B2 Preliminary Bering Sea Growth Conceptual Model



Note. Conceptual cohort sequence from physical conditions and spawning through prey, fall energy, first-winter survival and age-1 recruitment, with subsequent predation affecting survival to age 3. Arrows represent hypotheses supported by the cited literature; they were separate from the fitted direct proxy paths.

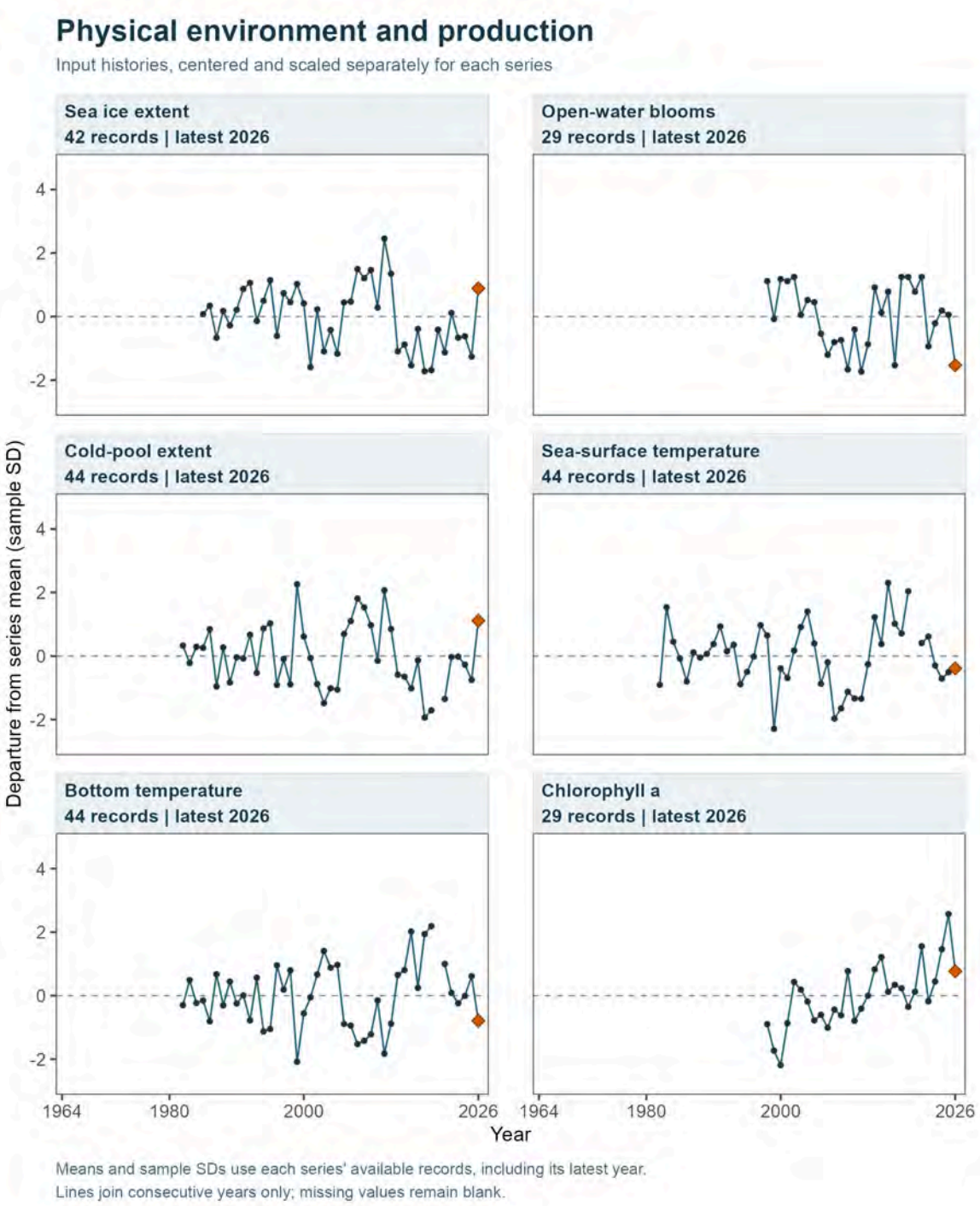
Figure B3 Conceptual Cohort Sequence From Spawning Through Age-3 Survival



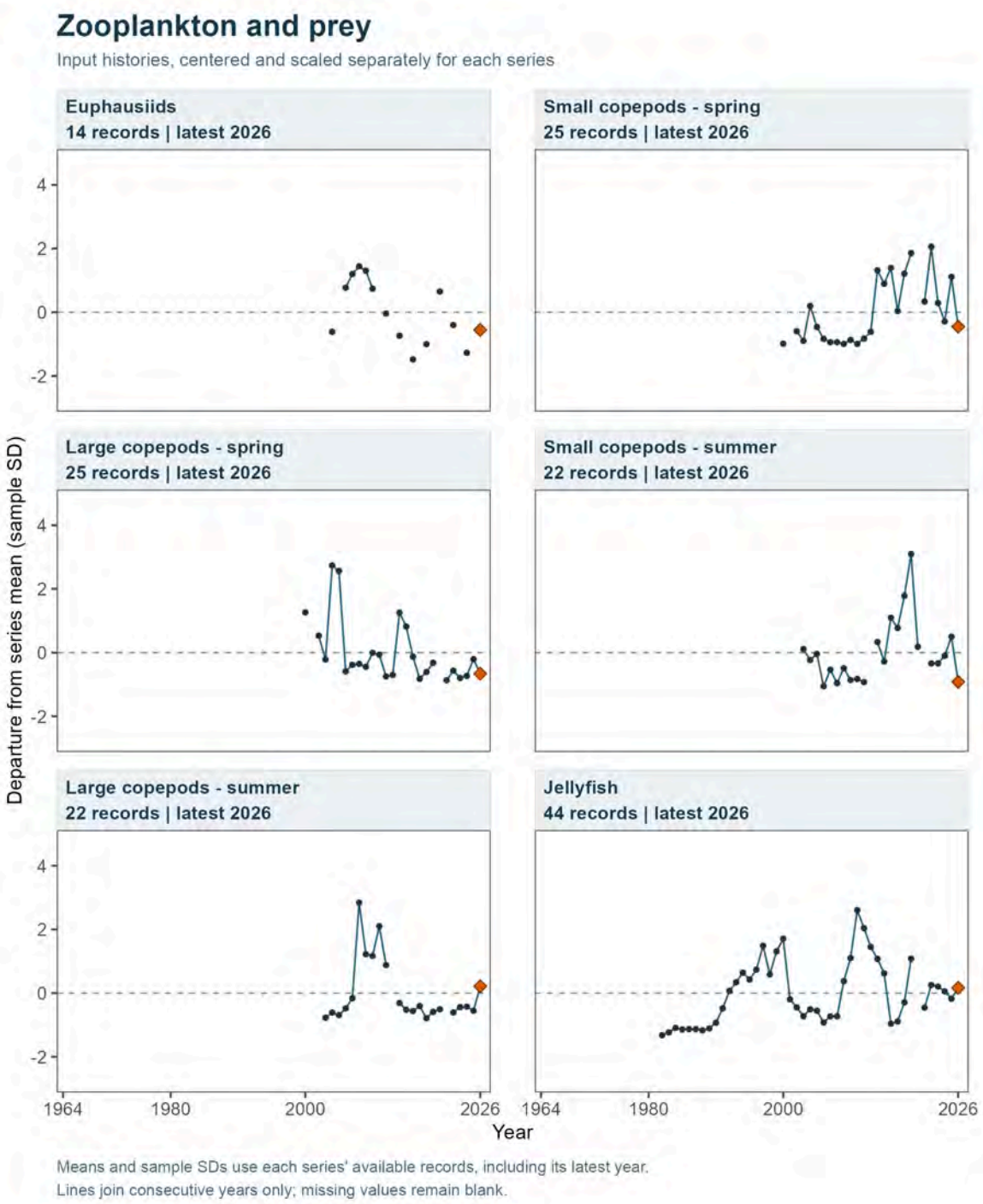
Note. Annual mean age-0 pollock energy density in the northern and southeastern Bering Seas, 2002–2025, in kJ/g dry mass. Points show regional means; lines connect consecutive observed years and break at missing years. Source: Page and Maselko (2026).

Figure B4 Annual Mean Age-0 Pollock Energy Density, 2002–2025

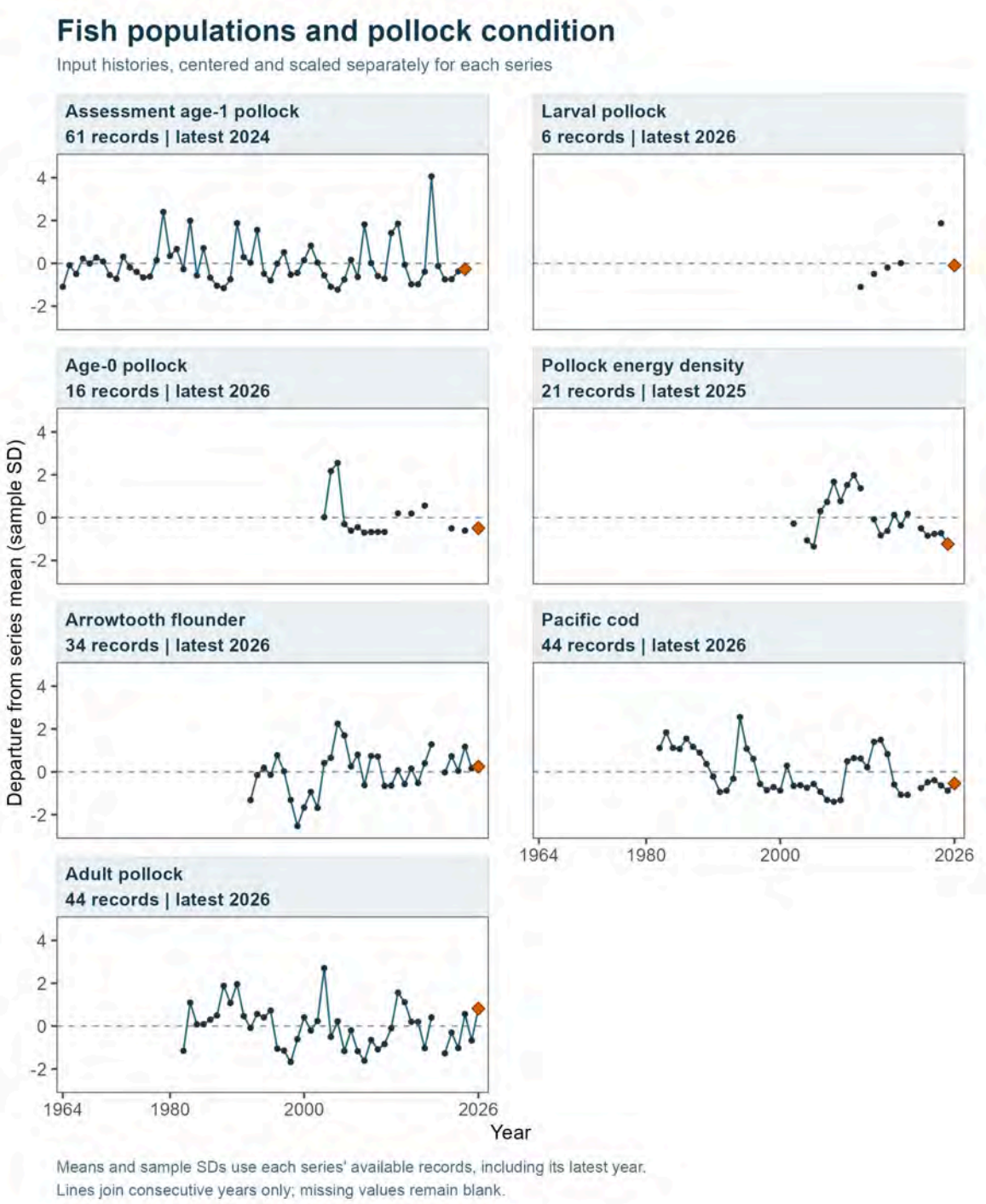
Physical environment and primary production



Zooplankton and prey

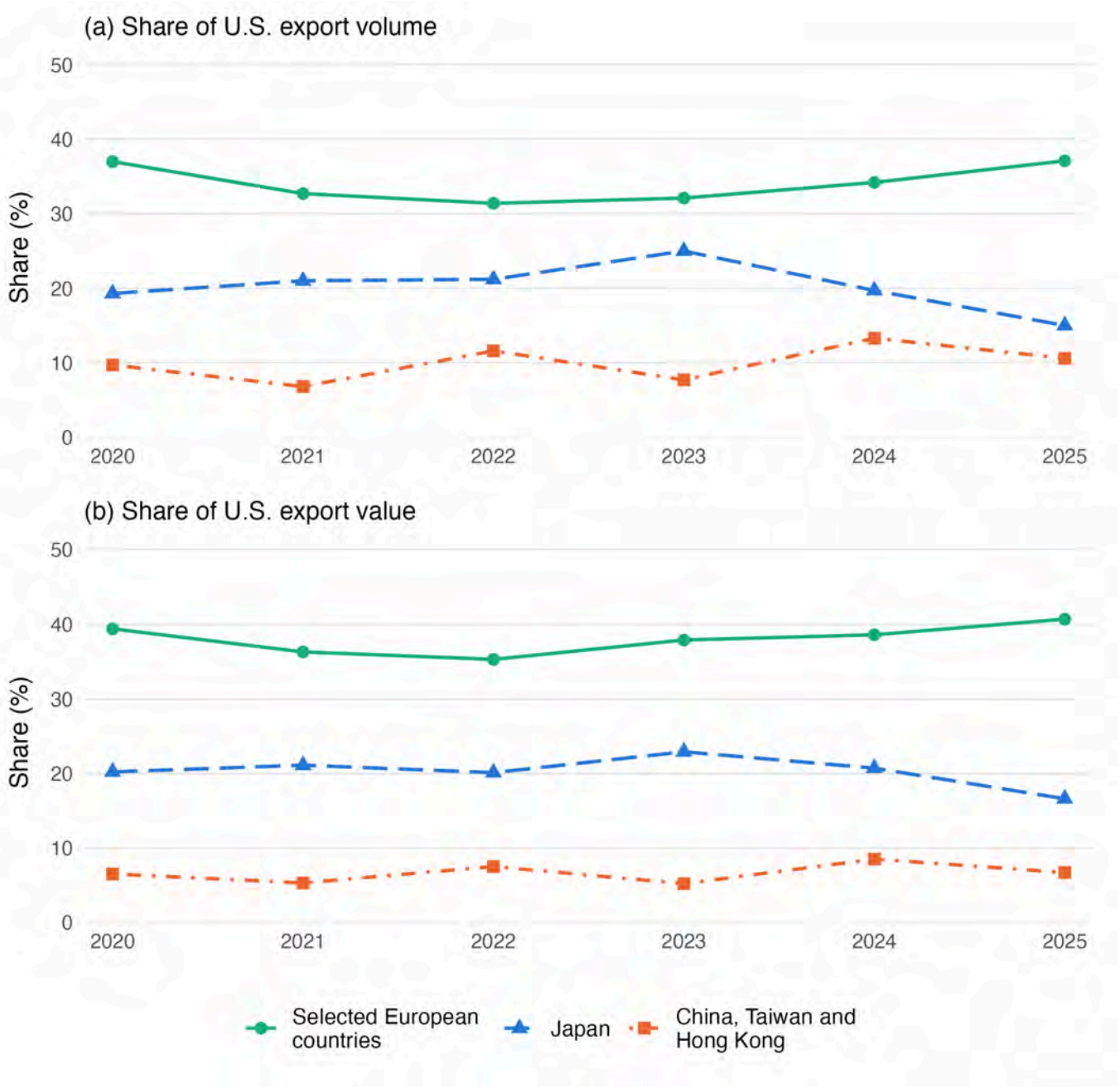


Fish abundance, energy density and the age-1 response



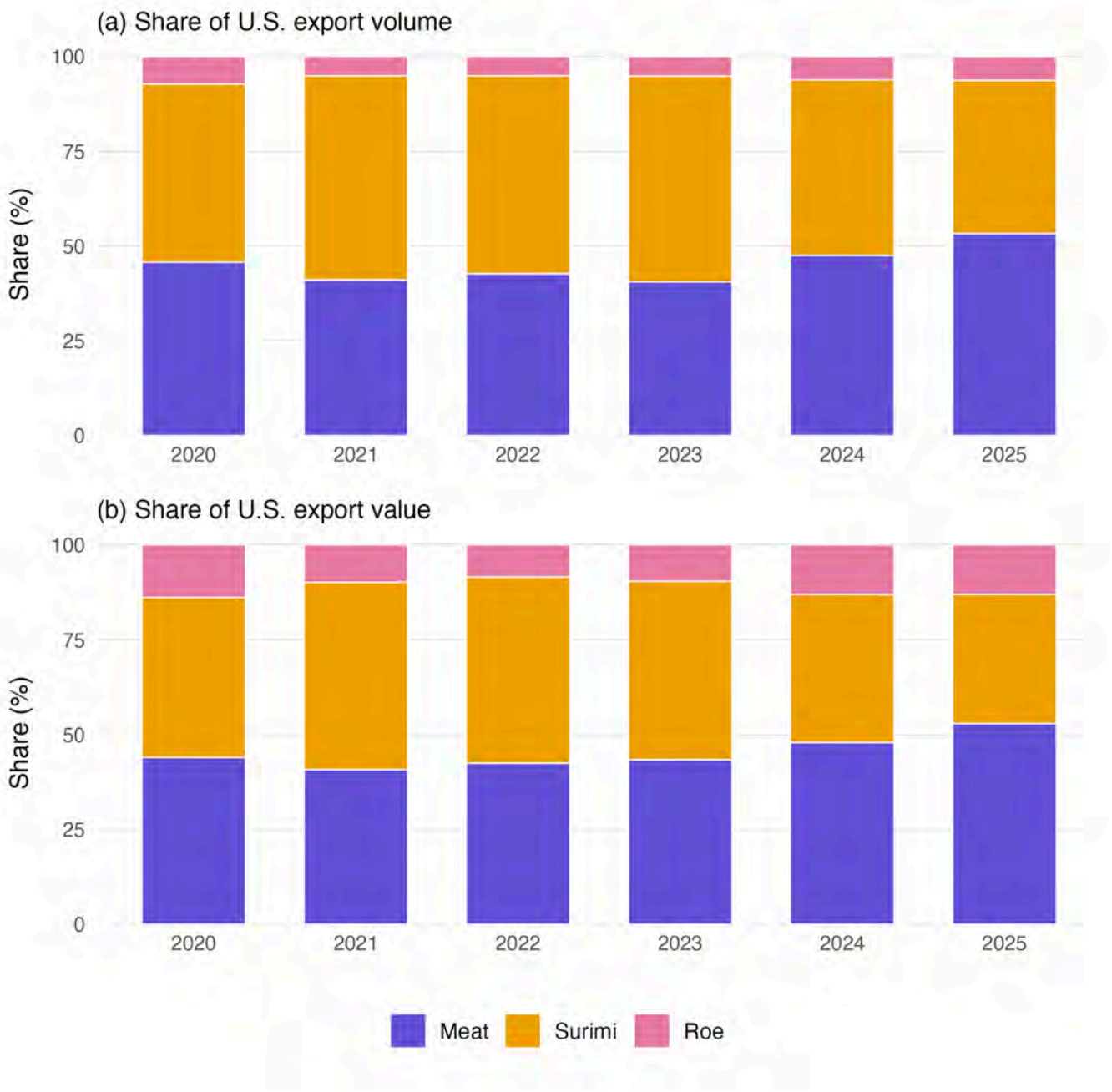
Note. Annual input histories grouped for readability. Each value was centered on that series' available-record arithmetic mean and divided by its sample SD, including the latest year. The zero line denotes that mean; gaps were retained without interpolation. Symbols identify values and highlighted endpoints identify each latest record. The panels showed 19 annual series. The energy record ended in 2025; the age-1 response ended in 2024. The panels showed annual observations rather than DSEM estimates or forecasts.

Figure B5 Indicator Histories in Standardized Units



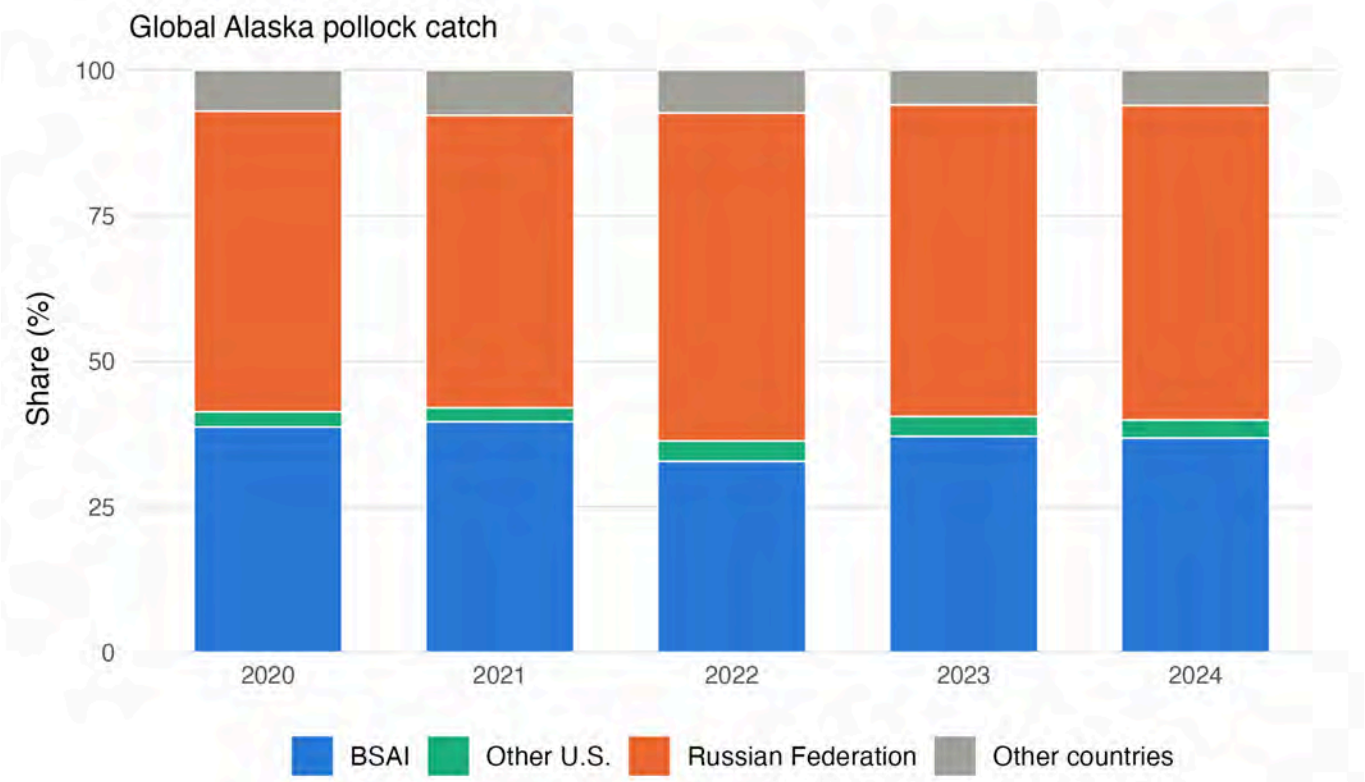
Note. Destination shares of U.S. Alaska pollock domestic exports by (a) product volume and (b) nominal FAS value. The three categories cover part of total exports. Selected European countries were Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. The combined trade category covers China, Taiwan and Hong Kong. Shares and definitions match Table B8, panel B. Source: (NOAA Fisheries 2026).

Figure B6 U.S. Alaska Pollock Export Destination Shares, 2020–2025



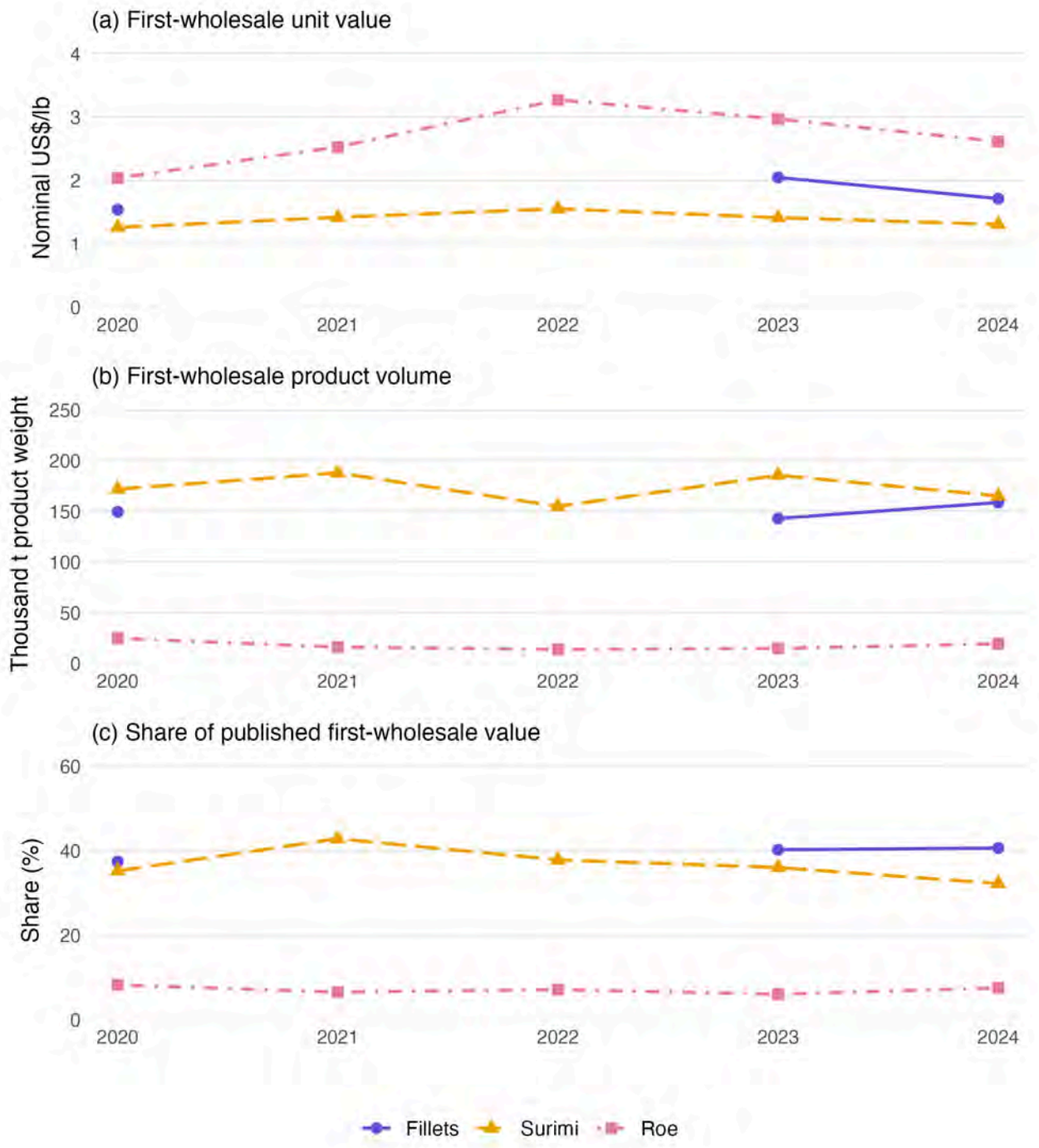
Note. Product shares of U.S. Alaska pollock domestic exports by (a) product volume and (b) nominal FAS value. Meat combined products other than surimi and roe, including frozen whole and headed-and-gutted fish and fillets. The one-decimal source shares were rescaled to sum to 100% within each year; the largest adjustment was 0.054 percentage points. Values and product definitions were in Table B8, panel B. Source: (NOAA Fisheries 2026).

Figure B7 U.S. Alaska Pollock Export Product Mix, 2020–2025



Note. Shares of global Alaska pollock capture production by live weight. Other U.S. was the U.S. share minus the BSAI share; other countries was the remainder after the United States and Russian Federation. BSAI included Bering Sea and Aleutian Islands catch. FAO release Capture_2026.1.0 supplied the global totals; the Economic SAFE supplied BSAI catch. Definitions and totals were in Table B8, panel A. Sources: (FAO 2026); (Abelman et al. 2026).

Figure B8 Global Alaska Pollock Catch by Origin, 2020–2024



Note. BSAI pollock (a) nominal first-wholesale unit values, (b) production in thousand tons of product weight, and (c) shares of published first-wholesale value. Unit values equal total published value times the product value share, divided by product volume and converted to US$/lb; they reflected product mix as well as market conditions. Fillet observations for 2021–2022 were unavailable because confidential shoreside deep-skin components prevent their calculation. Gaps remain missing rather than zero. Other products account for the remaining value share. See Table B7 for definitions. Source: (Abelman et al. 2026).

Figure B9 BSAI Pollock First-Wholesale Product Indicators, 2020–2024

Appendix C Research and Other Noncommercial Pollock Removals

Reported noncommercial catch

Reported noncommercial pollock catches in the Bering Sea were summarized by collection in Table C1 and by year in Table C2. The AKR dataset covers 1982–2025 across the Gulf of Alaska, Bering Sea and Aleutian Islands; Bering Sea records begin in 1991, with broader multisurvey coverage from 2010. These were reported collection-year amounts, rather than verified complete EBS-stock totals. Missing years and collection cells indicate absent observations. The data ended in 2025.

The summaries used the reported Bering Sea FMP area, retaining stations from collections whose names mention other regions. Explicitly Bogoslof-named surveys were shown separately; other collections in reporting area 518 remain among the other reported Bering Sea catches. In 2024, the total was 216.280081 t, including 4.393640 t from the named Bogoslof survey and 211.886441 t from other reported Bering Sea collections. The corresponding 2025 reported total was 140.994428 t.

Experimental fishing permit (EFP) records account for 1,198.506090 t in 2011 and 771.516610 t in 2021. Their inclusion explains the large totals in those years. The sole 2020 record was a Bogoslof collection; other EBS research removals remain unverified for that year. Historical EFP inclusion in official catch accounting required reconciliation. AKR metadata state that no 2025 EFP catches occurred outside CAS.

Weights were converted from kilograms to tons using the units corroborated by AKR dataset correspondence, dated 9 October and forwarded on 13 October 2026. Annual completeness of the AKR dataset received on 27 October remained unverified. The 2020–2023 totals agree, after rounding, with the accepted 2024 SAFE's research-catch table (Ianelli et al. 2024). Noncommercial removals were reported separately from assessment catch. The full annual summaries and source record retain the collection details and reporting qualifications.

Exempted fishing and other removal categories

The 2025 EFP 2025-01 permit and 2026 renewal allow up to 3,000 t of total groundfish, rather than pollock alone, to be exempt from TAC during each permit's effective period; additional groundfish catch counts against TAC. This authorization ceiling was separate from observed removals. Actual pollock catch under these permitted and its accounting treatment require permit-specific records.

EFP 2024-02 provided a footrope/gear exemption and otherwise retained applicable regulations. It supplied no basis for assuming a TAC exemption. The noncommercial dataset included BS-labelled subsistence records in 1991 and 1994; complete recent stock-specific subsistence, recreational and other-FMP removals remain unverified.

Tables

Table C1 Reported Bering Sea Noncommercial Pollock Catch by Collection and Year

Panel A. 1991–2009

Collection (agency)	1991	1994	1997	1999	2001	2003	2005	2007	2009
AFSC Annual Longline Survey (NMFS)	NA	NA	1.0	2.1	4.0	3.1	1.1	0.9	1.4
Subsistence Fishery (ADFG)	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA

Panel B. 2010–2017

Collection (agency)	2010	2011	2012	2013	2014	2015	2016	2017
AFSC Annual Longline Survey (NMFS)	NA	3.9	NA	2.3	NA	3.4	NA	1.6
Aleutian Island Bottom Trawl Survey (NMFS)	27.0	NA	4.5	NA	12.3	NA	2.6	NA
Bering Sea Acoustic Survey (NMFS)	49.6	NA	NA	NA	NA	NA	NA	NA
Bering Sea Bottom Trawl Survey (NMFS)	140.7	NA	NA	NA	NA	NA	NA	NA
Bering Sea Slope Survey (NMFS)	3.3	NA	7.7	NA	NA	NA	12.4	NA
Bogoslof EIT Survey with Northern Extensions (NMFS)	NA	NA	4.1	NA	NA	NA	NA	NA
Eastern Bering Sea Bottom Trawl Survey (NMFS)	NA	116.5	140.0	178.7	293.4	249.7	177.4	181.1

Collection (agency)	2010	2011	2012	2013	2014	2015	2016	2017
Gulf of Alaska Bottom Trawl Survey (NMFS)	NA	<0.1	NA	<0.1	NA	<0.1	NA	NA
IPHC Annual Longline Survey (IPHC)	0.7	0.2	0.1	0.2	0.6	0.7	0.9	0.1
Large-Mesh Trawl Survey (ADFG)	3.7	3.2	2.4	2.2	1.4	2.1	4.6	5.0
Northern Bering Sea Bottom Trawl Survey (NMFS)	0.6	NA	NA	NA	NA	NA	NA	38.1
Pollock EFP 11-01 (NMFS)	NA	1,198.5	3.8	NA	NA	NA	NA	NA
Pribilof Islands Crab Survey (ADFG)	NA	0.1	NA	NA	NA	NA	0.3	NA
St. Matthews Crab Survey (ADFG)	0.2	NA	NA	NA	NA	NA	NA	0.2
Summer EBS Survey with Russia (NMFS)	NA	NA	45.2	NA	NA	NA	NA	NA

Panel C. 2018–2025

Collection (agency)	2018	2019	2020	2021	2022	2023	2024	2025
AFSC Annual Longline Survey (NMFS)	NA	1.3	NA	0.9	NA	0.7	NA	NA
Aleutian Island Bottom Trawl Survey (NMFS)	6.1	NA	NA	NA	9.7	NA	5.0	NA
BSAI Trawl Salmon Excluder Device EFP 2018-03-02 (NMFS)	NA	NA	NA	771.5	NA	NA	NA	NA
Blue King Crab Pot Survey (ADFG)	<0.1	NA	NA	NA	0.1	NA	NA	NA
Bogoslof Island Walleye Pollock Acoustic-Trawl Survey (NMFS)	6.0	NA	NA	NA	NA	NA	NA	NA
Eastern Bering Sea Bottom Trawl Survey (NMFS)	111.7	188.4	NA	107.8	168.1	118.0	163.2	120.4
Eastern Bering Sea Walleye Pollock Acoustic-Trawl Survey (NMFS)	36.7	NA	NA	NA	48.3	NA	NA	NA
Gulf of Alaska Bottom Trawl Survey (NMFS)	NA	<0.1	NA	NA	NA	<0.1	NA	NA
IPHC Annual Longline Survey (IPHC)	0.1	0.1	NA	<0.1	0.2	NA	0.1	NA
Large-Mesh Trawl Survey (ADFG)	1.8	1.8	NA	1.4	6.1	0.7	3.8	2.1
Northern Bering Sea Bottom Trawl Survey (NMFS)	15.0	38.6	NA	16.0	13.1	NA	NA	18.5
Summer Acoustic-Trawl Survey of Walleye Pollock in the Eastern Bering Sea (NMFS)	NA	NA	NA	NA	NA	NA	39.8	NA
Winter Acoustic-Trawl Survey of Walleye Pollock Near Bogoslof Island and vicinity (NMFS)	NA	NA	12.9	NA	NA	NA	4.4	NA

Note. Values were metric tons (source kilograms divided by 1,000), rounded to one decimal place. Source: received Noncommercial Fishery Catch (1).csv, 27 October 2026 received-date field. Reported records had FMP Area = BS and Species Group Code = PLCK. All reporting areas were retained, including 518. NA indicated missing records; 0.0 indicated a reported zero. Early panels show observed BS years only, and collection rows with no records in a panel were omitted from that panel. All collection-year cells and full source precision were retained in the accompanying CSV. Scope followed the FMP field, including collections whose names mention other regions. Positive amounts that round to 0.0 t were shown as <0.1; 0.0 denotes a source zero.

Table C2 Annual Reported Bering Sea Pollock Catch by Source Category

Collection year	Reported BS total (t)	EFP (t)	Explicitly Bogoslof-named (t)	Other reported BS (t)	Source records
1991	<0.1	NA	NA	<0.1	1
1992	NA	NA	NA	NA	NA
1993	NA	NA	NA	NA	NA
1994	<0.1	NA	NA	<0.1	1
1995	NA	NA	NA	NA	NA
1996	NA	NA	NA	NA	NA
1997	1.0	NA	NA	1.0	4
1998	NA	NA	NA	NA	NA
1999	2.1	NA	NA	2.1	4
2000	NA	NA	NA	NA	NA
2001	4.0	NA	NA	4.0	4
2002	NA	NA	NA	NA	NA

Collection year	Reported BS total (t)	EFP (t)	Explicitly Bogoslof-named (t)	Other reported BS (t)	Source records
2003	3.1	NA	NA	3.1	4
2004	NA	NA	NA	NA	NA
2005	1.1	NA	NA	1.1	3
2006	NA	NA	NA	NA	NA
2007	0.9	NA	NA	0.9	4
2008	NA	NA	NA	NA	NA
2009	1.4	NA	NA	1.4	4
2010	226.0	NA	NA	226.0	65
2011	1,322.5	1,198.5	NA	124.0	30
2012	207.9	3.8	4.1	200.0	38
2013	183.4	NA	NA	183.4	56
2014	307.7	NA	NA	307.7	26
2015	255.9	NA	NA	255.9	30
2016	198.1	NA	NA	198.1	32
2017	226.1	NA	NA	226.1	29
2018	177.4	NA	6.0	171.4	38
2019	230.1	NA	NA	230.1	29
2020	12.9	NA	12.9	NA	1
2021	897.6	771.5	NA	126.1	34
2022	245.7	NA	NA	245.7	40
2023	119.4	NA	NA	119.4	19
2024	216.3	NA	4.4	211.9	33
2025	141.0	NA	NA	141.0	20
2026	NA	NA	NA	NA	NA

Note. Weights are metric tons, rounded to one decimal place. Categories are mutually exclusive source-label summaries. EFP comprises the two explicitly EFP-named collections; the Bogoslof column includes collections explicitly named for Bogoslof. Other reported BS includes all remaining BS-labelled records, including area-518 records from other collections. NA indicates missing records; 0.0 indicates a reported zero. The row count measures records. Totals cover the reported records; annual coverage and overlap with official catch accounting remain uncertain.

Appendix D Detailed Current-Model Estimates

All estimated parameters and their asymptotic uncertainty were listed below (Table D1), followed by the largest parameter correlations (Table D2). These estimates use the selected model and fixed biological schedules. The full numerical products also retain natural-scale transformations and all shared parameter positions.

Table D1 Model 26.0 Estimated Parameters and Approximate 95% Confidence Intervals

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0001	Recruitment level	R0	9.6728	0.1212	9.4352	9.9104
P0002	Recruitment deviation	1964	−1.0198	0.4681	−1.9373	−0.1023
P0003	Recruitment deviation	1965	0.3917	0.2916	−0.1798	0.9632
P0004	Recruitment deviation	1966	0.0001	0.3593	−0.7041	0.7042
P0005	Recruitment deviation	1967	0.5387	0.2917	−0.0330	1.1104
P0006	Recruitment deviation	1968	0.3459	0.3165	−0.2745	0.9662
P0007	Recruitment deviation	1969	0.5038	0.2931	−0.0705	1.0782
P0008	Recruitment deviation	1970	0.3846	0.3052	−0.2136	0.9828
P0009	Recruitment deviation	1971	−0.1528	0.3739	−0.8856	0.5800
P0010	Recruitment deviation	1972	−0.3766	0.3851	−1.1314	0.3782
P0011	Recruitment deviation	1973	0.5213	0.2325	0.0655	0.9770
P0012	Recruitment deviation	1974	0.1941	0.2371	−0.2706	0.6589
P0013	Recruitment deviation	1975	0.0354	0.2205	−0.3967	0.4675
P0014	Recruitment deviation	1976	−0.2044	0.2104	−0.6169	0.2081
P0015	Recruitment deviation	1977	−0.1243	0.1911	−0.4989	0.2503
P0016	Recruitment deviation	1978	0.5126	0.1555	0.2078	0.8175
P0017	Recruitment deviation	1979	1.3692	0.1375	1.0997	1.6387
P0018	Recruitment deviation	1980	0.6249	0.1492	0.3324	0.9174
P0019	Recruitment deviation	1981	0.7685	0.1463	0.4817	1.0553
P0020	Recruitment deviation	1982	0.1889	0.1614	−0.1274	0.5052
P0021	Recruitment deviation	1983	1.1863	0.1357	0.9204	1.4521
P0022	Recruitment deviation	1984	−0.1097	0.1634	−0.4299	0.2104
P0023	Recruitment deviation	1985	0.7176	0.1390	0.4450	0.9901
P0024	Recruitment deviation	1986	−0.2200	0.1558	−0.5254	0.0853
P0025	Recruitment deviation	1987	−0.7740	0.1648	−1.0971	−0.4510
P0026	Recruitment deviation	1988	−1.0224	0.1658	−1.3474	−0.6974
P0027	Recruitment deviation	1989	−0.2878	0.1424	−0.5669	−0.0086
P0028	Recruitment deviation	1990	1.1562	0.1262	0.9090	1.4035
P0029	Recruitment deviation	1991	0.5442	0.1307	0.2881	0.8003
P0030	Recruitment deviation	1992	0.4032	0.1325	0.1436	0.6628
P0031	Recruitment deviation	1993	1.0698	0.1269	0.8211	1.3186
P0032	Recruitment deviation	1994	0.0032	0.1356	−0.2625	0.2690
P0033	Recruitment deviation	1995	−0.3517	0.1389	−0.6239	−0.0794
P0034	Recruitment deviation	1996	0.3553	0.1292	0.1020	0.6086
P0035	Recruitment deviation	1997	0.6464	0.1269	0.3977	0.8950
P0036	Recruitment deviation	1998	−0.0602	0.1317	−0.3183	0.1978
P0037	Recruitment deviation	1999	0.0094	0.1306	−0.2466	0.2654
P0038	Recruitment deviation	2000	0.4371	0.1273	0.1876	0.6866
P0039	Recruitment deviation	2001	0.7735	0.1252	0.5281	1.0189
P0040	Recruitment deviation	2002	0.3678	0.1265	0.1199	0.6157

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0041	Recruitment deviation	2003	−0.1019	0.1286	−0.3540	0.1502
P0042	Recruitment deviation	2004	−0.8894	0.1362	−1.1564	−0.6224
P0043	Recruitment deviation	2005	−1.2337	0.1415	−1.5110	−0.9563
P0044	Recruitment deviation	2006	−0.3192	0.1309	−0.5758	−0.0627
P0045	Recruitment deviation	2007	0.4533	0.1271	0.2041	0.7025
P0046	Recruitment deviation	2008	−0.1584	0.1330	−0.4192	0.1024
P0047	Recruitment deviation	2009	1.1374	0.1249	0.8925	1.3823
P0048	Recruitment deviation	2010	0.3763	0.1287	0.1240	0.6287
P0049	Recruitment deviation	2011	−0.1110	0.1328	−0.3713	0.1493
P0050	Recruitment deviation	2012	−0.2546	0.1337	−0.5166	0.0074
P0051	Recruitment deviation	2013	1.0028	0.1249	0.7580	1.2475
P0052	Recruitment deviation	2014	1.1366	0.1252	0.8912	1.3819
P0053	Recruitment deviation	2015	0.2917	0.1313	0.0344	0.5490
P0054	Recruitment deviation	2016	−0.6103	0.1475	−0.8995	−0.3212
P0055	Recruitment deviation	2017	−0.6994	0.1519	−0.9971	−0.4018
P0056	Recruitment deviation	2018	0.0578	0.1410	−0.2187	0.3342
P0057	Recruitment deviation	2019	1.7104	0.1302	1.4552	1.9656
P0058	Recruitment deviation	2020	0.5518	0.1454	0.2667	0.8368
P0059	Recruitment deviation	2021	−0.2033	0.1786	−0.5534	0.1467
P0060	Recruitment deviation	2022	−0.2247	0.2049	−0.6263	0.1768
P0061	Recruitment deviation	2023	−0.3126	0.2286	−0.7606	0.1353
P0062	Recruitment deviation	2024	0.9050	0.2517	0.4118	1.3983
P0063	Recruitment deviation	2025	0.5663	0.2920	−0.0060	1.1387
P0064	Recruitment deviation	2026	0.8281	0.5378	−0.2260	1.8822
P0065	Initial-age deviation	Age1	−0.3949	0.3509	−1.0827	0.2928
P0066	Initial-age deviation	Age2	−0.4683	0.3455	−1.1455	0.2089
P0067	Initial-age deviation	Age3	−1.2468	0.4532	−2.1351	−0.3586
P0068	Initial-age deviation	Age4	−1.4797	0.5231	−2.5049	−0.4545
P0069	Initial-age deviation	Age5	−0.9725	0.4745	−1.9026	−0.0424
P0070	Initial-age deviation	Age6	−1.1558	0.5508	−2.2353	−0.0762
P0071	Initial-age deviation	Age7	−1.3132	0.6310	−2.5499	−0.0765
P0072	Initial-age deviation	Age8	−1.2359	0.6710	−2.5510	0.0791
P0073	Initial-age deviation	Age9	−1.0702	0.6957	−2.4338	0.2934
P0074	Initial-age deviation	Age10	−0.9172	0.7220	−2.3322	0.4979
P0075	Initial-age deviation	Age11	−0.7788	0.7491	−2.2470	0.6894
P0076	Initial-age deviation	Age12	−0.6579	0.7760	−2.1789	0.8631
P0077	Initial-age deviation	Age13	−0.5491	0.8035	−2.1239	1.0256
P0078	Initial-age deviation	Age14	−1.0041	0.7100	−2.3957	0.3874
P0079	Log fishing scale	Fishery; 1964	−2.9386	0.2174	−3.3647	−2.5125
P0080	Log fishing scale	Fishery; 1965	−2.7303	0.2116	−3.1450	−2.3155
P0081	Log fishing scale	Fishery; 1966	−2.6737	0.2155	−3.0960	−2.2513
P0082	Log fishing scale	Fishery; 1967	−2.0362	0.2270	−2.4811	−1.5913
P0083	Log fishing scale	Fishery; 1968	−1.9723	0.2260	−2.4153	−1.5292
P0084	Log fishing scale	Fishery; 1969	−1.9071	0.2317	−2.3611	−1.4530
P0085	Log fishing scale	Fishery; 1970	−1.5364	0.2309	−1.9890	−1.0838
P0086	Log fishing scale	Fishery; 1971	−1.1811	0.2325	−1.6368	−0.7254
P0087	Log fishing scale	Fishery; 1972	−1.0495	0.2265	−1.4935	−0.6055
P0088	Log fishing scale	Fishery; 1973	−0.9062	0.2295	−1.3561	−0.4563

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0089	Log fishing scale	Fishery; 1974	−0.8209	0.2280	−1.2679	−0.3740
P0090	Log fishing scale	Fishery; 1975	−0.9945	0.2055	−1.3973	−0.5916
P0091	Log fishing scale	Fishery; 1976	−1.0737	0.2009	−1.4673	−0.6800
P0092	Log fishing scale	Fishery; 1977	−1.1394	0.2153	−1.5614	−0.7174
P0093	Log fishing scale	Fishery; 1978	−1.0271	0.2171	−1.4525	−0.6017
P0094	Log fishing scale	Fishery; 1979	−0.9874	0.2107	−1.4003	−0.5745
P0095	Log fishing scale	Fishery; 1980	−1.0814	0.1983	−1.4701	−0.6927
P0096	Log fishing scale	Fishery; 1981	−1.4230	0.1935	−1.8023	−1.0438
P0097	Log fishing scale	Fishery; 1982	−1.8679	0.1901	−2.2404	−1.4954
P0098	Log fishing scale	Fishery; 1983	−2.0507	0.1833	−2.4100	−1.6914
P0099	Log fishing scale	Fishery; 1984	−2.0663	0.1527	−2.3655	−1.7671
P0100	Log fishing scale	Fishery; 1985	−2.0559	0.1408	−2.3318	−1.7801
P0101	Log fishing scale	Fishery; 1986	−2.1239	0.1347	−2.3878	−1.8599
P0102	Log fishing scale	Fishery; 1987	−2.4130	0.1266	−2.6611	−2.1649
P0103	Log fishing scale	Fishery; 1988	−2.0653	0.1178	−2.2962	−1.8344
P0104	Log fishing scale	Fishery; 1989	−2.0069	0.1006	−2.2040	−1.8098
P0105	Log fishing scale	Fishery; 1990	−1.5822	0.0944	−1.7672	−1.3972
P0106	Log fishing scale	Fishery; 1991	−1.4032	0.0849	−1.5696	−1.2368
P0107	Log fishing scale	Fishery; 1992	−1.1200	0.0920	−1.3004	−0.9396
P0108	Log fishing scale	Fishery; 1993	−1.5672	0.1086	−1.7800	−1.3543
P0109	Log fishing scale	Fishery; 1994	−1.8109	0.1176	−2.0413	−1.5804
P0110	Log fishing scale	Fishery; 1995	−1.8155	0.1118	−2.0347	−1.5964
P0111	Log fishing scale	Fishery; 1996	−1.6567	0.1114	−1.8751	−1.4383
P0112	Log fishing scale	Fishery; 1997	−1.6452	0.1244	−1.8890	−1.4014
P0113	Log fishing scale	Fishery; 1998	−1.8130	0.1174	−2.0431	−1.5830
P0114	Log fishing scale	Fishery; 1999	−2.0245	0.1131	−2.2463	−1.8028
P0115	Log fishing scale	Fishery; 2000	−1.9078	0.0941	−2.0923	−1.7232
P0116	Log fishing scale	Fishery; 2001	−1.7581	0.0844	−1.9236	−1.5926
P0117	Log fishing scale	Fishery; 2002	−1.5902	0.0776	−1.7424	−1.4381
P0118	Log fishing scale	Fishery; 2003	−1.5098	0.0772	−1.6611	−1.3585
P0119	Log fishing scale	Fishery; 2004	−1.5953	0.0838	−1.7596	−1.4311
P0120	Log fishing scale	Fishery; 2005	−1.6359	0.0829	−1.7985	−1.4734
P0121	Log fishing scale	Fishery; 2006	−1.4267	0.0820	−1.5873	−1.2660
P0122	Log fishing scale	Fishery; 2007	−1.3555	0.0809	−1.5141	−1.1970
P0123	Log fishing scale	Fishery; 2008	−1.2726	0.0841	−1.4374	−1.1078
P0124	Log fishing scale	Fishery; 2009	−1.3188	0.0943	−1.5036	−1.1341
P0125	Log fishing scale	Fishery; 2010	−1.5006	0.1034	−1.7033	−1.2978
P0126	Log fishing scale	Fishery; 2011	−1.1973	0.1005	−1.3944	−1.0003
P0127	Log fishing scale	Fishery; 2012	−1.2027	0.1268	−1.4512	−0.9542
P0128	Log fishing scale	Fishery; 2013	−1.2580	0.1457	−1.5435	−0.9725
P0129	Log fishing scale	Fishery; 2014	−1.3178	0.1579	−1.6272	−1.0085
P0130	Log fishing scale	Fishery; 2015	−1.2383	0.1649	−1.5615	−0.9152
P0131	Log fishing scale	Fishery; 2016	−1.5367	0.1456	−1.8220	−1.2513
P0132	Log fishing scale	Fishery; 2017	−1.5614	0.1284	−1.8130	−1.3097
P0133	Log fishing scale	Fishery; 2018	−1.7471	0.1197	−1.9818	−1.5124
P0134	Log fishing scale	Fishery; 2019	−1.6372	0.1073	−1.8475	−1.4269
P0135	Log fishing scale	Fishery; 2020	−1.3656	0.1186	−1.5980	−1.1331
P0136	Log fishing scale	Fishery; 2021	−1.4188	0.1220	−1.6579	−1.1798

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0137	Log fishing scale	Fishery; 2022	−1.7708	0.1385	−2.0422	−1.4993
P0138	Log fishing scale	Fishery; 2023	−1.8165	0.1494	−2.1092	−1.5238
P0139	Log fishing scale	Fishery; 2024	−1.9059	0.1439	−2.1878	−1.6239
P0140	Log fishing scale	Fishery; 2025	−1.8131	0.1338	−2.0753	−1.5508
P0141	Log fishing scale	Fishery; 2026	−1.6691	0.1614	−1.9853	−1.3528
P0142	Log catchability	AVO	−8.2249	0.0711	−8.3642	−8.0855
P0143	Log catchability	ATS	−0.6599	0.0620	−0.7814	−0.5384
P0144	Log catchability	CPUE	−0.2481	0.1849	−0.6104	0.1143
P0145	Selectivity increment	Fishery; Bin1; 1964 *	1.2875	0.5969	0.1177	2.4573
P0146	Selectivity increment	Fishery; Bin2; 1964 *	0.7997	0.4928	−0.1663	1.7656
P0147	Selectivity increment	Fishery; Bin3; 1964 *	0.4574	0.4383	−0.4016	1.3164
P0148	Selectivity increment	Fishery; Bin4; 1964 *	0.3677	0.3979	−0.4122	1.1476
P0149	Selectivity increment	Fishery; Bin5; 1964 *	−0.1820	0.3965	−0.9591	0.5952
P0150	Selectivity increment	Fishery; Bin6; 1964 *	−0.4579	0.2958	−1.0377	0.1219
P0151	Selectivity increment	Fishery; Bin7; 1964 *	−0.5719	0.2747	−1.1103	−0.0335
P0152	Selectivity increment	Fishery; Bin8; 1964 *	−0.5861	0.2680	−1.1114	−0.0608
P0153	Selectivity increment	Fishery; Bin9; 1964 *	−0.4992	0.2677	−1.0239	0.0255
P0154	Selectivity increment	Fishery; Bin10; 1964 *	−0.2953	0.2716	−0.8277	0.2371
P0155	Selectivity increment	Fishery; Bin11; 1964 *	−0.2831	0.2799	−0.8317	0.2654
P0156	Selectivity increment	Fishery; Bin12; 1964 *	−0.0367	0.2934	−0.6117	0.5383
P0157	Selectivity increment	Fishery; Bin1; 1965 *	0.3571	0.4151	−0.4565	1.1708
P0158	Selectivity increment	Fishery; Bin2; 1965 *	0.1619	0.4026	−0.6272	0.9511
P0159	Selectivity increment	Fishery; Bin3; 1965 *	0.1307	0.3944	−0.6423	0.9037
P0160	Selectivity increment	Fishery; Bin4; 1965 *	0.0902	0.3777	−0.6500	0.8304
P0161	Selectivity increment	Fishery; Bin5; 1965 *	−0.0379	0.3792	−0.7810	0.7053
P0162	Selectivity increment	Fishery; Bin6; 1965 *	−0.1784	0.3055	−0.7771	0.4203
P0163	Selectivity increment	Fishery; Bin7; 1965 *	−0.1639	0.2839	−0.7203	0.3926
P0164	Selectivity increment	Fishery; Bin8; 1965 *	−0.1318	0.2797	−0.6799	0.4163
P0165	Selectivity increment	Fishery; Bin9; 1965 *	−0.0992	0.2797	−0.6475	0.4491
P0166	Selectivity increment	Fishery; Bin10; 1965 *	−0.0684	0.2813	−0.6198	0.4830
P0167	Selectivity increment	Fishery; Bin11; 1965 *	−0.0439	0.2832	−0.5990	0.5111
P0168	Selectivity increment	Fishery; Bin12; 1965 *	−0.0165	0.2786	−0.5626	0.5295
P0169	Selectivity increment	Fishery; Bin1; 1966 *	0.3379	0.4159	−0.4772	1.1530
P0170	Selectivity increment	Fishery; Bin2; 1966 *	0.1962	0.4019	−0.5915	0.9838
P0171	Selectivity increment	Fishery; Bin3; 1966 *	0.1357	0.3933	−0.6351	0.9065
P0172	Selectivity increment	Fishery; Bin4; 1966 *	−0.0528	0.3090	−0.6585	0.5528
P0173	Selectivity increment	Fishery; Bin5; 1966 *	−0.0653	0.2844	−0.6227	0.4921
P0174	Selectivity increment	Fishery; Bin6; 1966 *	−0.0912	0.2786	−0.6373	0.4549
P0175	Selectivity increment	Fishery; Bin7; 1966 *	−0.0904	0.2774	−0.6341	0.4534
P0176	Selectivity increment	Fishery; Bin8; 1966 *	−0.0915	0.2773	−0.6350	0.4519
P0177	Selectivity increment	Fishery; Bin9; 1966 *	−0.0850	0.2779	−0.6298	0.4597
P0178	Selectivity increment	Fishery; Bin10; 1966 *	−0.0744	0.2795	−0.6221	0.4733
P0179	Selectivity increment	Fishery; Bin11; 1966 *	−0.0638	0.2811	−0.6149	0.4872
P0180	Selectivity increment	Fishery; Bin12; 1966 *	−0.0553	0.2749	−0.5940	0.4834
P0181	Selectivity increment	Fishery; Bin1; 1967 *	0.3044	0.4161	−0.5112	1.1200
P0182	Selectivity increment	Fishery; Bin2; 1967 *	0.1602	0.3988	−0.6214	0.9418
P0183	Selectivity increment	Fishery; Bin3; 1967 *	0.2062	0.3907	−0.5595	0.9719
P0184	Selectivity increment	Fishery; Bin4; 1967 *	−0.1132	0.3085	−0.7179	0.4915

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0185	Selectivity increment	Fishery; Bin5; 1967 *	−0.1023	0.2828	−0.6566	0.4520
P0186	Selectivity increment	Fishery; Bin6; 1967 *	−0.0914	0.2781	−0.6364	0.4536
P0187	Selectivity increment	Fishery; Bin7; 1967 *	−0.0794	0.2773	−0.6229	0.4641
P0188	Selectivity increment	Fishery; Bin8; 1967 *	−0.0677	0.2772	−0.6110	0.4757
P0189	Selectivity increment	Fishery; Bin9; 1967 *	−0.0629	0.2779	−0.6075	0.4818
P0190	Selectivity increment	Fishery; Bin10; 1967 *	−0.0573	0.2794	−0.6049	0.4904
P0191	Selectivity increment	Fishery; Bin11; 1967 *	−0.0511	0.2811	−0.6020	0.4998
P0192	Selectivity increment	Fishery; Bin12; 1967 *	−0.0455	0.2747	−0.5838	0.4928
P0193	Selectivity increment	Fishery; Bin1; 1968 *	0.3127	0.4163	−0.5033	1.1286
P0194	Selectivity increment	Fishery; Bin2; 1968 *	0.1419	0.3978	−0.6377	0.9215
P0195	Selectivity increment	Fishery; Bin3; 1968 *	0.0120	0.3855	−0.7436	0.7675
P0196	Selectivity increment	Fishery; Bin4; 1968 *	−0.0108	0.3097	−0.6179	0.5963
P0197	Selectivity increment	Fishery; Bin5; 1968 *	−0.0366	0.2850	−0.5952	0.5220
P0198	Selectivity increment	Fishery; Bin6; 1968 *	−0.0514	0.2793	−0.5988	0.4960
P0199	Selectivity increment	Fishery; Bin7; 1968 *	−0.0611	0.2781	−0.6061	0.4839
P0200	Selectivity increment	Fishery; Bin8; 1968 *	−0.0644	0.2790	−0.6113	0.4824
P0201	Selectivity increment	Fishery; Bin9; 1968 *	−0.0626	0.2800	−0.6114	0.4863
P0202	Selectivity increment	Fishery; Bin10; 1968 *	−0.0612	0.2825	−0.6149	0.4925
P0203	Selectivity increment	Fishery; Bin11; 1968 *	−0.0596	0.2834	−0.6150	0.4958
P0204	Selectivity increment	Fishery; Bin12; 1968 *	−0.0589	0.2764	−0.6007	0.4829
P0205	Selectivity increment	Fishery; Bin1; 1969 *	0.2851	0.4165	−0.5312	1.1014
P0206	Selectivity increment	Fishery; Bin2; 1969 *	0.0924	0.3968	−0.6852	0.8701
P0207	Selectivity increment	Fishery; Bin3; 1969 *	0.1579	0.3857	−0.5981	0.9139
P0208	Selectivity increment	Fishery; Bin4; 1969 *	−0.0960	0.3101	−0.7037	0.5117
P0209	Selectivity increment	Fishery; Bin5; 1969 *	−0.0947	0.2880	−0.6590	0.4697
P0210	Selectivity increment	Fishery; Bin6; 1969 *	−0.0822	0.2892	−0.6490	0.4846
P0211	Selectivity increment	Fishery; Bin7; 1969 *	−0.0710	0.3110	−0.6805	0.5385
P0212	Selectivity increment	Fishery; Bin8; 1969 *	−0.0543	0.3363	−0.7134	0.6047
P0213	Selectivity increment	Fishery; Bin9; 1969 *	−0.0484	0.3372	−0.7094	0.6125
P0214	Selectivity increment	Fishery; Bin10; 1969 *	−0.0360	0.4001	−0.8201	0.7481
P0215	Selectivity increment	Fishery; Bin11; 1969 *	−0.0272	0.3244	−0.6629	0.6085
P0216	Selectivity increment	Fishery; Bin12; 1969 *	−0.0257	0.2858	−0.5858	0.5345
P0217	Selectivity increment	Fishery; Bin1; 1970 *	0.3011	0.4170	−0.5161	1.1183
P0218	Selectivity increment	Fishery; Bin2; 1970 *	0.1488	0.3965	−0.6283	0.9259
P0219	Selectivity increment	Fishery; Bin3; 1970 *	−0.0316	0.3840	−0.7843	0.7211
P0220	Selectivity increment	Fishery; Bin4; 1970 *	−0.2072	0.3635	−0.9196	0.5052
P0221	Selectivity increment	Fishery; Bin5; 1970 *	−0.1218	0.3161	−0.7413	0.4976
P0222	Selectivity increment	Fishery; Bin6; 1970 *	−0.1011	0.3166	−0.7217	0.5194
P0223	Selectivity increment	Fishery; Bin7; 1970 *	−0.0529	0.3685	−0.7751	0.6693
P0224	Selectivity increment	Fishery; Bin8; 1970 *	−0.0096	0.3991	−0.7920	0.7727
P0225	Selectivity increment	Fishery; Bin9; 1970 *	−0.0009	0.3998	−0.7845	0.7828
P0226	Selectivity increment	Fishery; Bin10; 1970 *	0.0133	0.4076	−0.7855	0.8122
P0227	Selectivity increment	Fishery; Bin11; 1970 *	0.0230	0.4049	−0.7706	0.8167
P0228	Selectivity increment	Fishery; Bin12; 1970 *	0.0389	0.3034	−0.5557	0.6335
P0229	Selectivity increment	Fishery; Bin1; 1971 *	0.0965	0.4172	−0.7211	0.9142
P0230	Selectivity increment	Fishery; Bin2; 1971 *	0.0278	0.3955	−0.7474	0.8031
P0231	Selectivity increment	Fishery; Bin3; 1971 *	−0.0921	0.3808	−0.8385	0.6544
P0232	Selectivity increment	Fishery; Bin4; 1971 *	−0.0308	0.3714	−0.7587	0.6972

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0233	Selectivity increment	Fishery; Bin5; 1971 *	0.0085	0.3196	−0.6179	0.6350
P0234	Selectivity increment	Fishery; Bin6; 1971 *	−0.0046	0.3151	−0.6222	0.6129
P0235	Selectivity increment	Fishery; Bin7; 1971 *	−0.0485	0.3697	−0.7730	0.6761
P0236	Selectivity increment	Fishery; Bin8; 1971 *	0.0021	0.4013	−0.7845	0.7887
P0237	Selectivity increment	Fishery; Bin9; 1971 *	0.0038	0.4016	−0.7833	0.7910
P0238	Selectivity increment	Fishery; Bin10; 1971 *	0.0043	0.4080	−0.7953	0.8040
P0239	Selectivity increment	Fishery; Bin11; 1971 *	0.0104	0.4051	−0.7835	0.8044
P0240	Selectivity increment	Fishery; Bin12; 1971 *	0.0224	0.3007	−0.5671	0.6118
P0241	Selectivity increment	Fishery; Bin1; 1972 *	−0.1540	0.4171	−0.9715	0.6635
P0242	Selectivity increment	Fishery; Bin2; 1972 *	0.1905	0.3966	−0.5868	0.9678
P0243	Selectivity increment	Fishery; Bin3; 1972 *	0.0918	0.3791	−0.6513	0.8349
P0244	Selectivity increment	Fishery; Bin4; 1972 *	0.0742	0.3605	−0.6324	0.7808
P0245	Selectivity increment	Fishery; Bin5; 1972 *	−0.0186	0.3073	−0.6208	0.5836
P0246	Selectivity increment	Fishery; Bin6; 1972 *	−0.0055	0.2955	−0.5847	0.5738
P0247	Selectivity increment	Fishery; Bin7; 1972 *	−0.0047	0.3201	−0.6322	0.6227
P0248	Selectivity increment	Fishery; Bin8; 1972 *	−0.0323	0.4015	−0.8192	0.7546
P0249	Selectivity increment	Fishery; Bin9; 1972 *	−0.0229	0.4016	−0.8100	0.7641
P0250	Selectivity increment	Fishery; Bin10; 1972 *	−0.0315	0.4079	−0.8311	0.7680
P0251	Selectivity increment	Fishery; Bin11; 1972 *	−0.0396	0.4049	−0.8332	0.7540
P0252	Selectivity increment	Fishery; Bin12; 1972 *	−0.0473	0.3006	−0.6364	0.5419
P0253	Selectivity increment	Fishery; Bin1; 1973 *	−0.1854	0.4165	−1.0018	0.6309
P0254	Selectivity increment	Fishery; Bin2; 1973 *	0.1006	0.3966	−0.6767	0.8779
P0255	Selectivity increment	Fishery; Bin3; 1973 *	0.0425	0.3793	−0.7010	0.7860
P0256	Selectivity increment	Fishery; Bin4; 1973 *	0.0386	0.3526	−0.6525	0.7298
P0257	Selectivity increment	Fishery; Bin5; 1973 *	0.0410	0.3027	−0.5522	0.6342
P0258	Selectivity increment	Fishery; Bin6; 1973 *	0.0434	0.2924	−0.5296	0.6165
P0259	Selectivity increment	Fishery; Bin7; 1973 *	0.0391	0.3170	−0.5822	0.6604
P0260	Selectivity increment	Fishery; Bin8; 1973 *	0.0045	0.3969	−0.7735	0.7825
P0261	Selectivity increment	Fishery; Bin9; 1973 *	−0.0153	0.3987	−0.7967	0.7660
P0262	Selectivity increment	Fishery; Bin10; 1973 *	−0.0262	0.4063	−0.8225	0.7701
P0263	Selectivity increment	Fishery; Bin11; 1973 *	−0.0364	0.4038	−0.8279	0.7550
P0264	Selectivity increment	Fishery; Bin12; 1973 *	−0.0463	0.3011	−0.6364	0.5438
P0265	Selectivity increment	Fishery; Bin1; 1974 *	−0.1610	0.4155	−0.9753	0.6534
P0266	Selectivity increment	Fishery; Bin2; 1974 *	0.1384	0.3933	−0.6324	0.9092
P0267	Selectivity increment	Fishery; Bin3; 1974 *	0.1528	0.3689	−0.5702	0.8759
P0268	Selectivity increment	Fishery; Bin4; 1974 *	0.0118	0.3473	−0.6690	0.6926
P0269	Selectivity increment	Fishery; Bin5; 1974 *	0.0042	0.3027	−0.5891	0.5975
P0270	Selectivity increment	Fishery; Bin6; 1974 *	−0.0021	0.2923	−0.5750	0.5709
P0271	Selectivity increment	Fishery; Bin7; 1974 *	−0.0010	0.3158	−0.6200	0.6180
P0272	Selectivity increment	Fishery; Bin8; 1974 *	−0.0203	0.3456	−0.6978	0.6571
P0273	Selectivity increment	Fishery; Bin9; 1974 *	−0.0200	0.3422	−0.6907	0.6507
P0274	Selectivity increment	Fishery; Bin10; 1974 *	−0.0257	0.4021	−0.8137	0.7624
P0275	Selectivity increment	Fishery; Bin11; 1974 *	−0.0326	0.4002	−0.8171	0.7518
P0276	Selectivity increment	Fishery; Bin12; 1974 *	−0.0446	0.3017	−0.6360	0.5468
P0277	Selectivity increment	Fishery; Bin1; 1975 *	−0.1574	0.4148	−0.9705	0.6557
P0278	Selectivity increment	Fishery; Bin2; 1975 *	−0.1858	0.3879	−0.9460	0.5745
P0279	Selectivity increment	Fishery; Bin3; 1975 *	0.1323	0.3078	−0.4710	0.7357
P0280	Selectivity increment	Fishery; Bin4; 1975 *	0.0781	0.2842	−0.4789	0.6351

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0281	Selectivity increment	Fishery; Bin5; 1975 *	0.0430	0.2808	−0.5074	0.5933
P0282	Selectivity increment	Fishery; Bin6; 1975 *	0.0290	0.2859	−0.5313	0.5893
P0283	Selectivity increment	Fishery; Bin7; 1975 *	0.0231	0.3077	−0.5801	0.6262
P0284	Selectivity increment	Fishery; Bin8; 1975 *	0.0028	0.3377	−0.6589	0.6646
P0285	Selectivity increment	Fishery; Bin9; 1975 *	0.0035	0.3448	−0.6722	0.6792
P0286	Selectivity increment	Fishery; Bin10; 1975 *	0.0104	0.3139	−0.6049	0.6257
P0287	Selectivity increment	Fishery; Bin11; 1975 *	0.0105	0.2910	−0.5598	0.5807
P0288	Selectivity increment	Fishery; Bin12; 1975 *	0.0104	0.2783	−0.5351	0.5558
P0289	Selectivity increment	Fishery; Bin1; 1976 *	−0.1591	0.4145	−0.9714	0.6533
P0290	Selectivity increment	Fishery; Bin2; 1976 *	−0.0964	0.3884	−0.8577	0.6650
P0291	Selectivity increment	Fishery; Bin3; 1976 *	−0.0776	0.3491	−0.7618	0.6066
P0292	Selectivity increment	Fishery; Bin4; 1976 *	0.0621	0.3017	−0.5292	0.6534
P0293	Selectivity increment	Fishery; Bin5; 1976 *	0.0496	0.2832	−0.5055	0.6048
P0294	Selectivity increment	Fishery; Bin6; 1976 *	0.0379	0.2801	−0.5111	0.5870
P0295	Selectivity increment	Fishery; Bin7; 1976 *	0.0310	0.2819	−0.5214	0.5835
P0296	Selectivity increment	Fishery; Bin8; 1976 *	0.0269	0.2950	−0.5513	0.6051
P0297	Selectivity increment	Fishery; Bin9; 1976 *	0.0252	0.3416	−0.6443	0.6947
P0298	Selectivity increment	Fishery; Bin10; 1976 *	0.0334	0.3214	−0.5965	0.6633
P0299	Selectivity increment	Fishery; Bin11; 1976 *	0.0339	0.2922	−0.5388	0.6066
P0300	Selectivity increment	Fishery; Bin12; 1976 *	0.0329	0.2785	−0.5129	0.5787
P0301	Selectivity increment	Fishery; Bin1; 1977 *	−0.1490	0.4140	−0.9604	0.6624
P0302	Selectivity increment	Fishery; Bin2; 1977 *	−0.0115	0.3875	−0.7709	0.7479
P0303	Selectivity increment	Fishery; Bin3; 1977 *	−0.1853	0.3694	−0.9094	0.5387
P0304	Selectivity increment	Fishery; Bin4; 1977 *	−0.0719	0.3558	−0.7692	0.6254
P0305	Selectivity increment	Fishery; Bin5; 1977 *	0.0195	0.3047	−0.5777	0.6167
P0306	Selectivity increment	Fishery; Bin6; 1977 *	0.0338	0.2861	−0.5269	0.5945
P0307	Selectivity increment	Fishery; Bin7; 1977 *	0.0379	0.2880	−0.5266	0.6024
P0308	Selectivity increment	Fishery; Bin8; 1977 *	0.0395	0.3108	−0.5697	0.6487
P0309	Selectivity increment	Fishery; Bin9; 1977 *	0.0514	0.3946	−0.7220	0.8247
P0310	Selectivity increment	Fishery; Bin10; 1977 *	0.0697	0.3962	−0.7069	0.8463
P0311	Selectivity increment	Fishery; Bin11; 1977 *	0.0816	0.3251	−0.5556	0.7189
P0312	Selectivity increment	Fishery; Bin12; 1977 *	0.0844	0.2885	−0.4811	0.6498
P0313	Selectivity increment	Fishery; Bin1; 1978 *	−0.1935	0.4131	−1.0032	0.6162
P0314	Selectivity increment	Fishery; Bin2; 1978 *	−0.1580	0.3803	−0.9035	0.5874
P0315	Selectivity increment	Fishery; Bin3; 1978 *	−0.0660	0.3645	−0.7803	0.6483
P0316	Selectivity increment	Fishery; Bin4; 1978 *	−0.0381	0.3640	−0.7515	0.6753
P0317	Selectivity increment	Fishery; Bin5; 1978 *	0.0269	0.3143	−0.5891	0.6429
P0318	Selectivity increment	Fishery; Bin6; 1978 *	0.0307	0.3083	−0.5736	0.6349
P0319	Selectivity increment	Fishery; Bin7; 1978 *	0.0457	0.3154	−0.5725	0.6639
P0320	Selectivity increment	Fishery; Bin8; 1978 *	0.0496	0.3259	−0.5891	0.6883
P0321	Selectivity increment	Fishery; Bin9; 1978 *	0.0673	0.3989	−0.7144	0.8491
P0322	Selectivity increment	Fishery; Bin10; 1978 *	0.0741	0.3989	−0.7076	0.8559
P0323	Selectivity increment	Fishery; Bin11; 1978 *	0.0807	0.3341	−0.5741	0.7354
P0324	Selectivity increment	Fishery; Bin12; 1978 *	0.0808	0.2890	−0.4856	0.6472
P0325	Selectivity increment	Fishery; Bin1; 1979 *	−0.1527	0.4072	−0.9509	0.6455
P0326	Selectivity increment	Fishery; Bin2; 1979 *	−0.3807	0.3608	−1.0879	0.3265
P0327	Selectivity increment	Fishery; Bin3; 1979 *	−0.1744	0.3505	−0.8614	0.5126
P0328	Selectivity increment	Fishery; Bin4; 1979 *	−0.0494	0.3568	−0.7488	0.6499

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0329	Selectivity increment	Fishery; Bin5; 1979 *	0.0853	0.3491	−0.5990	0.7695
P0330	Selectivity increment	Fishery; Bin6; 1979 *	0.1164	0.3292	−0.5289	0.7617
P0331	Selectivity increment	Fishery; Bin7; 1979 *	0.0994	0.3399	−0.5669	0.7656
P0332	Selectivity increment	Fishery; Bin8; 1979 *	0.1032	0.3687	−0.6194	0.8257
P0333	Selectivity increment	Fishery; Bin9; 1979 *	0.1059	0.4008	−0.6796	0.8914
P0334	Selectivity increment	Fishery; Bin10; 1979 *	0.0896	0.3983	−0.6910	0.8703
P0335	Selectivity increment	Fishery; Bin11; 1979 *	0.0792	0.3286	−0.5649	0.7232
P0336	Selectivity increment	Fishery; Bin12; 1979 *	0.0784	0.2878	−0.4856	0.6424
P0337	Selectivity increment	Fishery; Bin1; 1980 *	−0.1661	0.4085	−0.9667	0.6344
P0338	Selectivity increment	Fishery; Bin2; 1980 *	−0.4732	0.3535	−1.1660	0.2197
P0339	Selectivity increment	Fishery; Bin3; 1980 *	−0.2547	0.3436	−0.9282	0.4188
P0340	Selectivity increment	Fishery; Bin4; 1980 *	0.0750	0.3564	−0.6234	0.7734
P0341	Selectivity increment	Fishery; Bin5; 1980 *	0.1095	0.3585	−0.5930	0.8121
P0342	Selectivity increment	Fishery; Bin6; 1980 *	0.1351	0.3138	−0.4800	0.7502
P0343	Selectivity increment	Fishery; Bin7; 1980 *	0.1332	0.3106	−0.4757	0.7420
P0344	Selectivity increment	Fishery; Bin8; 1980 *	0.1202	0.3686	−0.6023	0.8427
P0345	Selectivity increment	Fishery; Bin9; 1980 *	0.0907	0.3988	−0.6909	0.8722
P0346	Selectivity increment	Fishery; Bin10; 1980 *	0.0826	0.3937	−0.6891	0.8542
P0347	Selectivity increment	Fishery; Bin11; 1980 *	0.0751	0.3175	−0.5472	0.6975
P0348	Selectivity increment	Fishery; Bin12; 1980 *	0.0726	0.2867	−0.4893	0.6345
P0349	Selectivity increment	Fishery; Bin1; 1981 *	−0.1370	0.4123	−0.9450	0.6710
P0350	Selectivity increment	Fishery; Bin2; 1981 *	−0.2530	0.3700	−0.9782	0.4722
P0351	Selectivity increment	Fishery; Bin3; 1981 *	−0.2579	0.3394	−0.9230	0.4072
P0352	Selectivity increment	Fishery; Bin4; 1981 *	0.0107	0.3493	−0.6739	0.6953
P0353	Selectivity increment	Fishery; Bin5; 1981 *	0.1230	0.3471	−0.5573	0.8033
P0354	Selectivity increment	Fishery; Bin6; 1981 *	0.0783	0.3012	−0.5121	0.6686
P0355	Selectivity increment	Fishery; Bin7; 1981 *	0.0847	0.2895	−0.4827	0.6522
P0356	Selectivity increment	Fishery; Bin8; 1981 *	0.0882	0.3089	−0.5172	0.6936
P0357	Selectivity increment	Fishery; Bin9; 1981 *	0.0812	0.3921	−0.6872	0.8497
P0358	Selectivity increment	Fishery; Bin10; 1981 *	0.0626	0.3238	−0.5721	0.6973
P0359	Selectivity increment	Fishery; Bin11; 1981 *	0.0595	0.2952	−0.5191	0.6382
P0360	Selectivity increment	Fishery; Bin12; 1981 *	0.0596	0.2817	−0.4925	0.6117
P0361	Selectivity increment	Fishery; Bin1; 1982 *	−0.1040	0.4154	−0.9182	0.7102
P0362	Selectivity increment	Fishery; Bin2; 1982 *	−0.0931	0.3823	−0.8423	0.6562
P0363	Selectivity increment	Fishery; Bin3; 1982 *	−0.3008	0.3536	−0.9937	0.3922
P0364	Selectivity increment	Fishery; Bin4; 1982 *	−0.0092	0.3403	−0.6762	0.6579
P0365	Selectivity increment	Fishery; Bin5; 1982 *	0.0660	0.3012	−0.5244	0.6565
P0366	Selectivity increment	Fishery; Bin6; 1982 *	0.0694	0.2805	−0.4804	0.6193
P0367	Selectivity increment	Fishery; Bin7; 1982 *	0.0670	0.2772	−0.4763	0.6104
P0368	Selectivity increment	Fishery; Bin8; 1982 *	0.0685	0.2771	−0.4746	0.6116
P0369	Selectivity increment	Fishery; Bin9; 1982 *	0.0662	0.2794	−0.4813	0.6137
P0370	Selectivity increment	Fishery; Bin10; 1982 *	0.0600	0.2812	−0.4911	0.6111
P0371	Selectivity increment	Fishery; Bin11; 1982 *	0.0560	0.2836	−0.5000	0.6119
P0372	Selectivity increment	Fishery; Bin12; 1982 *	0.0538	0.2777	−0.4905	0.5981
P0373	Selectivity increment	Fishery; Bin1; 1983 *	−0.1223	0.4165	−0.9386	0.6940
P0374	Selectivity increment	Fishery; Bin2; 1983 *	0.1032	0.3892	−0.6597	0.8660
P0375	Selectivity increment	Fishery; Bin3; 1983 *	−0.0970	0.3645	−0.8113	0.6174
P0376	Selectivity increment	Fishery; Bin4; 1983 *	−0.1890	0.3452	−0.8656	0.4876

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0377	Selectivity increment	Fishery; Bin5; 1983 *	−0.0624	0.3207	−0.6909	0.5661
P0378	Selectivity increment	Fishery; Bin6; 1983 *	0.0676	0.2926	−0.5059	0.6410
P0379	Selectivity increment	Fishery; Bin7; 1983 *	0.0552	0.2786	−0.4908	0.6012
P0380	Selectivity increment	Fishery; Bin8; 1983 *	0.0486	0.2766	−0.4935	0.5906
P0381	Selectivity increment	Fishery; Bin9; 1983 *	0.0482	0.2775	−0.4956	0.5921
P0382	Selectivity increment	Fishery; Bin10; 1983 *	0.0497	0.2797	−0.4985	0.5978
P0383	Selectivity increment	Fishery; Bin11; 1983 *	0.0494	0.2820	−0.5033	0.6021
P0384	Selectivity increment	Fishery; Bin12; 1983 *	0.0488	0.2760	−0.4922	0.5898
P0385	Selectivity increment	Fishery; Bin1; 1984 *	−0.1099	0.4185	−0.9301	0.7102
P0386	Selectivity increment	Fishery; Bin2; 1984 *	−0.1521	0.3905	−0.9174	0.6132
P0387	Selectivity increment	Fishery; Bin3; 1984 *	0.0489	0.3700	−0.6763	0.7742
P0388	Selectivity increment	Fishery; Bin4; 1984 *	−0.0874	0.3505	−0.7743	0.5996
P0389	Selectivity increment	Fishery; Bin5; 1984 *	0.0264	0.3403	−0.6405	0.6933
P0390	Selectivity increment	Fishery; Bin6; 1984 *	0.0367	0.2951	−0.5417	0.6151
P0391	Selectivity increment	Fishery; Bin7; 1984 *	0.0512	0.2785	−0.4946	0.5970
P0392	Selectivity increment	Fishery; Bin8; 1984 *	0.0411	0.2762	−0.5002	0.5824
P0393	Selectivity increment	Fishery; Bin9; 1984 *	0.0380	0.2771	−0.5051	0.5811
P0394	Selectivity increment	Fishery; Bin10; 1984 *	0.0360	0.2792	−0.5113	0.5833
P0395	Selectivity increment	Fishery; Bin11; 1984 *	0.0358	0.2814	−0.5158	0.5874
P0396	Selectivity increment	Fishery; Bin12; 1984 *	0.0354	0.2754	−0.5043	0.5751
P0397	Selectivity increment	Fishery; Bin1; 1985 *	−0.1272	0.4190	−0.9484	0.6940
P0398	Selectivity increment	Fishery; Bin2; 1985 *	0.0402	0.3949	−0.7338	0.8141
P0399	Selectivity increment	Fishery; Bin3; 1985 *	0.1307	0.3677	−0.5900	0.8513
P0400	Selectivity increment	Fishery; Bin4; 1985 *	−0.0902	0.3563	−0.7885	0.6081
P0401	Selectivity increment	Fishery; Bin5; 1985 *	−0.2409	0.3470	−0.9210	0.4392
P0402	Selectivity increment	Fishery; Bin6; 1985 *	0.0564	0.2947	−0.5213	0.6340
P0403	Selectivity increment	Fishery; Bin7; 1985 *	0.0519	0.2754	−0.4879	0.5917
P0404	Selectivity increment	Fishery; Bin8; 1985 *	0.0500	0.2751	−0.4892	0.5891
P0405	Selectivity increment	Fishery; Bin9; 1985 *	0.0345	0.2765	−0.5074	0.5765
P0406	Selectivity increment	Fishery; Bin10; 1985 *	0.0325	0.2789	−0.5141	0.5790
P0407	Selectivity increment	Fishery; Bin11; 1985 *	0.0318	0.2811	−0.5191	0.5827
P0408	Selectivity increment	Fishery; Bin12; 1985 *	0.0304	0.2749	−0.5084	0.5693
P0409	Selectivity increment	Fishery; Bin1; 1986 *	−0.1344	0.4196	−0.9569	0.6881
P0410	Selectivity increment	Fishery; Bin2; 1986 *	−0.0383	0.3972	−0.8168	0.7401
P0411	Selectivity increment	Fishery; Bin3; 1986 *	0.0606	0.3691	−0.6628	0.7840
P0412	Selectivity increment	Fishery; Bin4; 1986 *	0.1677	0.3543	−0.5267	0.8622
P0413	Selectivity increment	Fishery; Bin5; 1986 *	−0.0207	0.3550	−0.7164	0.6751
P0414	Selectivity increment	Fishery; Bin6; 1986 *	−0.0709	0.3319	−0.7214	0.5796
P0415	Selectivity increment	Fishery; Bin7; 1986 *	0.0143	0.2940	−0.5620	0.5905
P0416	Selectivity increment	Fishery; Bin8; 1986 *	−0.0173	0.2782	−0.5626	0.5279
P0417	Selectivity increment	Fishery; Bin9; 1986 *	0.0089	0.2789	−0.5378	0.5555
P0418	Selectivity increment	Fishery; Bin10; 1986 *	0.0072	0.2788	−0.5393	0.5537
P0419	Selectivity increment	Fishery; Bin11; 1986 *	0.0093	0.2807	−0.5408	0.5594
P0420	Selectivity increment	Fishery; Bin12; 1986 *	0.0136	0.2745	−0.5244	0.5517
P0421	Selectivity increment	Fishery; Bin1; 1987 *	−0.1333	0.4198	−0.9561	0.6895
P0422	Selectivity increment	Fishery; Bin2; 1987 *	−0.0846	0.4008	−0.8702	0.7009
P0423	Selectivity increment	Fishery; Bin3; 1987 *	0.1086	0.3713	−0.6192	0.8364
P0424	Selectivity increment	Fishery; Bin4; 1987 *	−0.1061	0.3582	−0.8082	0.5959

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0425	Selectivity increment	Fishery; Bin5; 1987 *	0.0218	0.3538	−0.6717	0.7153
P0426	Selectivity increment	Fishery; Bin6; 1987 *	−0.0462	0.3557	−0.7433	0.6509
P0427	Selectivity increment	Fishery; Bin7; 1987 *	−0.0955	0.3359	−0.7538	0.5628
P0428	Selectivity increment	Fishery; Bin8; 1987 *	0.1044	0.2962	−0.4762	0.6850
P0429	Selectivity increment	Fishery; Bin9; 1987 *	0.0984	0.2793	−0.4491	0.6459
P0430	Selectivity increment	Fishery; Bin10; 1987 *	0.0660	0.2781	−0.4791	0.6112
P0431	Selectivity increment	Fishery; Bin11; 1987 *	0.0418	0.2801	−0.5072	0.5908
P0432	Selectivity increment	Fishery; Bin12; 1987 *	0.0248	0.2743	−0.5127	0.5624
P0433	Selectivity increment	Fishery; Bin1; 1988 *	−0.1650	0.4198	−0.9878	0.6577
P0434	Selectivity increment	Fishery; Bin2; 1988 *	−0.1229	0.4025	−0.9118	0.6660
P0435	Selectivity increment	Fishery; Bin3; 1988 *	0.4321	0.3737	−0.3003	1.1645
P0436	Selectivity increment	Fishery; Bin4; 1988 *	0.0242	0.3611	−0.6835	0.7320
P0437	Selectivity increment	Fishery; Bin5; 1988 *	0.0879	0.3542	−0.6062	0.7820
P0438	Selectivity increment	Fishery; Bin6; 1988 *	−0.0565	0.3542	−0.7508	0.6377
P0439	Selectivity increment	Fishery; Bin7; 1988 *	0.1187	0.3368	−0.5414	0.7788
P0440	Selectivity increment	Fishery; Bin8; 1988 *	−0.0812	0.2935	−0.6565	0.4941
P0441	Selectivity increment	Fishery; Bin9; 1988 *	−0.0785	0.2772	−0.6218	0.4648
P0442	Selectivity increment	Fishery; Bin10; 1988 *	−0.0796	0.2776	−0.6236	0.4644
P0443	Selectivity increment	Fishery; Bin11; 1988 *	−0.0497	0.2829	−0.6042	0.5048
P0444	Selectivity increment	Fishery; Bin12; 1988 *	−0.0295	0.2753	−0.5690	0.5100
P0445	Selectivity increment	Fishery; Bin1; 1989 *	−0.1307	0.4196	−0.9531	0.6916
P0446	Selectivity increment	Fishery; Bin2; 1989 *	−0.0816	0.4021	−0.8696	0.7065
P0447	Selectivity increment	Fishery; Bin3; 1989 *	−0.3948	0.3821	−1.1437	0.3540
P0448	Selectivity increment	Fishery; Bin4; 1989 *	0.1355	0.3658	−0.5814	0.8525
P0449	Selectivity increment	Fishery; Bin5; 1989 *	0.0220	0.3542	−0.6723	0.7163
P0450	Selectivity increment	Fishery; Bin6; 1989 *	0.0546	0.3531	−0.6374	0.7466
P0451	Selectivity increment	Fishery; Bin7; 1989 *	0.1293	0.2978	−0.4543	0.7130
P0452	Selectivity increment	Fishery; Bin8; 1989 *	0.1041	0.2772	−0.4392	0.6473
P0453	Selectivity increment	Fishery; Bin9; 1989 *	0.0309	0.2754	−0.5088	0.5706
P0454	Selectivity increment	Fishery; Bin10; 1989 *	0.0641	0.2773	−0.4795	0.6076
P0455	Selectivity increment	Fishery; Bin11; 1989 *	0.0445	0.2815	−0.5072	0.5962
P0456	Selectivity increment	Fishery; Bin12; 1989 *	0.0221	0.2747	−0.5163	0.5605
P0457	Selectivity increment	Fishery; Bin1; 1990 *	−0.1246	0.4192	−0.9462	0.6971
P0458	Selectivity increment	Fishery; Bin2; 1990 *	−0.0556	0.3998	−0.8392	0.7279
P0459	Selectivity increment	Fishery; Bin3; 1990 *	−0.3454	0.3826	−1.0953	0.4046
P0460	Selectivity increment	Fishery; Bin4; 1990 *	0.0258	0.3704	−0.7002	0.7518
P0461	Selectivity increment	Fishery; Bin5; 1990 *	0.1451	0.3528	−0.5464	0.8366
P0462	Selectivity increment	Fishery; Bin6; 1990 *	0.0542	0.3493	−0.6303	0.7387
P0463	Selectivity increment	Fishery; Bin7; 1990 *	−0.0416	0.3272	−0.6830	0.5997
P0464	Selectivity increment	Fishery; Bin8; 1990 *	0.0504	0.2894	−0.5169	0.6176
P0465	Selectivity increment	Fishery; Bin9; 1990 *	0.0621	0.2804	−0.4875	0.6116
P0466	Selectivity increment	Fishery; Bin10; 1990 *	0.0002	0.2925	−0.5731	0.5736
P0467	Selectivity increment	Fishery; Bin11; 1990 *	0.1328	0.2978	−0.4508	0.7164
P0468	Selectivity increment	Fishery; Bin12; 1990 *	0.0966	0.2719	−0.4364	0.6295
P0469	Selectivity increment	Fishery; Bin1; 1991 *	−0.0571	0.4181	−0.8765	0.7624
P0470	Selectivity increment	Fishery; Bin2; 1991 *	−0.0210	0.3915	−0.7883	0.7462
P0471	Selectivity increment	Fishery; Bin3; 1991 *	−0.3596	0.3748	−1.0942	0.3750
P0472	Selectivity increment	Fishery; Bin4; 1991 *	−0.2984	0.3583	−1.0006	0.4038

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0473	Selectivity increment	Fishery; Bin5; 1991 *	−0.1882	0.3484	−0.8710	0.4946
P0474	Selectivity increment	Fishery; Bin6; 1991 *	−0.0522	0.3230	−0.6853	0.5809
P0475	Selectivity increment	Fishery; Bin7; 1991 *	0.1413	0.3233	−0.4924	0.7750
P0476	Selectivity increment	Fishery; Bin8; 1991 *	−0.0373	0.2924	−0.6104	0.5359
P0477	Selectivity increment	Fishery; Bin9; 1991 *	0.1423	0.2774	−0.4014	0.6859
P0478	Selectivity increment	Fishery; Bin10; 1991 *	0.0714	0.2959	−0.5085	0.6513
P0479	Selectivity increment	Fishery; Bin11; 1991 *	0.3360	0.2985	−0.2491	0.9211
P0480	Selectivity increment	Fishery; Bin12; 1991 *	0.3228	0.2650	−0.1966	0.8421
P0481	Selectivity increment	Fishery; Bin1; 1992 *	−0.1291	0.4153	−0.9430	0.6848
P0482	Selectivity increment	Fishery; Bin2; 1992 *	−0.0575	0.3344	−0.7129	0.5978
P0483	Selectivity increment	Fishery; Bin3; 1992 *	0.5222	0.3061	−0.0779	1.1222
P0484	Selectivity increment	Fishery; Bin4; 1992 *	−0.2344	0.3156	−0.8530	0.3842
P0485	Selectivity increment	Fishery; Bin5; 1992 *	−0.3277	0.3180	−0.9509	0.2955
P0486	Selectivity increment	Fishery; Bin6; 1992 *	−0.0479	0.3127	−0.6607	0.5649
P0487	Selectivity increment	Fishery; Bin7; 1992 *	−0.0629	0.2927	−0.6365	0.5108
P0488	Selectivity increment	Fishery; Bin8; 1992 *	0.2020	0.2872	−0.3608	0.7648
P0489	Selectivity increment	Fishery; Bin9; 1992 *	0.0885	0.2802	−0.4607	0.6377
P0490	Selectivity increment	Fishery; Bin10; 1992 *	0.2149	0.2878	−0.3491	0.7790
P0491	Selectivity increment	Fishery; Bin11; 1992 *	−0.1178	0.2882	−0.6827	0.4471
P0492	Selectivity increment	Fishery; Bin12; 1992 *	−0.0503	0.2607	−0.5612	0.4607
P0493	Selectivity increment	Fishery; Bin1; 1993 *	−0.1187	0.4147	−0.9315	0.6940
P0494	Selectivity increment	Fishery; Bin2; 1993 *	−0.4719	0.3522	−1.1621	0.2184
P0495	Selectivity increment	Fishery; Bin3; 1993 *	−0.0290	0.2736	−0.5654	0.5073
P0496	Selectivity increment	Fishery; Bin4; 1993 *	0.8219	0.2800	0.2731	1.3708
P0497	Selectivity increment	Fishery; Bin5; 1993 *	0.0377	0.3059	−0.5619	0.6373
P0498	Selectivity increment	Fishery; Bin6; 1993 *	0.0368	0.3239	−0.5980	0.6717
P0499	Selectivity increment	Fishery; Bin7; 1993 *	0.0738	0.3239	−0.5609	0.7086
P0500	Selectivity increment	Fishery; Bin8; 1993 *	−0.0135	0.2905	−0.5830	0.5559
P0501	Selectivity increment	Fishery; Bin9; 1993 *	−0.0312	0.2806	−0.5812	0.5188
P0502	Selectivity increment	Fishery; Bin10; 1993 *	−0.0706	0.2792	−0.6178	0.4766
P0503	Selectivity increment	Fishery; Bin11; 1993 *	−0.1520	0.3012	−0.7423	0.4384
P0504	Selectivity increment	Fishery; Bin12; 1993 *	−0.0833	0.2738	−0.6200	0.4534
P0505	Selectivity increment	Fishery; Bin1; 1994 *	−0.0143	0.4166	−0.8309	0.8023
P0506	Selectivity increment	Fishery; Bin2; 1994 *	0.0152	0.3582	−0.6868	0.7172
P0507	Selectivity increment	Fishery; Bin3; 1994 *	−0.7774	0.3087	−1.3825	−0.1722
P0508	Selectivity increment	Fishery; Bin4; 1994 *	−0.3070	0.2656	−0.8275	0.2136
P0509	Selectivity increment	Fishery; Bin5; 1994 *	0.9075	0.2652	0.3877	1.4273
P0510	Selectivity increment	Fishery; Bin6; 1994 *	0.2876	0.3068	−0.3137	0.8890
P0511	Selectivity increment	Fishery; Bin7; 1994 *	0.0218	0.3155	−0.5966	0.6402
P0512	Selectivity increment	Fishery; Bin8; 1994 *	−0.0271	0.2831	−0.5820	0.5277
P0513	Selectivity increment	Fishery; Bin9; 1994 *	−0.0449	0.2690	−0.5721	0.4824
P0514	Selectivity increment	Fishery; Bin10; 1994 *	−0.0192	0.2727	−0.5538	0.5153
P0515	Selectivity increment	Fishery; Bin11; 1994 *	0.0142	0.2870	−0.5483	0.5767
P0516	Selectivity increment	Fishery; Bin12; 1994 *	−0.0564	0.2782	−0.6018	0.4889
P0517	Selectivity increment	Fishery; Bin1; 1995 *	0.0094	0.4170	−0.8078	0.8267
P0518	Selectivity increment	Fishery; Bin2; 1995 *	0.1923	0.3679	−0.5288	0.9134
P0519	Selectivity increment	Fishery; Bin3; 1995 *	−0.2946	0.3221	−0.9259	0.3368
P0520	Selectivity increment	Fishery; Bin4; 1995 *	−0.7007	0.2923	−1.2736	−0.1279

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0521	Selectivity increment	Fishery; Bin5; 1995 *	−0.3795	0.2662	−0.9013	0.1423
P0522	Selectivity increment	Fishery; Bin6; 1995 *	0.4455	0.2661	−0.0760	0.9671
P0523	Selectivity increment	Fishery; Bin7; 1995 *	0.1832	0.2782	−0.3621	0.7285
P0524	Selectivity increment	Fishery; Bin8; 1995 *	0.1784	0.2707	−0.3522	0.7090
P0525	Selectivity increment	Fishery; Bin9; 1995 *	0.1368	0.2714	−0.3951	0.6687
P0526	Selectivity increment	Fishery; Bin10; 1995 *	0.1109	0.2724	−0.4231	0.6449
P0527	Selectivity increment	Fishery; Bin11; 1995 *	0.0758	0.2748	−0.4628	0.6143
P0528	Selectivity increment	Fishery; Bin12; 1995 *	0.0424	0.2681	−0.4831	0.5680
P0529	Selectivity increment	Fishery; Bin1; 1996 *	−0.0097	0.4173	−0.8277	0.8083
P0530	Selectivity increment	Fishery; Bin2; 1996 *	0.5075	0.3722	−0.2219	1.2369
P0531	Selectivity increment	Fishery; Bin3; 1996 *	0.2794	0.3348	−0.3768	0.9357
P0532	Selectivity increment	Fishery; Bin4; 1996 *	−0.7854	0.3054	−1.3840	−0.1867
P0533	Selectivity increment	Fishery; Bin5; 1996 *	−0.7408	0.2866	−1.3026	−0.1790
P0534	Selectivity increment	Fishery; Bin6; 1996 *	−0.3569	0.2674	−0.8811	0.1672
P0535	Selectivity increment	Fishery; Bin7; 1996 *	0.2781	0.2585	−0.2285	0.7847
P0536	Selectivity increment	Fishery; Bin8; 1996 *	0.3081	0.2639	−0.2091	0.8253
P0537	Selectivity increment	Fishery; Bin9; 1996 *	0.2215	0.2701	−0.3080	0.7510
P0538	Selectivity increment	Fishery; Bin10; 1996 *	0.1476	0.2737	−0.3889	0.6841
P0539	Selectivity increment	Fishery; Bin11; 1996 *	0.0906	0.2752	−0.4489	0.6301
P0540	Selectivity increment	Fishery; Bin12; 1996 *	0.0601	0.2678	−0.4648	0.5849
P0541	Selectivity increment	Fishery; Bin1; 1997 *	−0.1094	0.4177	−0.9282	0.7093
P0542	Selectivity increment	Fishery; Bin2; 1997 *	0.3323	0.3622	−0.3776	1.0422
P0543	Selectivity increment	Fishery; Bin3; 1997 *	0.1555	0.3403	−0.5114	0.8224
P0544	Selectivity increment	Fishery; Bin4; 1997 *	0.6559	0.3059	0.0563	1.2556
P0545	Selectivity increment	Fishery; Bin5; 1997 *	−0.0012	0.2806	−0.5511	0.5488
P0546	Selectivity increment	Fishery; Bin6; 1997 *	−0.3984	0.2751	−0.9376	0.1409
P0547	Selectivity increment	Fishery; Bin7; 1997 *	−0.4036	0.2694	−0.9315	0.1243
P0548	Selectivity increment	Fishery; Bin8; 1997 *	−0.2889	0.2735	−0.8249	0.2471
P0549	Selectivity increment	Fishery; Bin9; 1997 *	−0.0227	0.2787	−0.5690	0.5235
P0550	Selectivity increment	Fishery; Bin10; 1997 *	0.0186	0.2746	−0.5197	0.5569
P0551	Selectivity increment	Fishery; Bin11; 1997 *	0.0284	0.2758	−0.5121	0.5689
P0552	Selectivity increment	Fishery; Bin12; 1997 *	0.0335	0.2671	−0.4900	0.5570
P0553	Selectivity increment	Fishery; Bin1; 1998 *	−0.0772	0.4183	−0.8971	0.7427
P0554	Selectivity increment	Fishery; Bin2; 1998 *	−0.3764	0.3344	−1.0318	0.2791
P0555	Selectivity increment	Fishery; Bin3; 1998 *	0.2778	0.3214	−0.3521	0.9077
P0556	Selectivity increment	Fishery; Bin4; 1998 *	0.2308	0.3062	−0.3693	0.8309
P0557	Selectivity increment	Fishery; Bin5; 1998 *	0.1763	0.2739	−0.3605	0.7132
P0558	Selectivity increment	Fishery; Bin6; 1998 *	0.2773	0.2583	−0.2290	0.7837
P0559	Selectivity increment	Fishery; Bin7; 1998 *	−0.2341	0.2704	−0.7642	0.2960
P0560	Selectivity increment	Fishery; Bin8; 1998 *	−0.0717	0.2888	−0.6378	0.4944
P0561	Selectivity increment	Fishery; Bin9; 1998 *	−0.0713	0.2812	−0.6223	0.4798
P0562	Selectivity increment	Fishery; Bin10; 1998 *	−0.0478	0.2738	−0.5845	0.4889
P0563	Selectivity increment	Fishery; Bin11; 1998 *	−0.0464	0.2758	−0.5870	0.4942
P0564	Selectivity increment	Fishery; Bin12; 1998 *	−0.0374	0.2688	−0.5643	0.4895
P0565	Selectivity increment	Fishery; Bin1; 1999 *	−0.1247	0.4186	−0.9452	0.6958
P0566	Selectivity increment	Fishery; Bin2; 1999 *	−0.3584	0.3509	−1.0462	0.3294
P0567	Selectivity increment	Fishery; Bin3; 1999 *	0.8134	0.2823	0.2601	1.3666
P0568	Selectivity increment	Fishery; Bin4; 1999 *	0.4525	0.2907	−0.1172	1.0221

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0569	Selectivity increment	Fishery; Bin5; 1999 *	0.1329	0.2861	−0.4279	0.6938
P0570	Selectivity increment	Fishery; Bin6; 1999 *	−0.2625	0.2614	−0.7749	0.2499
P0571	Selectivity increment	Fishery; Bin7; 1999 *	0.2338	0.2526	−0.2613	0.7289
P0572	Selectivity increment	Fishery; Bin8; 1999 *	−0.1112	0.2746	−0.6493	0.4269
P0573	Selectivity increment	Fishery; Bin9; 1999 *	−0.2599	0.2671	−0.7833	0.2636
P0574	Selectivity increment	Fishery; Bin10; 1999 *	−0.2373	0.2691	−0.7648	0.2901
P0575	Selectivity increment	Fishery; Bin11; 1999 *	−0.1704	0.2922	−0.7431	0.4023
P0576	Selectivity increment	Fishery; Bin12; 1999 *	−0.1081	0.2841	−0.6649	0.4487
P0577	Selectivity increment	Fishery; Bin1; 2000 *	−0.0558	0.4185	−0.8761	0.7645
P0578	Selectivity increment	Fishery; Bin2; 2000 *	−0.1443	0.3623	−0.8544	0.5658
P0579	Selectivity increment	Fishery; Bin3; 2000 *	−0.5590	0.2797	−1.1072	−0.0108
P0580	Selectivity increment	Fishery; Bin4; 2000 *	0.2946	0.2566	−0.2083	0.7976
P0581	Selectivity increment	Fishery; Bin5; 2000 *	0.4186	0.2725	−0.1155	0.9528
P0582	Selectivity increment	Fishery; Bin6; 2000 *	−0.0055	0.2800	−0.5544	0.5433
P0583	Selectivity increment	Fishery; Bin7; 2000 *	−0.0436	0.2605	−0.5542	0.4669
P0584	Selectivity increment	Fishery; Bin8; 2000 *	0.2266	0.2481	−0.2597	0.7129
P0585	Selectivity increment	Fishery; Bin9; 2000 *	0.0273	0.2558	−0.4741	0.5287
P0586	Selectivity increment	Fishery; Bin10; 2000 *	−0.0436	0.2647	−0.5624	0.4753
P0587	Selectivity increment	Fishery; Bin11; 2000 *	−0.0517	0.2881	−0.6163	0.5129
P0588	Selectivity increment	Fishery; Bin12; 2000 *	−0.0637	0.2858	−0.6239	0.4965
P0589	Selectivity increment	Fishery; Bin1; 2001 *	−0.0146	0.4182	−0.8342	0.8051
P0590	Selectivity increment	Fishery; Bin2; 2001 *	−0.2128	0.3639	−0.9260	0.5005
P0591	Selectivity increment	Fishery; Bin3; 2001 *	−0.4501	0.3107	−1.0591	0.1588
P0592	Selectivity increment	Fishery; Bin4; 2001 *	−0.3103	0.2707	−0.8409	0.2202
P0593	Selectivity increment	Fishery; Bin5; 2001 *	0.2544	0.2536	−0.2428	0.7515
P0594	Selectivity increment	Fishery; Bin6; 2001 *	0.6106	0.2699	0.0815	1.1397
P0595	Selectivity increment	Fishery; Bin7; 2001 *	0.1237	0.2651	−0.3958	0.6432
P0596	Selectivity increment	Fishery; Bin8; 2001 *	−0.1064	0.2514	−0.5990	0.3863
P0597	Selectivity increment	Fishery; Bin9; 2001 *	0.0296	0.2532	−0.4666	0.5259
P0598	Selectivity increment	Fishery; Bin10; 2001 *	0.0467	0.2626	−0.4679	0.5614
P0599	Selectivity increment	Fishery; Bin11; 2001 *	0.0368	0.2697	−0.4918	0.5654
P0600	Selectivity increment	Fishery; Bin12; 2001 *	−0.0076	0.2700	−0.5368	0.5215
P0601	Selectivity increment	Fishery; Bin1; 2002 *	−0.0584	0.4185	−0.8785	0.7618
P0602	Selectivity increment	Fishery; Bin2; 2002 *	0.1591	0.3560	−0.5386	0.8567
P0603	Selectivity increment	Fishery; Bin3; 2002 *	0.0693	0.3069	−0.5323	0.6709
P0604	Selectivity increment	Fishery; Bin4; 2002 *	−0.0089	0.2773	−0.5524	0.5345
P0605	Selectivity increment	Fishery; Bin5; 2002 *	−0.2313	0.2558	−0.7326	0.2699
P0606	Selectivity increment	Fishery; Bin6; 2002 *	0.0666	0.2451	−0.4137	0.5470
P0607	Selectivity increment	Fishery; Bin7; 2002 *	0.0798	0.2495	−0.4092	0.5689
P0608	Selectivity increment	Fishery; Bin8; 2002 *	0.0548	0.2547	−0.4443	0.5539
P0609	Selectivity increment	Fishery; Bin9; 2002 *	0.0383	0.2538	−0.4592	0.5357
P0610	Selectivity increment	Fishery; Bin10; 2002 *	−0.0247	0.2576	−0.5297	0.4802
P0611	Selectivity increment	Fishery; Bin11; 2002 *	−0.0785	0.2672	−0.6022	0.4452
P0612	Selectivity increment	Fishery; Bin12; 2002 *	−0.0660	0.2655	−0.5864	0.4544
P0613	Selectivity increment	Fishery; Bin1; 2003 *	−0.0709	0.4187	−0.8916	0.7499
P0614	Selectivity increment	Fishery; Bin2; 2003 *	−0.3090	0.3568	−1.0082	0.3902
P0615	Selectivity increment	Fishery; Bin3; 2003 *	0.6699	0.2727	0.1354	1.2045
P0616	Selectivity increment	Fishery; Bin4; 2003 *	−0.0671	0.2628	−0.5821	0.4478

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0617	Selectivity increment	Fishery; Bin5; 2003 *	0.0369	0.2581	−0.4690	0.5428
P0618	Selectivity increment	Fishery; Bin6; 2003 *	−0.1845	0.2516	−0.6775	0.3085
P0619	Selectivity increment	Fishery; Bin7; 2003 *	0.0299	0.2463	−0.4528	0.5126
P0620	Selectivity increment	Fishery; Bin8; 2003 *	0.0377	0.2530	−0.4581	0.5336
P0621	Selectivity increment	Fishery; Bin9; 2003 *	−0.0010	0.2590	−0.5085	0.5066
P0622	Selectivity increment	Fishery; Bin10; 2003 *	−0.0130	0.2594	−0.5213	0.4954
P0623	Selectivity increment	Fishery; Bin11; 2003 *	−0.0731	0.2643	−0.5912	0.4449
P0624	Selectivity increment	Fishery; Bin12; 2003 *	−0.0559	0.2639	−0.5732	0.4614
P0625	Selectivity increment	Fishery; Bin1; 2004 *	−0.0277	0.4190	−0.8489	0.7936
P0626	Selectivity increment	Fishery; Bin2; 2004 *	−0.1140	0.3769	−0.8527	0.6247
P0627	Selectivity increment	Fishery; Bin3; 2004 *	−0.6762	0.2837	−1.2323	−0.1201
P0628	Selectivity increment	Fishery; Bin4; 2004 *	0.7169	0.2537	0.2196	1.2142
P0629	Selectivity increment	Fishery; Bin5; 2004 *	0.0216	0.2568	−0.4817	0.5249
P0630	Selectivity increment	Fishery; Bin6; 2004 *	−0.1190	0.2671	−0.6425	0.4044
P0631	Selectivity increment	Fishery; Bin7; 2004 *	−0.0233	0.2567	−0.5265	0.4799
P0632	Selectivity increment	Fishery; Bin8; 2004 *	0.0195	0.2529	−0.4762	0.5151
P0633	Selectivity increment	Fishery; Bin9; 2004 *	0.0478	0.2620	−0.4656	0.5613
P0634	Selectivity increment	Fishery; Bin10; 2004 *	0.0528	0.2673	−0.4710	0.5766
P0635	Selectivity increment	Fishery; Bin11; 2004 *	0.0774	0.2682	−0.4484	0.6031
P0636	Selectivity increment	Fishery; Bin12; 2004 *	0.0243	0.2639	−0.4929	0.5415
P0637	Selectivity increment	Fishery; Bin1; 2005 *	−0.0551	0.4191	−0.8765	0.7662
P0638	Selectivity increment	Fishery; Bin2; 2005 *	0.1003	0.3875	−0.6593	0.8598
P0639	Selectivity increment	Fishery; Bin3; 2005 *	−0.0105	0.3079	−0.6139	0.5929
P0640	Selectivity increment	Fishery; Bin4; 2005 *	−0.3443	0.2523	−0.8388	0.1502
P0641	Selectivity increment	Fishery; Bin5; 2005 *	0.4211	0.2497	−0.0682	0.9104
P0642	Selectivity increment	Fishery; Bin6; 2005 *	0.2411	0.2598	−0.2682	0.7503
P0643	Selectivity increment	Fishery; Bin7; 2005 *	−0.1040	0.2576	−0.6089	0.4009
P0644	Selectivity increment	Fishery; Bin8; 2005 *	−0.1580	0.2557	−0.6591	0.3431
P0645	Selectivity increment	Fishery; Bin9; 2005 *	−0.0584	0.2607	−0.5694	0.4527
P0646	Selectivity increment	Fishery; Bin10; 2005 *	0.0069	0.2686	−0.5195	0.5333
P0647	Selectivity increment	Fishery; Bin11; 2005 *	0.0034	0.2723	−0.5304	0.5371
P0648	Selectivity increment	Fishery; Bin12; 2005 *	−0.0424	0.2634	−0.5586	0.4738
P0649	Selectivity increment	Fishery; Bin1; 2006 *	−0.0831	0.4190	−0.9043	0.7381
P0650	Selectivity increment	Fishery; Bin2; 2006 *	0.0868	0.3896	−0.6768	0.8504
P0651	Selectivity increment	Fishery; Bin3; 2006 *	0.5507	0.3137	−0.0642	1.1655
P0652	Selectivity increment	Fishery; Bin4; 2006 *	−0.0815	0.2585	−0.5881	0.4251
P0653	Selectivity increment	Fishery; Bin5; 2006 *	−0.3062	0.2441	−0.7846	0.1723
P0654	Selectivity increment	Fishery; Bin6; 2006 *	−0.0503	0.2432	−0.5269	0.4264
P0655	Selectivity increment	Fishery; Bin7; 2006 *	−0.0551	0.2479	−0.5410	0.4308
P0656	Selectivity increment	Fishery; Bin8; 2006 *	−0.0252	0.2559	−0.5268	0.4763
P0657	Selectivity increment	Fishery; Bin9; 2006 *	−0.0731	0.2605	−0.5836	0.4375
P0658	Selectivity increment	Fishery; Bin10; 2006 *	−0.0319	0.2663	−0.5540	0.4901
P0659	Selectivity increment	Fishery; Bin11; 2006 *	0.0189	0.2723	−0.5148	0.5526
P0660	Selectivity increment	Fishery; Bin12; 2006 *	0.0499	0.2638	−0.4671	0.5670
P0661	Selectivity increment	Fishery; Bin1; 2007 *	−0.0442	0.4186	−0.8647	0.7763
P0662	Selectivity increment	Fishery; Bin2; 2007 *	−0.0142	0.3863	−0.7714	0.7429
P0663	Selectivity increment	Fishery; Bin3; 2007 *	−0.0473	0.3156	−0.6659	0.5713
P0664	Selectivity increment	Fishery; Bin4; 2007 *	0.0167	0.2701	−0.5127	0.5461

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0665	Selectivity increment	Fishery; Bin5; 2007 *	−0.0412	0.2468	−0.5249	0.4425
P0666	Selectivity increment	Fishery; Bin6; 2007 *	0.0189	0.2405	−0.4525	0.4904
P0667	Selectivity increment	Fishery; Bin7; 2007 *	0.0371	0.2432	−0.4395	0.5138
P0668	Selectivity increment	Fishery; Bin8; 2007 *	−0.0466	0.2513	−0.5391	0.4459
P0669	Selectivity increment	Fishery; Bin9; 2007 *	−0.0207	0.2599	−0.5301	0.4886
P0670	Selectivity increment	Fishery; Bin10; 2007 *	0.0048	0.2650	−0.5145	0.5241
P0671	Selectivity increment	Fishery; Bin11; 2007 *	0.0473	0.2699	−0.4817	0.5762
P0672	Selectivity increment	Fishery; Bin12; 2007 *	0.0894	0.2630	−0.4261	0.6048
P0673	Selectivity increment	Fishery; Bin1; 2008 *	−0.0079	0.4177	−0.8266	0.8108
P0674	Selectivity increment	Fishery; Bin2; 2008 *	−0.1140	0.3624	−0.8243	0.5962
P0675	Selectivity increment	Fishery; Bin3; 2008 *	−0.5247	0.3047	−1.1219	0.0724
P0676	Selectivity increment	Fishery; Bin4; 2008 *	−0.1226	0.2806	−0.6725	0.4274
P0677	Selectivity increment	Fishery; Bin5; 2008 *	−0.0705	0.2571	−0.5745	0.4335
P0678	Selectivity increment	Fishery; Bin6; 2008 *	0.0489	0.2404	−0.4224	0.5201
P0679	Selectivity increment	Fishery; Bin7; 2008 *	0.0738	0.2405	−0.3975	0.5452
P0680	Selectivity increment	Fishery; Bin8; 2008 *	0.1378	0.2459	−0.3442	0.6198
P0681	Selectivity increment	Fishery; Bin9; 2008 *	0.1536	0.2555	−0.3472	0.6544
P0682	Selectivity increment	Fishery; Bin10; 2008 *	0.0828	0.2751	−0.4564	0.6220
P0683	Selectivity increment	Fishery; Bin11; 2008 *	0.1590	0.2830	−0.3956	0.7137
P0684	Selectivity increment	Fishery; Bin12; 2008 *	0.1838	0.2618	−0.3292	0.6969
P0685	Selectivity increment	Fishery; Bin1; 2009 *	−0.0405	0.4164	−0.8567	0.7757
P0686	Selectivity increment	Fishery; Bin2; 2009 *	−0.3417	0.3505	−1.0287	0.3453
P0687	Selectivity increment	Fishery; Bin3; 2009 *	0.1995	0.2750	−0.3395	0.7385
P0688	Selectivity increment	Fishery; Bin4; 2009 *	0.0605	0.2709	−0.4704	0.5914
P0689	Selectivity increment	Fishery; Bin5; 2009 *	−0.1362	0.2743	−0.6738	0.4015
P0690	Selectivity increment	Fishery; Bin6; 2009 *	−0.0916	0.2610	−0.6032	0.4199
P0691	Selectivity increment	Fishery; Bin7; 2009 *	−0.0530	0.2484	−0.5399	0.4339
P0692	Selectivity increment	Fishery; Bin8; 2009 *	−0.0082	0.2472	−0.4927	0.4763
P0693	Selectivity increment	Fishery; Bin9; 2009 *	0.0108	0.2611	−0.5009	0.5224
P0694	Selectivity increment	Fishery; Bin10; 2009 *	0.1422	0.2987	−0.4433	0.7277
P0695	Selectivity increment	Fishery; Bin11; 2009 *	0.1431	0.2927	−0.4305	0.7167
P0696	Selectivity increment	Fishery; Bin12; 2009 *	0.1152	0.2631	−0.4006	0.6309
P0697	Selectivity increment	Fishery; Bin1; 2010 *	0.0380	0.4155	−0.7764	0.8524
P0698	Selectivity increment	Fishery; Bin2; 2010 *	0.0713	0.3478	−0.6103	0.7529
P0699	Selectivity increment	Fishery; Bin3; 2010 *	−0.6053	0.2855	−1.1648	−0.0458
P0700	Selectivity increment	Fishery; Bin4; 2010 *	0.4401	0.2487	−0.0475	0.9276
P0701	Selectivity increment	Fishery; Bin5; 2010 *	0.1763	0.2702	−0.3533	0.7059
P0702	Selectivity increment	Fishery; Bin6; 2010 *	−0.2436	0.2851	−0.8024	0.3152
P0703	Selectivity increment	Fishery; Bin7; 2010 *	−0.0793	0.2864	−0.6407	0.4821
P0704	Selectivity increment	Fishery; Bin8; 2010 *	0.0697	0.2604	−0.4407	0.5800
P0705	Selectivity increment	Fishery; Bin9; 2010 *	0.0800	0.2622	−0.4339	0.5940
P0706	Selectivity increment	Fishery; Bin10; 2010 *	0.0262	0.2937	−0.5494	0.6018
P0707	Selectivity increment	Fishery; Bin11; 2010 *	−0.0324	0.2989	−0.6181	0.5533
P0708	Selectivity increment	Fishery; Bin12; 2010 *	0.0589	0.2752	−0.4806	0.5984
P0709	Selectivity increment	Fishery; Bin1; 2011 *	0.0295	0.4160	−0.7858	0.8448
P0710	Selectivity increment	Fishery; Bin2; 2011 *	−0.0180	0.3414	−0.6872	0.6511
P0711	Selectivity increment	Fishery; Bin3; 2011 *	0.0445	0.2837	−0.5116	0.6005
P0712	Selectivity increment	Fishery; Bin4; 2011 *	−1.0769	0.2551	−1.5769	−0.5770

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0713	Selectivity increment	Fishery; Bin5; 2011 *	0.4190	0.2469	−0.0649	0.9030
P0714	Selectivity increment	Fishery; Bin6; 2011 *	0.3585	0.2725	−0.1757	0.8927
P0715	Selectivity increment	Fishery; Bin7; 2011 *	0.1392	0.2841	−0.4176	0.6961
P0716	Selectivity increment	Fishery; Bin8; 2011 *	−0.0029	0.2677	−0.5275	0.5217
P0717	Selectivity increment	Fishery; Bin9; 2011 *	0.0017	0.2713	−0.5299	0.5334
P0718	Selectivity increment	Fishery; Bin10; 2011 *	0.0820	0.2732	−0.4534	0.6174
P0719	Selectivity increment	Fishery; Bin11; 2011 *	0.0533	0.2812	−0.4978	0.6044
P0720	Selectivity increment	Fishery; Bin12; 2011 *	−0.0299	0.2765	−0.5719	0.5121
P0721	Selectivity increment	Fishery; Bin1; 2012 *	−0.0139	0.4163	−0.8298	0.8021
P0722	Selectivity increment	Fishery; Bin2; 2012 *	0.2336	0.3613	−0.4745	0.9417
P0723	Selectivity increment	Fishery; Bin3; 2012 *	0.1890	0.2724	−0.3450	0.7229
P0724	Selectivity increment	Fishery; Bin4; 2012 *	0.6247	0.2561	0.1228	1.1266
P0725	Selectivity increment	Fishery; Bin5; 2012 *	−1.0798	0.2559	−1.5813	−0.5782
P0726	Selectivity increment	Fishery; Bin6; 2012 *	−0.0236	0.2490	−0.5115	0.4644
P0727	Selectivity increment	Fishery; Bin7; 2012 *	0.0121	0.2637	−0.5047	0.5289
P0728	Selectivity increment	Fishery; Bin8; 2012 *	0.0237	0.2771	−0.5194	0.5668
P0729	Selectivity increment	Fishery; Bin9; 2012 *	0.0051	0.2797	−0.5432	0.5533
P0730	Selectivity increment	Fishery; Bin10; 2012 *	−0.0627	0.2976	−0.6459	0.5205
P0731	Selectivity increment	Fishery; Bin11; 2012 *	0.0107	0.3307	−0.6375	0.6590
P0732	Selectivity increment	Fishery; Bin12; 2012 *	0.0811	0.2825	−0.4726	0.6347
P0733	Selectivity increment	Fishery; Bin1; 2013 *	0.0205	0.4165	−0.7958	0.8368
P0734	Selectivity increment	Fishery; Bin2; 2013 *	−0.1915	0.3668	−0.9104	0.5275
P0735	Selectivity increment	Fishery; Bin3; 2013 *	0.0270	0.2910	−0.5434	0.5974
P0736	Selectivity increment	Fishery; Bin4; 2013 *	−0.1384	0.2482	−0.6249	0.3481
P0737	Selectivity increment	Fishery; Bin5; 2013 *	0.5116	0.2562	0.0094	1.0138
P0738	Selectivity increment	Fishery; Bin6; 2013 *	−0.6014	0.2588	−1.1087	−0.0941
P0739	Selectivity increment	Fishery; Bin7; 2013 *	−0.1571	0.2700	−0.6863	0.3720
P0740	Selectivity increment	Fishery; Bin8; 2013 *	0.0768	0.3021	−0.5153	0.6688
P0741	Selectivity increment	Fishery; Bin9; 2013 *	0.1177	0.2916	−0.4538	0.6892
P0742	Selectivity increment	Fishery; Bin10; 2013 *	0.1362	0.2948	−0.4415	0.7139
P0743	Selectivity increment	Fishery; Bin11; 2013 *	0.1077	0.3419	−0.5625	0.7778
P0744	Selectivity increment	Fishery; Bin12; 2013 *	0.0911	0.2877	−0.4728	0.6550
P0745	Selectivity increment	Fishery; Bin1; 2014 *	−0.0208	0.4159	−0.8359	0.7943
P0746	Selectivity increment	Fishery; Bin2; 2014 *	0.1368	0.3573	−0.5635	0.8372
P0747	Selectivity increment	Fishery; Bin3; 2014 *	−0.0265	0.3022	−0.6189	0.5659
P0748	Selectivity increment	Fishery; Bin4; 2014 *	−0.1390	0.2622	−0.6529	0.3749
P0749	Selectivity increment	Fishery; Bin5; 2014 *	−0.0989	0.2478	−0.5845	0.3868
P0750	Selectivity increment	Fishery; Bin6; 2014 *	0.3036	0.2553	−0.1967	0.8038
P0751	Selectivity increment	Fishery; Bin7; 2014 *	0.1480	0.2667	−0.3747	0.6708
P0752	Selectivity increment	Fishery; Bin8; 2014 *	−0.1281	0.2924	−0.7011	0.4449
P0753	Selectivity increment	Fishery; Bin9; 2014 *	−0.1334	0.3287	−0.7777	0.5110
P0754	Selectivity increment	Fishery; Bin10; 2014 *	−0.0146	0.3099	−0.6219	0.5927
P0755	Selectivity increment	Fishery; Bin11; 2014 *	−0.0181	0.3208	−0.6467	0.6106
P0756	Selectivity increment	Fishery; Bin12; 2014 *	−0.0092	0.2918	−0.5810	0.5627
P0757	Selectivity increment	Fishery; Bin1; 2015 *	−0.0049	0.4173	−0.8228	0.8129
P0758	Selectivity increment	Fishery; Bin2; 2015 *	−0.4664	0.3403	−1.1335	0.2006
P0759	Selectivity increment	Fishery; Bin3; 2015 *	1.0864	0.2825	0.5327	1.6401
P0760	Selectivity increment	Fishery; Bin4; 2015 *	0.1881	0.2654	−0.3321	0.7083

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0761	Selectivity increment	Fishery; Bin5; 2015 *	−0.1869	0.2562	−0.6890	0.3151
P0762	Selectivity increment	Fishery; Bin6; 2015 *	−0.1074	0.2478	−0.5930	0.3783
P0763	Selectivity increment	Fishery; Bin7; 2015 *	−0.1479	0.2510	−0.6399	0.3441
P0764	Selectivity increment	Fishery; Bin8; 2015 *	−0.1207	0.2715	−0.6527	0.4113
P0765	Selectivity increment	Fishery; Bin9; 2015 *	−0.1278	0.3310	−0.7765	0.5209
P0766	Selectivity increment	Fishery; Bin10; 2015 *	−0.0646	0.3500	−0.7505	0.6213
P0767	Selectivity increment	Fishery; Bin11; 2015 *	−0.0234	0.3684	−0.7454	0.6986
P0768	Selectivity increment	Fishery; Bin12; 2015 *	−0.0245	0.2928	−0.5983	0.5493
P0769	Selectivity increment	Fishery; Bin1; 2016 *	0.0709	0.4184	−0.7491	0.8909
P0770	Selectivity increment	Fishery; Bin2; 2016 *	0.0205	0.3679	−0.7006	0.7417
P0771	Selectivity increment	Fishery; Bin3; 2016 *	−1.4595	0.2654	−1.9797	−0.9393
P0772	Selectivity increment	Fishery; Bin4; 2016 *	1.0623	0.2498	0.5726	1.5519
P0773	Selectivity increment	Fishery; Bin5; 2016 *	0.2840	0.2593	−0.2243	0.7922
P0774	Selectivity increment	Fishery; Bin6; 2016 *	−0.0027	0.2623	−0.5167	0.5114
P0775	Selectivity increment	Fishery; Bin7; 2016 *	−0.0982	0.2597	−0.6071	0.4107
P0776	Selectivity increment	Fishery; Bin8; 2016 *	0.2058	0.2624	−0.3085	0.7201
P0777	Selectivity increment	Fishery; Bin9; 2016 *	0.1100	0.3019	−0.4817	0.7018
P0778	Selectivity increment	Fishery; Bin10; 2016 *	−0.0858	0.3388	−0.7498	0.5782
P0779	Selectivity increment	Fishery; Bin11; 2016 *	−0.0413	0.3728	−0.7720	0.6894
P0780	Selectivity increment	Fishery; Bin12; 2016 *	−0.0660	0.2958	−0.6458	0.5138
P0781	Selectivity increment	Fishery; Bin1; 2017 *	0.0527	0.4179	−0.7664	0.8719
P0782	Selectivity increment	Fishery; Bin2; 2017 *	0.2806	0.3829	−0.4698	1.0311
P0783	Selectivity increment	Fishery; Bin3; 2017 *	−0.2525	0.3120	−0.8641	0.3590
P0784	Selectivity increment	Fishery; Bin4; 2017 *	−1.1177	0.2428	−1.5936	−0.6418
P0785	Selectivity increment	Fishery; Bin5; 2017 *	0.5963	0.2497	0.1068	1.0857
P0786	Selectivity increment	Fishery; Bin6; 2017 *	0.3303	0.2619	−0.1831	0.8436
P0787	Selectivity increment	Fishery; Bin7; 2017 *	0.1867	0.2691	−0.3407	0.7141
P0788	Selectivity increment	Fishery; Bin8; 2017 *	−0.0775	0.2733	−0.6132	0.4583
P0789	Selectivity increment	Fishery; Bin9; 2017 *	0.0698	0.2694	−0.4582	0.5978
P0790	Selectivity increment	Fishery; Bin10; 2017 *	0.0476	0.2886	−0.5180	0.6133
P0791	Selectivity increment	Fishery; Bin11; 2017 *	−0.0586	0.3038	−0.6541	0.5369
P0792	Selectivity increment	Fishery; Bin12; 2017 *	−0.0577	0.2800	−0.6065	0.4910
P0793	Selectivity increment	Fishery; Bin1; 2018 *	0.0269	0.4176	−0.7916	0.8454
P0794	Selectivity increment	Fishery; Bin2; 2018 *	0.3297	0.3844	−0.4237	1.0831
P0795	Selectivity increment	Fishery; Bin3; 2018 *	0.1383	0.3454	−0.5386	0.8153
P0796	Selectivity increment	Fishery; Bin4; 2018 *	−0.5920	0.2685	−1.1182	−0.0658
P0797	Selectivity increment	Fishery; Bin5; 2018 *	0.0098	0.2416	−0.4637	0.4833
P0798	Selectivity increment	Fishery; Bin6; 2018 *	0.1787	0.2486	−0.3085	0.6660
P0799	Selectivity increment	Fishery; Bin7; 2018 *	0.1098	0.2599	−0.3996	0.6191
P0800	Selectivity increment	Fishery; Bin8; 2018 *	0.0802	0.2732	−0.4553	0.6156
P0801	Selectivity increment	Fishery; Bin9; 2018 *	−0.0363	0.2658	−0.5572	0.4847
P0802	Selectivity increment	Fishery; Bin10; 2018 *	−0.0785	0.2671	−0.6021	0.4451
P0803	Selectivity increment	Fishery; Bin11; 2018 *	−0.0815	0.2758	−0.6221	0.4591
P0804	Selectivity increment	Fishery; Bin12; 2018 *	−0.0851	0.2740	−0.6221	0.4518
P0805	Selectivity increment	Fishery; Bin1; 2019 *	0.0466	0.4171	−0.7710	0.8641
P0806	Selectivity increment	Fishery; Bin2; 2019 *	0.4753	0.3768	−0.2631	1.2138
P0807	Selectivity increment	Fishery; Bin3; 2019 *	0.2133	0.3498	−0.4724	0.8989
P0808	Selectivity increment	Fishery; Bin4; 2019 *	−0.3828	0.3044	−0.9794	0.2138

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0809	Selectivity increment	Fishery; Bin5; 2019 *	−1.2476	0.2535	−1.7444	−0.7507
P0810	Selectivity increment	Fishery; Bin6; 2019 *	0.0949	0.2440	−0.3833	0.5732
P0811	Selectivity increment	Fishery; Bin7; 2019 *	0.4408	0.2500	−0.0491	0.9307
P0812	Selectivity increment	Fishery; Bin8; 2019 *	0.2212	0.2554	−0.2793	0.7217
P0813	Selectivity increment	Fishery; Bin9; 2019 *	0.1280	0.2577	−0.3771	0.6332
P0814	Selectivity increment	Fishery; Bin10; 2019 *	0.1319	0.2624	−0.3825	0.6463
P0815	Selectivity increment	Fishery; Bin11; 2019 *	−0.0475	0.2710	−0.5786	0.4836
P0816	Selectivity increment	Fishery; Bin12; 2019 *	−0.0742	0.2705	−0.6044	0.4561
P0817	Selectivity increment	Fishery; Bin1; 2020 *	−0.0191	0.4206	−0.8434	0.8052
P0818	Selectivity increment	Fishery; Bin2; 2020 *	0.6177	0.3313	−0.0316	1.2671
P0819	Selectivity increment	Fishery; Bin3; 2020 *	0.4207	0.3273	−0.2208	1.0622
P0820	Selectivity increment	Fishery; Bin4; 2020 *	0.5413	0.3105	−0.0673	1.1498
P0821	Selectivity increment	Fishery; Bin5; 2020 *	0.1307	0.2757	−0.4096	0.6709
P0822	Selectivity increment	Fishery; Bin6; 2020 *	−0.4191	0.2437	−0.8968	0.0586
P0823	Selectivity increment	Fishery; Bin7; 2020 *	−0.5005	0.2439	−0.9786	−0.0224
P0824	Selectivity increment	Fishery; Bin8; 2020 *	−0.4159	0.2603	−0.9260	0.0942
P0825	Selectivity increment	Fishery; Bin9; 2020 *	−0.1799	0.2700	−0.7091	0.3493
P0826	Selectivity increment	Fishery; Bin10; 2020 *	−0.1332	0.2641	−0.6509	0.3844
P0827	Selectivity increment	Fishery; Bin11; 2020 *	0.0035	0.2686	−0.5231	0.5300
P0828	Selectivity increment	Fishery; Bin12; 2020 *	−0.0460	0.2683	−0.5718	0.4798
P0829	Selectivity increment	Fishery; Bin1; 2021 *	−0.0184	0.4212	−0.8439	0.8071
P0830	Selectivity increment	Fishery; Bin2; 2021 *	0.3251	0.2749	−0.2138	0.8639
P0831	Selectivity increment	Fishery; Bin3; 2021 *	0.9147	0.2699	0.3857	1.4437
P0832	Selectivity increment	Fishery; Bin4; 2021 *	−0.1532	0.2838	−0.7093	0.4030
P0833	Selectivity increment	Fishery; Bin5; 2021 *	−0.0152	0.2871	−0.5779	0.5474
P0834	Selectivity increment	Fishery; Bin6; 2021 *	−0.6384	0.2690	−1.1655	−0.1113
P0835	Selectivity increment	Fishery; Bin7; 2021 *	−0.1600	0.2500	−0.6500	0.3299
P0836	Selectivity increment	Fishery; Bin8; 2021 *	0.0909	0.2552	−0.4093	0.5910
P0837	Selectivity increment	Fishery; Bin9; 2021 *	−0.1014	0.2714	−0.6334	0.4305
P0838	Selectivity increment	Fishery; Bin10; 2021 *	−0.1057	0.2667	−0.6285	0.4170
P0839	Selectivity increment	Fishery; Bin11; 2021 *	−0.0815	0.2704	−0.6114	0.4484
P0840	Selectivity increment	Fishery; Bin12; 2021 *	−0.0567	0.2670	−0.5800	0.4666
P0841	Selectivity increment	Fishery; Bin1; 2022 *	0.0125	0.4227	−0.8160	0.8411
P0842	Selectivity increment	Fishery; Bin2; 2022 *	0.2365	0.3079	−0.3670	0.8399
P0843	Selectivity increment	Fishery; Bin3; 2022 *	−0.4506	0.2537	−0.9478	0.0466
P0844	Selectivity increment	Fishery; Bin4; 2022 *	0.5723	0.2483	0.0856	1.0591
P0845	Selectivity increment	Fishery; Bin5; 2022 *	0.0776	0.2801	−0.4714	0.6266
P0846	Selectivity increment	Fishery; Bin6; 2022 *	0.0682	0.2955	−0.5109	0.6473
P0847	Selectivity increment	Fishery; Bin7; 2022 *	−0.2542	0.2823	−0.8076	0.2991
P0848	Selectivity increment	Fishery; Bin8; 2022 *	−0.0369	0.2568	−0.5401	0.4664
P0849	Selectivity increment	Fishery; Bin9; 2022 *	−0.0857	0.2572	−0.5898	0.4184
P0850	Selectivity increment	Fishery; Bin10; 2022 *	−0.1450	0.2819	−0.6976	0.4076
P0851	Selectivity increment	Fishery; Bin11; 2022 *	−0.0111	0.2962	−0.5915	0.5694
P0852	Selectivity increment	Fishery; Bin12; 2022 *	0.0163	0.2718	−0.5165	0.5491
P0853	Selectivity increment	Fishery; Bin1; 2023 *	0.0335	0.4240	−0.7975	0.8646
P0854	Selectivity increment	Fishery; Bin2; 2023 *	−0.5536	0.3485	−1.2367	0.1295
P0855	Selectivity increment	Fishery; Bin3; 2023 *	0.1024	0.3004	−0.4864	0.6911
P0856	Selectivity increment	Fishery; Bin4; 2023 *	−0.1481	0.2631	−0.6638	0.3677

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0857	Selectivity increment	Fishery; Bin5; 2023 *	0.5445	0.2616	0.0319	1.0572
P0858	Selectivity increment	Fishery; Bin6; 2023 *	0.3275	0.2881	−0.2372	0.8923
P0859	Selectivity increment	Fishery; Bin7; 2023 *	−0.1214	0.2972	−0.7039	0.4612
P0860	Selectivity increment	Fishery; Bin8; 2023 *	−0.2840	0.3093	−0.8901	0.3222
P0861	Selectivity increment	Fishery; Bin9; 2023 *	0.0082	0.2801	−0.5408	0.5572
P0862	Selectivity increment	Fishery; Bin10; 2023 *	0.0548	0.2938	−0.5211	0.6307
P0863	Selectivity increment	Fishery; Bin11; 2023 *	0.0069	0.3066	−0.5941	0.6079
P0864	Selectivity increment	Fishery; Bin12; 2023 *	0.0292	0.2763	−0.5124	0.5707
P0865	Selectivity increment	Fishery; Bin1; 2024 *	0.0203	0.4247	−0.8122	0.8528
P0866	Selectivity increment	Fishery; Bin2; 2024 *	−0.5495	0.3664	−1.2676	0.1685
P0867	Selectivity increment	Fishery; Bin3; 2024 *	0.1606	0.3170	−0.4607	0.7819
P0868	Selectivity increment	Fishery; Bin4; 2024 *	0.1045	0.2938	−0.4713	0.6804
P0869	Selectivity increment	Fishery; Bin5; 2024 *	−0.2087	0.2602	−0.7186	0.3012
P0870	Selectivity increment	Fishery; Bin6; 2024 *	0.3659	0.2595	−0.1427	0.8745
P0871	Selectivity increment	Fishery; Bin7; 2024 *	0.2160	0.2755	−0.3239	0.7559
P0872	Selectivity increment	Fishery; Bin8; 2024 *	−0.0331	0.3171	−0.6545	0.5884
P0873	Selectivity increment	Fishery; Bin9; 2024 *	−0.0209	0.2958	−0.6007	0.5589
P0874	Selectivity increment	Fishery; Bin10; 2024 *	−0.0052	0.2983	−0.5898	0.5795
P0875	Selectivity increment	Fishery; Bin11; 2024 *	−0.0403	0.3419	−0.7104	0.6298
P0876	Selectivity increment	Fishery; Bin12; 2024 *	−0.0097	0.2891	−0.5763	0.5569
P0877	Selectivity increment	Fishery; Bin1; 2025 *	0.0465	0.4277	−0.7917	0.8847
P0878	Selectivity increment	Fishery; Bin2; 2025 *	−0.1805	0.3689	−0.9034	0.5425
P0879	Selectivity increment	Fishery; Bin3; 2025 *	−0.3735	0.3337	−1.0275	0.2805
P0880	Selectivity increment	Fishery; Bin4; 2025 *	−0.1775	0.3158	−0.7964	0.4414
P0881	Selectivity increment	Fishery; Bin5; 2025 *	−0.2383	0.2955	−0.8174	0.3409
P0882	Selectivity increment	Fishery; Bin6; 2025 *	0.1600	0.2522	−0.3343	0.6542
P0883	Selectivity increment	Fishery; Bin7; 2025 *	0.3901	0.2527	−0.1051	0.8854
P0884	Selectivity increment	Fishery; Bin8; 2025 *	0.2710	0.2754	−0.2687	0.8107
P0885	Selectivity increment	Fishery; Bin9; 2025 *	0.0724	0.2890	−0.4940	0.6388
P0886	Selectivity increment	Fishery; Bin10; 2025 *	0.0628	0.2921	−0.5098	0.6354
P0887	Selectivity increment	Fishery; Bin11; 2025 *	−0.0233	0.3339	−0.6777	0.6312
P0888	Selectivity increment	Fishery; Bin12; 2025 *	−0.0097	0.2915	−0.5811	0.5617
P0889	Selectivity increment	Fishery; Bin1; 2026 *	0.0057	0.4326	−0.8422	0.8537
P0890	Selectivity increment	Fishery; Bin2; 2026 *	−0.0131	0.4291	−0.8541	0.8278
P0891	Selectivity increment	Fishery; Bin3; 2026 *	0.0024	0.4306	−0.8416	0.8464
P0892	Selectivity increment	Fishery; Bin4; 2026 *	0.0136	0.4330	−0.8351	0.8622
P0893	Selectivity increment	Fishery; Bin5; 2026 *	0.0458	0.4381	−0.8128	0.9045
P0894	Selectivity increment	Fishery; Bin6; 2026 *	−0.1266	0.3089	−0.7320	0.4787
P0895	Selectivity increment	Fishery; Bin7; 2026 *	−0.1276	0.2822	−0.6807	0.4256
P0896	Selectivity increment	Fishery; Bin8; 2026 *	0.0580	0.2800	−0.4908	0.6068
P0897	Selectivity increment	Fishery; Bin9; 2026 *	0.0408	0.2804	−0.5087	0.5903
P0898	Selectivity increment	Fishery; Bin10; 2026 *	0.0264	0.2850	−0.5322	0.5850
P0899	Selectivity increment	Fishery; Bin11; 2026 *	0.0629	0.3040	−0.5330	0.6587
P0900	Selectivity increment	Fishery; Bin12; 2026 *	0.0118	0.2926	−0.5617	0.5853
P0901	Selectivity increment	AVO; Bin2; 1994 *	0.4268	0.3221	−0.2045	1.0581
P0902	Selectivity increment	AVO; Bin3; 1994 *	0.2014	0.3578	−0.4998	0.9027
P0903	Selectivity increment	AVO; Bin4; 1994 *	0.0307	0.3479	−0.6511	0.7125
P0904	Selectivity increment	AVO; Bin5; 1994 *	0.1390	0.3399	−0.5273	0.8052

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0905	Selectivity increment	AVO; Bin6; 1994 *	0.1843	0.3570	−0.5154	0.8839
P0906	Selectivity increment	AVO; Bin7; 1994 *	−0.2044	0.3577	−0.9055	0.4967
P0907	Selectivity increment	AVO; Bin8; 1994 *	0.0739	0.3182	−0.5498	0.6976
P0908	Selectivity increment	AVO; Bin2; 1995 *	0.2193	0.2842	−0.3376	0.7763
P0909	Selectivity increment	AVO; Bin3; 1995 *	0.2252	0.2938	−0.3507	0.8010
P0910	Selectivity increment	AVO; Bin4; 1995 *	0.1966	0.2925	−0.3766	0.7699
P0911	Selectivity increment	AVO; Bin5; 1995 *	0.1891	0.2912	−0.3817	0.7599
P0912	Selectivity increment	AVO; Bin6; 1995 *	0.2052	0.2922	−0.3676	0.7779
P0913	Selectivity increment	AVO; Bin7; 1995 *	0.2084	0.2921	−0.3640	0.7808
P0914	Selectivity increment	AVO; Bin8; 1995 *	0.2116	0.2641	−0.3061	0.7293
P0915	Selectivity increment	AVO; Bin2; 1996 *	0.2181	0.2742	−0.3193	0.7556
P0916	Selectivity increment	AVO; Bin3; 1996 *	0.2133	0.2742	−0.3240	0.7507
P0917	Selectivity increment	AVO; Bin4; 1996 *	0.2070	0.2725	−0.3271	0.7412
P0918	Selectivity increment	AVO; Bin5; 1996 *	0.1986	0.2723	−0.3351	0.7323
P0919	Selectivity increment	AVO; Bin6; 1996 *	0.2015	0.2730	−0.3335	0.7364
P0920	Selectivity increment	AVO; Bin7; 1996 *	0.2067	0.2721	−0.3266	0.7400
P0921	Selectivity increment	AVO; Bin8; 1996 *	0.2151	0.2472	−0.2694	0.6997
P0922	Selectivity increment	AVO; Bin2; 1997 *	0.2620	0.2631	−0.2535	0.7776
P0923	Selectivity increment	AVO; Bin3; 1997 *	0.2517	0.2607	−0.2594	0.7627
P0924	Selectivity increment	AVO; Bin4; 1997 *	0.2206	0.2594	−0.2877	0.7289
P0925	Selectivity increment	AVO; Bin5; 1997 *	0.2321	0.2585	−0.2745	0.7387
P0926	Selectivity increment	AVO; Bin6; 1997 *	0.2202	0.2597	−0.2888	0.7292
P0927	Selectivity increment	AVO; Bin7; 1997 *	0.2254	0.2590	−0.2822	0.7331
P0928	Selectivity increment	AVO; Bin8; 1997 *	0.2178	0.2340	−0.2408	0.6764
P0929	Selectivity increment	AVO; Bin2; 1998 *	0.2201	0.2506	−0.2710	0.7112
P0930	Selectivity increment	AVO; Bin3; 1998 *	0.2988	0.2509	−0.1930	0.7905
P0931	Selectivity increment	AVO; Bin4; 1998 *	0.2887	0.2506	−0.2025	0.7799
P0932	Selectivity increment	AVO; Bin5; 1998 *	0.2513	0.2507	−0.2401	0.7427
P0933	Selectivity increment	AVO; Bin6; 1998 *	0.2567	0.2509	−0.2351	0.7485
P0934	Selectivity increment	AVO; Bin7; 1998 *	0.2612	0.2497	−0.2283	0.7507
P0935	Selectivity increment	AVO; Bin8; 1998 *	0.2331	0.2239	−0.2057	0.6719
P0936	Selectivity increment	AVO; Bin2; 1999 *	0.2312	0.2468	−0.2526	0.7149
P0937	Selectivity increment	AVO; Bin3; 1999 *	0.3187	0.2435	−0.1584	0.7959
P0938	Selectivity increment	AVO; Bin4; 1999 *	0.3135	0.2427	−0.1622	0.7891
P0939	Selectivity increment	AVO; Bin5; 1999 *	0.2774	0.2435	−0.1999	0.7547
P0940	Selectivity increment	AVO; Bin6; 1999 *	0.2693	0.2437	−0.2083	0.7470
P0941	Selectivity increment	AVO; Bin7; 1999 *	0.2849	0.2420	−0.1894	0.7593
P0942	Selectivity increment	AVO; Bin8; 1999 *	0.2551	0.2166	−0.1694	0.6796
P0943	Selectivity increment	AVO; Bin2; 2000 *	0.2540	0.2396	−0.2156	0.7236
P0944	Selectivity increment	AVO; Bin3; 2000 *	0.2719	0.2393	−0.1972	0.7410
P0945	Selectivity increment	AVO; Bin4; 2000 *	0.3283	0.2384	−0.1390	0.7955
P0946	Selectivity increment	AVO; Bin5; 2000 *	0.2944	0.2392	−0.1744	0.7632
P0947	Selectivity increment	AVO; Bin6; 2000 *	0.2994	0.2398	−0.1707	0.7694
P0948	Selectivity increment	AVO; Bin7; 2000 *	0.2678	0.2390	−0.2007	0.7363
P0949	Selectivity increment	AVO; Bin8; 2000 *	0.2747	0.2126	−0.1419	0.6913
P0950	Selectivity increment	AVO; Bin2; 2001 *	0.3133	0.2345	−0.1463	0.7729
P0951	Selectivity increment	AVO; Bin3; 2001 *	0.3023	0.2373	−0.1628	0.7673
P0952	Selectivity increment	AVO; Bin4; 2001 *	0.2844	0.2370	−0.1800	0.7489

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P0953	Selectivity increment	AVO; Bin5; 2001 *	0.3131	0.2372	−0.1517	0.7780
P0954	Selectivity increment	AVO; Bin6; 2001 *	0.3172	0.2374	−0.1480	0.7824
P0955	Selectivity increment	AVO; Bin7; 2001 *	0.2960	0.2370	−0.1685	0.7605
P0956	Selectivity increment	AVO; Bin8; 2001 *	0.2805	0.2102	−0.1314	0.6925
P0957	Selectivity increment	AVO; Bin2; 2002 *	0.3008	0.2355	−0.1608	0.7625
P0958	Selectivity increment	AVO; Bin3; 2002 *	0.3180	0.2342	−0.1411	0.7771
P0959	Selectivity increment	AVO; Bin4; 2002 *	0.3056	0.2342	−0.1533	0.7645
P0960	Selectivity increment	AVO; Bin5; 2002 *	0.3188	0.2346	−0.1410	0.7786
P0961	Selectivity increment	AVO; Bin6; 2002 *	0.3244	0.2345	−0.1353	0.7840
P0962	Selectivity increment	AVO; Bin7; 2002 *	0.3085	0.2345	−0.1510	0.7680
P0963	Selectivity increment	AVO; Bin8; 2002 *	0.2908	0.2078	−0.1165	0.6980
P0964	Selectivity increment	AVO; Bin2; 2003 *	0.2507	0.2309	−0.2019	0.7033
P0965	Selectivity increment	AVO; Bin3; 2003 *	0.2393	0.2357	−0.2227	0.7013
P0966	Selectivity increment	AVO; Bin4; 2003 *	0.3117	0.2351	−0.1490	0.7725
P0967	Selectivity increment	AVO; Bin5; 2003 *	0.3291	0.2351	−0.1317	0.7898
P0968	Selectivity increment	AVO; Bin6; 2003 *	0.3118	0.2353	−0.1493	0.7729
P0969	Selectivity increment	AVO; Bin7; 2003 *	0.3008	0.2349	−0.1597	0.7612
P0970	Selectivity increment	AVO; Bin8; 2003 *	0.3001	0.2080	−0.1075	0.7077
P0971	Selectivity increment	AVO; Bin2; 2004 *	0.2241	0.2342	−0.2349	0.6830
P0972	Selectivity increment	AVO; Bin3; 2004 *	0.2365	0.2351	−0.2244	0.6973
P0973	Selectivity increment	AVO; Bin4; 2004 *	0.3237	0.2336	−0.1342	0.7816
P0974	Selectivity increment	AVO; Bin5; 2004 *	0.3248	0.2340	−0.1338	0.7835
P0975	Selectivity increment	AVO; Bin6; 2004 *	0.3064	0.2345	−0.1533	0.7661
P0976	Selectivity increment	AVO; Bin7; 2004 *	0.2994	0.2344	−0.1600	0.7588
P0977	Selectivity increment	AVO; Bin8; 2004 *	0.2971	0.2078	−0.1101	0.7043
P0978	Selectivity increment	AVO; Bin2; 2005 *	0.3122	0.2340	−0.1465	0.7708
P0979	Selectivity increment	AVO; Bin3; 2005 *	0.2707	0.2370	−0.1939	0.7353
P0980	Selectivity increment	AVO; Bin4; 2005 *	0.2088	0.2361	−0.2539	0.6714
P0981	Selectivity increment	AVO; Bin5; 2005 *	0.2422	0.2355	−0.2193	0.7037
P0982	Selectivity increment	AVO; Bin6; 2005 *	0.2737	0.2355	−0.1878	0.7352
P0983	Selectivity increment	AVO; Bin7; 2005 *	0.2837	0.2354	−0.1776	0.7450
P0984	Selectivity increment	AVO; Bin8; 2005 *	0.2886	0.2091	−0.1212	0.6985
P0985	Selectivity increment	AVO; Bin2; 2006 *	0.2699	0.2375	−0.1956	0.7355
P0986	Selectivity increment	AVO; Bin3; 2006 *	0.2465	0.2377	−0.2194	0.7124
P0987	Selectivity increment	AVO; Bin4; 2006 *	0.2044	0.2360	−0.2583	0.6670
P0988	Selectivity increment	AVO; Bin5; 2006 *	0.2238	0.2353	−0.2374	0.6850
P0989	Selectivity increment	AVO; Bin6; 2006 *	0.2520	0.2353	−0.2091	0.7131
P0990	Selectivity increment	AVO; Bin7; 2006 *	0.2653	0.2354	−0.1961	0.7267
P0991	Selectivity increment	AVO; Bin8; 2006 *	0.2690	0.2100	−0.1426	0.6806
P0992	Selectivity increment	AVO; Bin2; 2007 *	0.2692	0.2368	−0.1949	0.7332
P0993	Selectivity increment	AVO; Bin3; 2007 *	0.2569	0.2368	−0.2071	0.7210
P0994	Selectivity increment	AVO; Bin4; 2007 *	0.2281	0.2359	−0.2343	0.6904
P0995	Selectivity increment	AVO; Bin5; 2007 *	0.2419	0.2351	−0.2189	0.7027
P0996	Selectivity increment	AVO; Bin6; 2007 *	0.2516	0.2350	−0.2090	0.7122
P0997	Selectivity increment	AVO; Bin7; 2007 *	0.2401	0.2350	−0.2206	0.7008
P0998	Selectivity increment	AVO; Bin8; 2007 *	0.2437	0.2092	−0.1664	0.6538
P0999	Selectivity increment	AVO; Bin2; 2008 *	0.2695	0.2362	−0.1933	0.7324
P1000	Selectivity increment	AVO; Bin3; 2008 *	0.2401	0.2375	−0.2253	0.7055

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P1001	Selectivity increment	AVO; Bin4; 2008 *	0.1914	0.2376	−0.2743	0.6571
P1002	Selectivity increment	AVO; Bin5; 2008 *	0.1803	0.2377	−0.2856	0.6462
P1003	Selectivity increment	AVO; Bin6; 2008 *	0.1896	0.2375	−0.2758	0.6551
P1004	Selectivity increment	AVO; Bin7; 2008 *	0.2055	0.2371	−0.2592	0.6702
P1005	Selectivity increment	AVO; Bin8; 2008 *	0.2248	0.2109	−0.1886	0.6382
P1006	Selectivity increment	AVO; Bin2; 2009 *	0.2256	0.2352	−0.2354	0.6867
P1007	Selectivity increment	AVO; Bin3; 2009 *	0.2164	0.2381	−0.2503	0.6832
P1008	Selectivity increment	AVO; Bin4; 2009 *	0.1855	0.2380	−0.2810	0.6519
P1009	Selectivity increment	AVO; Bin5; 2009 *	0.1817	0.2386	−0.2860	0.6494
P1010	Selectivity increment	AVO; Bin6; 2009 *	0.1921	0.2389	−0.2761	0.6602
P1011	Selectivity increment	AVO; Bin7; 2009 *	0.2021	0.2383	−0.2650	0.6692
P1012	Selectivity increment	AVO; Bin8; 2009 *	0.2012	0.2114	−0.2132	0.6156
P1013	Selectivity increment	AVO; Bin2; 2010 *	0.2367	0.2353	−0.2245	0.6979
P1014	Selectivity increment	AVO; Bin3; 2010 *	0.1889	0.2390	−0.2795	0.6574
P1015	Selectivity increment	AVO; Bin4; 2010 *	0.2100	0.2375	−0.2554	0.6754
P1016	Selectivity increment	AVO; Bin5; 2010 *	0.1807	0.2382	−0.2861	0.6476
P1017	Selectivity increment	AVO; Bin6; 2010 *	0.1855	0.2386	−0.2821	0.6531
P1018	Selectivity increment	AVO; Bin7; 2010 *	0.1926	0.2382	−0.2742	0.6595
P1019	Selectivity increment	AVO; Bin8; 2010 *	0.1823	0.2112	−0.2316	0.5962
P1020	Selectivity increment	AVO; Bin2; 2011 *	0.2198	0.2349	−0.2407	0.6802
P1021	Selectivity increment	AVO; Bin3; 2011 *	0.1828	0.2393	−0.2863	0.6519
P1022	Selectivity increment	AVO; Bin4; 2011 *	0.1560	0.2379	−0.3103	0.6223
P1023	Selectivity increment	AVO; Bin5; 2011 *	0.1683	0.2383	−0.2987	0.6354
P1024	Selectivity increment	AVO; Bin6; 2011 *	0.1801	0.2385	−0.2872	0.6475
P1025	Selectivity increment	AVO; Bin7; 2011 *	0.1860	0.2383	−0.2810	0.6531
P1026	Selectivity increment	AVO; Bin8; 2011 *	0.1717	0.2116	−0.2430	0.5863
P1027	Selectivity increment	AVO; Bin2; 2012 *	0.2201	0.2381	−0.2465	0.6868
P1028	Selectivity increment	AVO; Bin3; 2012 *	0.1874	0.2380	−0.2791	0.6539
P1029	Selectivity increment	AVO; Bin4; 2012 *	0.1557	0.2357	−0.3062	0.6177
P1030	Selectivity increment	AVO; Bin5; 2012 *	0.1715	0.2374	−0.2937	0.6367
P1031	Selectivity increment	AVO; Bin6; 2012 *	0.1797	0.2375	−0.2857	0.6451
P1032	Selectivity increment	AVO; Bin7; 2012 *	0.1825	0.2377	−0.2834	0.6484
P1033	Selectivity increment	AVO; Bin8; 2012 *	0.1626	0.2112	−0.2513	0.5765
P1034	Selectivity increment	AVO; Bin2; 2013 *	0.2090	0.2344	−0.2504	0.6683
P1035	Selectivity increment	AVO; Bin3; 2013 *	0.2204	0.2364	−0.2429	0.6837
P1036	Selectivity increment	AVO; Bin4; 2013 *	0.2464	0.2350	−0.2142	0.7070
P1037	Selectivity increment	AVO; Bin5; 2013 *	0.2349	0.2351	−0.2258	0.6957
P1038	Selectivity increment	AVO; Bin6; 2013 *	0.2267	0.2351	−0.2342	0.6875
P1039	Selectivity increment	AVO; Bin7; 2013 *	0.2029	0.2354	−0.2585	0.6643
P1040	Selectivity increment	AVO; Bin8; 2013 *	0.1606	0.2081	−0.2473	0.5686
P1041	Selectivity increment	AVO; Bin2; 2014 *	0.2387	0.2348	−0.2216	0.6989
P1042	Selectivity increment	AVO; Bin3; 2014 *	0.2282	0.2328	−0.2281	0.6845
P1043	Selectivity increment	AVO; Bin4; 2014 *	0.2623	0.2318	−0.1920	0.7167
P1044	Selectivity increment	AVO; Bin5; 2014 *	0.2438	0.2321	−0.2111	0.6986
P1045	Selectivity increment	AVO; Bin6; 2014 *	0.2492	0.2316	−0.2048	0.7032
P1046	Selectivity increment	AVO; Bin7; 2014 *	0.2315	0.2330	−0.2251	0.6881
P1047	Selectivity increment	AVO; Bin8; 2014 *	0.1816	0.2054	−0.2211	0.5842
P1048	Selectivity increment	AVO; Bin2; 2015 *	0.1440	0.2281	−0.3030	0.5910

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P1049	Selectivity increment	AVO; Bin3; 2015 *	0.2648	0.2323	−0.1904	0.7200
P1050	Selectivity increment	AVO; Bin4; 2015 *	0.2820	0.2321	−0.1729	0.7370
P1051	Selectivity increment	AVO; Bin5; 2015 *	0.2515	0.2330	−0.2053	0.7082
P1052	Selectivity increment	AVO; Bin6; 2015 *	0.2218	0.2332	−0.2352	0.6788
P1053	Selectivity increment	AVO; Bin7; 2015 *	0.2269	0.2336	−0.2309	0.6847
P1054	Selectivity increment	AVO; Bin8; 2015 *	0.2145	0.2058	−0.1888	0.6178
P1055	Selectivity increment	AVO; Bin2; 2016 *	0.1171	0.2337	−0.3409	0.5752
P1056	Selectivity increment	AVO; Bin3; 2016 *	0.2099	0.2333	−0.2474	0.6671
P1057	Selectivity increment	AVO; Bin4; 2016 *	0.2846	0.2324	−0.1708	0.7401
P1058	Selectivity increment	AVO; Bin5; 2016 *	0.2301	0.2344	−0.2294	0.6896
P1059	Selectivity increment	AVO; Bin6; 2016 *	0.2050	0.2348	−0.2552	0.6652
P1060	Selectivity increment	AVO; Bin7; 2016 *	0.2006	0.2352	−0.2604	0.6616
P1061	Selectivity increment	AVO; Bin8; 2016 *	0.2355	0.2086	−0.1734	0.6444
P1062	Selectivity increment	AVO; Bin2; 2017 *	0.2189	0.2350	−0.2416	0.6795
P1063	Selectivity increment	AVO; Bin3; 2017 *	0.1560	0.2388	−0.3121	0.6240
P1064	Selectivity increment	AVO; Bin4; 2017 *	0.1020	0.2369	−0.3624	0.5664
P1065	Selectivity increment	AVO; Bin5; 2017 *	0.1924	0.2378	−0.2738	0.6585
P1066	Selectivity increment	AVO; Bin6; 2017 *	0.2094	0.2389	−0.2588	0.6777
P1067	Selectivity increment	AVO; Bin7; 2017 *	0.2076	0.2398	−0.2625	0.6776
P1068	Selectivity increment	AVO; Bin8; 2017 *	0.2362	0.2134	−0.1821	0.6545
P1069	Selectivity increment	AVO; Bin2; 2018 *	0.1941	0.2406	−0.2776	0.6657
P1070	Selectivity increment	AVO; Bin3; 2018 *	0.1519	0.2425	−0.3234	0.6271
P1071	Selectivity increment	AVO; Bin4; 2018 *	0.1254	0.2409	−0.3467	0.5975
P1072	Selectivity increment	AVO; Bin5; 2018 *	0.1977	0.2397	−0.2722	0.6675
P1073	Selectivity increment	AVO; Bin6; 2018 *	0.2034	0.2414	−0.2698	0.6766
P1074	Selectivity increment	AVO; Bin7; 2018 *	0.2057	0.2430	−0.2707	0.6820
P1075	Selectivity increment	AVO; Bin8; 2018 *	0.2230	0.2169	−0.2022	0.6481
P1076	Selectivity increment	AVO; Bin2; 2019 *	0.2102	0.2403	−0.2607	0.6811
P1077	Selectivity increment	AVO; Bin3; 2019 *	0.2093	0.2441	−0.2692	0.6878
P1078	Selectivity increment	AVO; Bin4; 2019 *	0.2316	0.2446	−0.2477	0.7110
P1079	Selectivity increment	AVO; Bin5; 2019 *	0.2064	0.2446	−0.2730	0.6857
P1080	Selectivity increment	AVO; Bin6; 2019 *	0.2099	0.2448	−0.2698	0.6897
P1081	Selectivity increment	AVO; Bin7; 2019 *	0.2061	0.2448	−0.2737	0.6859
P1082	Selectivity increment	AVO; Bin8; 2019 *	0.2140	0.2181	−0.2135	0.6416
P1083	Selectivity increment	AVO; Bin2; 2020 *	0.1981	0.2447	−0.2815	0.6777
P1084	Selectivity increment	AVO; Bin3; 2020 *	0.2065	0.2472	−0.2781	0.6910
P1085	Selectivity increment	AVO; Bin4; 2020 *	0.2306	0.2472	−0.2538	0.7151
P1086	Selectivity increment	AVO; Bin5; 2020 *	0.1997	0.2474	−0.2853	0.6847
P1087	Selectivity increment	AVO; Bin6; 2020 *	0.1935	0.2475	−0.2916	0.6787
P1088	Selectivity increment	AVO; Bin7; 2020 *	0.2048	0.2475	−0.2802	0.6898
P1089	Selectivity increment	AVO; Bin8; 2020 *	0.2187	0.2214	−0.2152	0.6527
P1090	Selectivity increment	AVO; Bin2; 2021 *	0.1941	0.2490	−0.2939	0.6820
P1091	Selectivity increment	AVO; Bin3; 2021 *	0.1939	0.2508	−0.2977	0.6855
P1092	Selectivity increment	AVO; Bin4; 2021 *	0.2316	0.2500	−0.2584	0.7216
P1093	Selectivity increment	AVO; Bin5; 2021 *	0.1960	0.2505	−0.2951	0.6871
P1094	Selectivity increment	AVO; Bin6; 2021 *	0.1941	0.2507	−0.2972	0.6854
P1095	Selectivity increment	AVO; Bin7; 2021 *	0.2074	0.2505	−0.2837	0.6985
P1096	Selectivity increment	AVO; Bin8; 2021 *	0.2175	0.2256	−0.2246	0.6596

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P1097	Selectivity increment	AVO; Bin2; 2022 *	0.1766	0.2549	−0.3230	0.6761
P1098	Selectivity increment	AVO; Bin3; 2022 *	0.1694	0.2554	−0.3312	0.6701
P1099	Selectivity increment	AVO; Bin4; 2022 *	0.2445	0.2534	−0.2521	0.7411
P1100	Selectivity increment	AVO; Bin5; 2022 *	0.1840	0.2548	−0.3154	0.6834
P1101	Selectivity increment	AVO; Bin6; 2022 *	0.1910	0.2550	−0.3088	0.6908
P1102	Selectivity increment	AVO; Bin7; 2022 *	0.2070	0.2551	−0.2930	0.7069
P1103	Selectivity increment	AVO; Bin8; 2022 *	0.2136	0.2312	−0.2396	0.6667
P1104	Selectivity increment	AVO; Bin2; 2023 *	0.2450	0.2591	−0.2628	0.7527
P1105	Selectivity increment	AVO; Bin3; 2023 *	0.2141	0.2631	−0.3016	0.7298
P1106	Selectivity increment	AVO; Bin4; 2023 *	0.0901	0.2626	−0.4245	0.6048
P1107	Selectivity increment	AVO; Bin5; 2023 *	0.1396	0.2622	−0.3742	0.6535
P1108	Selectivity increment	AVO; Bin6; 2023 *	0.1864	0.2622	−0.3274	0.7002
P1109	Selectivity increment	AVO; Bin7; 2023 *	0.2082	0.2629	−0.3070	0.7234
P1110	Selectivity increment	AVO; Bin8; 2023 *	0.2057	0.2401	−0.2648	0.6762
P1111	Selectivity increment	AVO; Bin2; 2024 *	0.2261	0.2708	−0.3046	0.7569
P1112	Selectivity increment	AVO; Bin3; 2024 *	0.1919	0.2739	−0.3449	0.7287
P1113	Selectivity increment	AVO; Bin4; 2024 *	0.0979	0.2727	−0.4366	0.6324
P1114	Selectivity increment	AVO; Bin5; 2024 *	0.1236	0.2711	−0.4077	0.6549
P1115	Selectivity increment	AVO; Bin6; 2024 *	0.1798	0.2705	−0.3504	0.7100
P1116	Selectivity increment	AVO; Bin7; 2024 *	0.2037	0.2727	−0.3309	0.7382
P1117	Selectivity increment	AVO; Bin8; 2024 *	0.1924	0.2513	−0.3001	0.6849
P1118	Selectivity increment	AVO; Bin2; 2025 *	0.2192	0.2804	−0.3304	0.7688
P1119	Selectivity increment	AVO; Bin3; 2025 *	0.2323	0.2862	−0.3287	0.7934
P1120	Selectivity increment	AVO; Bin4; 2025 *	0.1656	0.2871	−0.3970	0.7283
P1121	Selectivity increment	AVO; Bin5; 2025 *	0.1703	0.2867	−0.3916	0.7321
P1122	Selectivity increment	AVO; Bin6; 2025 *	0.1740	0.2869	−0.3883	0.7362
P1123	Selectivity increment	AVO; Bin7; 2025 *	0.1884	0.2866	−0.3734	0.7501
P1124	Selectivity increment	AVO; Bin8; 2025 *	0.1812	0.2649	−0.3380	0.7004
P1125	Selectivity increment	AVO; Bin2; 2026 *	0.2093	0.3050	−0.3886	0.8072
P1126	Selectivity increment	AVO; Bin3; 2026 *	0.2386	0.3046	−0.3585	0.8356
P1127	Selectivity increment	AVO; Bin4; 2026 *	0.1551	0.3058	−0.4443	0.7544
P1128	Selectivity increment	AVO; Bin5; 2026 *	0.1576	0.3063	−0.4428	0.7581
P1129	Selectivity increment	AVO; Bin6; 2026 *	0.1761	0.3067	−0.4251	0.7772
P1130	Selectivity increment	AVO; Bin7; 2026 *	0.1927	0.3064	−0.4078	0.7932
P1131	Selectivity increment	AVO; Bin8; 2026 *	0.1815	0.2852	−0.3775	0.7406
P1132	Log logistic slope	Asc; BTS	−0.8376	0.1962	−1.2221	−0.4531
P1133	Logistic midpoint	Asc; BTS	6.9805	0.6409	5.7244	8.2367
P1134	BTS age-1 log selectivity	Age-1 component; BTS	−3.0479	0.3067	−3.6490	−2.4469
P1135	BTS slope deviation	Asc; BTS; 1983	0.9087	0.2274	0.4630	1.3543
P1136	BTS slope deviation	Asc; BTS; 1984	0.7382	0.2286	0.2901	1.1863
P1137	BTS slope deviation	Asc; BTS; 1985	0.2475	0.2461	−0.2348	0.7297
P1138	BTS slope deviation	Asc; BTS; 1986	0.3667	0.2364	−0.0965	0.8300
P1139	BTS slope deviation	Asc; BTS; 1987	0.3474	0.2949	−0.2306	0.9254
P1140	BTS slope deviation	Asc; BTS; 1988	0.3002	0.3348	−0.3559	0.9564
P1141	BTS slope deviation	Asc; BTS; 1989	0.5436	0.3985	−0.2374	1.3245
P1142	BTS slope deviation	Asc; BTS; 1990	1.2073	0.3076	0.6043	1.8102
P1143	BTS slope deviation	Asc; BTS; 1991	1.0413	0.2581	0.5355	1.5471
P1144	BTS slope deviation	Asc; BTS; 1992	0.9879	0.2549	0.4883	1.4875

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P1145	BTS slope deviation	Asc; BTS; 1993	1.1449	0.2594	0.6365	1.6532
P1146	BTS slope deviation	Asc; BTS; 1994	1.1404	0.2336	0.6827	1.5982
P1147	BTS slope deviation	Asc; BTS; 1995	1.0736	0.2332	0.6165	1.5307
P1148	BTS slope deviation	Asc; BTS; 1996	0.6664	0.2162	0.2428	1.0901
P1149	BTS slope deviation	Asc; BTS; 1997	0.5019	0.2354	0.0406	0.9632
P1150	BTS slope deviation	Asc; BTS; 1998	0.2949	0.2285	−0.1530	0.7427
P1151	BTS slope deviation	Asc; BTS; 1999	0.2464	0.2318	−0.2079	0.7008
P1152	BTS slope deviation	Asc; BTS; 2000	0.5104	0.2470	0.0264	0.9944
P1153	BTS slope deviation	Asc; BTS; 2001	0.3417	0.2233	−0.0959	0.7793
P1154	BTS slope deviation	Asc; BTS; 2002	0.7946	0.2240	0.3556	1.2337
P1155	BTS slope deviation	Asc; BTS; 2003	1.0199	0.2354	0.5585	1.4812
P1156	BTS slope deviation	Asc; BTS; 2004	0.9485	0.2234	0.5106	1.3864
P1157	BTS slope deviation	Asc; BTS; 2005	1.0394	0.2342	0.5803	1.4985
P1158	BTS slope deviation	Asc; BTS; 2006	0.7304	0.2221	0.2950	1.1657
P1159	BTS slope deviation	Asc; BTS; 2007	1.1604	0.2459	0.6785	1.6424
P1160	BTS slope deviation	Asc; BTS; 2008	1.3498	0.2211	0.9164	1.7832
P1161	BTS slope deviation	Asc; BTS; 2009	1.0541	0.2284	0.6065	1.5016
P1162	BTS slope deviation	Asc; BTS; 2010	1.5895	0.2493	1.1008	2.0781
P1163	BTS slope deviation	Asc; BTS; 2011	1.3653	0.2144	0.9450	1.7856
P1164	BTS slope deviation	Asc; BTS; 2012	1.0054	0.2373	0.5403	1.4705
P1165	BTS slope deviation	Asc; BTS; 2013	1.1035	0.2417	0.6297	1.5773
P1166	BTS slope deviation	Asc; BTS; 2014	1.3500	0.2227	0.9136	1.7864
P1167	BTS slope deviation	Asc; BTS; 2015	1.2379	0.2284	0.7902	1.6856
P1168	BTS slope deviation	Asc; BTS; 2016	1.2450	0.2421	0.7705	1.7195
P1169	BTS slope deviation	Asc; BTS; 2017	1.0643	0.2207	0.6317	1.4968
P1170	BTS slope deviation	Asc; BTS; 2018	0.5311	0.2347	0.0711	0.9911
P1171	BTS slope deviation	Asc; BTS; 2019	0.8316	0.2327	0.3755	1.2876
P1172	BTS slope deviation	Asc; BTS; 2020	0.7195	0.2985	0.1345	1.3046
P1173	BTS slope deviation	Asc; BTS; 2021	0.6483	0.2169	0.2232	1.0734
P1174	BTS slope deviation	Asc; BTS; 2022	0.8388	0.2317	0.3848	1.2929
P1175	BTS slope deviation	Asc; BTS; 2023	0.5333	0.2269	0.0887	0.9779
P1176	BTS slope deviation	Asc; BTS; 2024	0.5612	0.2527	0.0660	1.0564
P1177	BTS slope deviation	Asc; BTS; 2025	0.6074	0.2290	0.1586	1.0562
P1178	BTS slope deviation	Asc; BTS; 2026	0.8008	0.2609	0.2895	1.3121
P1179	BTS midpoint deviation	Asc; BTS; 1983	−0.3111	0.0866	−0.4808	−0.1414
P1180	BTS midpoint deviation	Asc; BTS; 1984	−0.1267	0.0895	−0.3021	0.0488
P1181	BTS midpoint deviation	Asc; BTS; 1985	0.0383	0.0942	−0.1463	0.2229
P1182	BTS midpoint deviation	Asc; BTS; 1986	0.0274	0.0975	−0.1637	0.2186
P1183	BTS midpoint deviation	Asc; BTS; 1987	−0.0750	0.1102	−0.2909	0.1409
P1184	BTS midpoint deviation	Asc; BTS; 1988	−0.2158	0.1232	−0.4573	0.0258
P1185	BTS midpoint deviation	Asc; BTS; 1989	−0.2963	0.1204	−0.5324	−0.0603
P1186	BTS midpoint deviation	Asc; BTS; 1990	−0.3506	0.1113	−0.5688	−0.1323
P1187	BTS midpoint deviation	Asc; BTS; 1991	−0.2509	0.1111	−0.4688	−0.0331
P1188	BTS midpoint deviation	Asc; BTS; 1992	−0.2448	0.1085	−0.4575	−0.0322
P1189	BTS midpoint deviation	Asc; BTS; 1993	−0.2921	0.1020	−0.4920	−0.0922
P1190	BTS midpoint deviation	Asc; BTS; 1994	−0.2291	0.0979	−0.4210	−0.0373
P1191	BTS midpoint deviation	Asc; BTS; 1995	−0.1343	0.1012	−0.3326	0.0640
P1192	BTS midpoint deviation	Asc; BTS; 1996	0.0653	0.0961	−0.1230	0.2536

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P1193	BTS midpoint deviation	Asc; BTS; 1997	0.1110	0.1035	−0.0917	0.3138
P1194	BTS midpoint deviation	Asc; BTS; 1998	0.1916	0.1005	−0.0054	0.3885
P1195	BTS midpoint deviation	Asc; BTS; 1999	0.1329	0.1076	−0.0780	0.3439
P1196	BTS midpoint deviation	Asc; BTS; 2000	−0.0032	0.1111	−0.2210	0.2145
P1197	BTS midpoint deviation	Asc; BTS; 2001	0.0394	0.1009	−0.1583	0.2372
P1198	BTS midpoint deviation	Asc; BTS; 2002	−0.0939	0.1011	−0.2920	0.1042
P1199	BTS midpoint deviation	Asc; BTS; 2003	−0.1374	0.1034	−0.3402	0.0653
P1200	BTS midpoint deviation	Asc; BTS; 2004	−0.1130	0.0971	−0.3033	0.0773
P1201	BTS midpoint deviation	Asc; BTS; 2005	−0.1589	0.0977	−0.3504	0.0326
P1202	BTS midpoint deviation	Asc; BTS; 2006	−0.0355	0.0960	−0.2237	0.1527
P1203	BTS midpoint deviation	Asc; BTS; 2007	−0.2089	0.0993	−0.4035	−0.0143
P1204	BTS midpoint deviation	Asc; BTS; 2008	−0.2335	0.0961	−0.4219	−0.0451
P1205	BTS midpoint deviation	Asc; BTS; 2009	−0.1517	0.0988	−0.3454	0.0420
P1206	BTS midpoint deviation	Asc; BTS; 2010	−0.3339	0.0978	−0.5256	−0.1421
P1207	BTS midpoint deviation	Asc; BTS; 2011	−0.2094	0.0940	−0.3936	−0.0251
P1208	BTS midpoint deviation	Asc; BTS; 2012	−0.1593	0.0986	−0.3526	0.0339
P1209	BTS midpoint deviation	Asc; BTS; 2013	−0.1905	0.0946	−0.3760	−0.0050
P1210	BTS midpoint deviation	Asc; BTS; 2014	−0.2790	0.0959	−0.4670	−0.0911
P1211	BTS midpoint deviation	Asc; BTS; 2015	−0.3231	0.0976	−0.5144	−0.1318
P1212	BTS midpoint deviation	Asc; BTS; 2016	−0.2689	0.0984	−0.4617	−0.0762
P1213	BTS midpoint deviation	Asc; BTS; 2017	−0.1865	0.0941	−0.3709	−0.0020
P1214	BTS midpoint deviation	Asc; BTS; 2018	−0.0140	0.0995	−0.2090	0.1811
P1215	BTS midpoint deviation	Asc; BTS; 2019	−0.1490	0.0969	−0.3390	0.0410
P1216	BTS midpoint deviation	Asc; BTS; 2020	−0.0624	0.1177	−0.2930	0.1683
P1217	BTS midpoint deviation	Asc; BTS; 2021	0.0125	0.0977	−0.1790	0.2041
P1218	BTS midpoint deviation	Asc; BTS; 2022	−0.0671	0.0992	−0.2617	0.1274
P1219	BTS midpoint deviation	Asc; BTS; 2023	0.0978	0.0985	−0.0952	0.2909
P1220	BTS midpoint deviation	Asc; BTS; 2024	0.0068	0.1052	−0.1993	0.2130
P1221	BTS midpoint deviation	Asc; BTS; 2025	0.0317	0.1021	−0.1684	0.2319
P1222	BTS midpoint deviation	Asc; BTS; 2026	−0.1099	0.1145	−0.3344	0.1146
P1223	BTS age-1 deviation	Age-1 component; BTS; 1983	−0.0145	0.1177	−0.2452	0.2162
P1224	BTS age-1 deviation	Age-1 component; BTS; 1984	0.0371	0.1648	−0.2858	0.3600
P1225	BTS age-1 deviation	Age-1 component; BTS; 1985	−0.1923	0.1416	−0.4698	0.0851
P1226	BTS age-1 deviation	Age-1 component; BTS; 1986	−0.4013	0.1448	−0.6851	−0.1174
P1227	BTS age-1 deviation	Age-1 component; BTS; 1987	−0.2452	0.1911	−0.6198	0.1294
P1228	BTS age-1 deviation	Age-1 component; BTS; 1988	−0.2987	0.1852	−0.6616	0.0643
P1229	BTS age-1 deviation	Age-1 component; BTS; 1989	−0.0598	0.1804	−0.4134	0.2939
P1230	BTS age-1 deviation	Age-1 component; BTS; 1990	0.1030	0.1485	−0.1881	0.3941
P1231	BTS age-1 deviation	Age-1 component; BTS; 1991	−0.1431	0.1368	−0.4113	0.1250
P1232	BTS age-1 deviation	Age-1 component; BTS; 1992	−0.0165	0.1370	−0.2849	0.2520
P1233	BTS age-1 deviation	Age-1 component; BTS; 1993	0.0411	0.1297	−0.2131	0.2953
P1234	BTS age-1 deviation	Age-1 component; BTS; 1994	−0.1102	0.1451	−0.3946	0.1741
P1235	BTS age-1 deviation	Age-1 component; BTS; 1995	−0.1370	0.1474	−0.4259	0.1519
P1236	BTS age-1 deviation	Age-1 component; BTS; 1996	−0.1046	0.1174	−0.3346	0.1254
P1237	BTS age-1 deviation	Age-1 component; BTS; 1997	0.0048	0.1318	−0.2534	0.2631
P1238	BTS age-1 deviation	Age-1 component; BTS; 1998	0.0560	0.1447	−0.2275	0.3395
P1239	BTS age-1 deviation	Age-1 component; BTS; 1999	0.0971	0.1390	−0.1753	0.3695
P1240	BTS age-1 deviation	Age-1 component; BTS; 2000	0.1927	0.1380	−0.0778	0.4631

Complete parameter estimates and uncertainty						
ID	Group	Parameter context	Estimate	SE	95% lower	95% upper
P1241	BTS age-1 deviation	Age-1 component; BTS; 2001	0.0776	0.1172	−0.1521	0.3073
P1242	BTS age-1 deviation	Age-1 component; BTS; 2002	0.0837	0.1210	−0.1534	0.3209
P1243	BTS age-1 deviation	Age-1 component; BTS; 2003	0.2335	0.1390	−0.0389	0.5059
P1244	BTS age-1 deviation	Age-1 component; BTS; 2004	0.0473	0.1386	−0.2242	0.3189
P1245	BTS age-1 deviation	Age-1 component; BTS; 2005	−0.0147	0.1483	−0.3054	0.2759
P1246	BTS age-1 deviation	Age-1 component; BTS; 2006	−0.0132	0.1166	−0.2417	0.2153
P1247	BTS age-1 deviation	Age-1 component; BTS; 2007	−0.0358	0.1179	−0.2668	0.1952
P1248	BTS age-1 deviation	Age-1 component; BTS; 2008	0.2024	0.1181	−0.0291	0.4340
P1249	BTS age-1 deviation	Age-1 component; BTS; 2009	0.3586	0.1115	0.1400	0.5773
P1250	BTS age-1 deviation	Age-1 component; BTS; 2010	0.3397	0.1320	0.0809	0.5984
P1251	BTS age-1 deviation	Age-1 component; BTS; 2011	−0.0718	0.1226	−0.3121	0.1685
P1252	BTS age-1 deviation	Age-1 component; BTS; 2012	−0.0599	0.1366	−0.3276	0.2078
P1253	BTS age-1 deviation	Age-1 component; BTS; 2013	0.2090	0.1341	−0.0539	0.4719
P1254	BTS age-1 deviation	Age-1 component; BTS; 2014	0.1700	0.1236	−0.0723	0.4123
P1255	BTS age-1 deviation	Age-1 component; BTS; 2015	0.0604	0.1400	−0.2139	0.3347
P1256	BTS age-1 deviation	Age-1 component; BTS; 2016	−0.0342	0.1521	−0.3322	0.2639
P1257	BTS age-1 deviation	Age-1 component; BTS; 2017	−0.0710	0.1368	−0.3392	0.1972
P1258	BTS age-1 deviation	Age-1 component; BTS; 2018	−0.0545	0.1279	−0.3053	0.1962
P1259	BTS age-1 deviation	Age-1 component; BTS; 2019	0.2778	0.1171	0.0483	0.5074
P1260	BTS age-1 deviation	Age-1 component; BTS; 2020	0.1488	0.2105	−0.2638	0.5614
P1261	BTS age-1 deviation	Age-1 component; BTS; 2021	0.0198	0.1341	−0.2431	0.2826
P1262	BTS age-1 deviation	Age-1 component; BTS; 2022	0.0699	0.1373	−0.1992	0.3390
P1263	BTS age-1 deviation	Age-1 component; BTS; 2023	−0.0696	0.1428	−0.3494	0.2102
P1264	BTS age-1 deviation	Age-1 component; BTS; 2024	0.1744	0.1502	−0.1201	0.4689
P1265	BTS age-1 deviation	Age-1 component; BTS; 2025	0.0580	0.1478	−0.2317	0.3477
P1266	BTS age-1 deviation	Age-1 component; BTS; 2026	−0.0438	0.2085	−0.4524	0.3649

* A parameter is shared across additional positions. The full shared-position mappings are in the numerical parameter table.

The BTS age-1 component reuses native coordinates named Descending; it is a separate first-age component rather than a descending limb. Its baseline is log selectivity, and its annual deviations multiply that baseline log value. Midpoint deviations likewise multiply the baseline midpoint. The selectivity table combines these parameters and their uncertainty.

Note. All estimated parameters and approximate 95% confidence intervals in Model 26.0, on their estimation scales. The parameter ID links to the complete numerical data and shared-parameter mappings. Recruitment and selectivity deviations are expressed on their fitted deviation or increment scales; the biological and selectivity schedules show their realized effects. The full precision data also supply natural-scale transformations where applicable.

Table D2 Largest Pairwise Correlations Among Model 26.0 Parameters

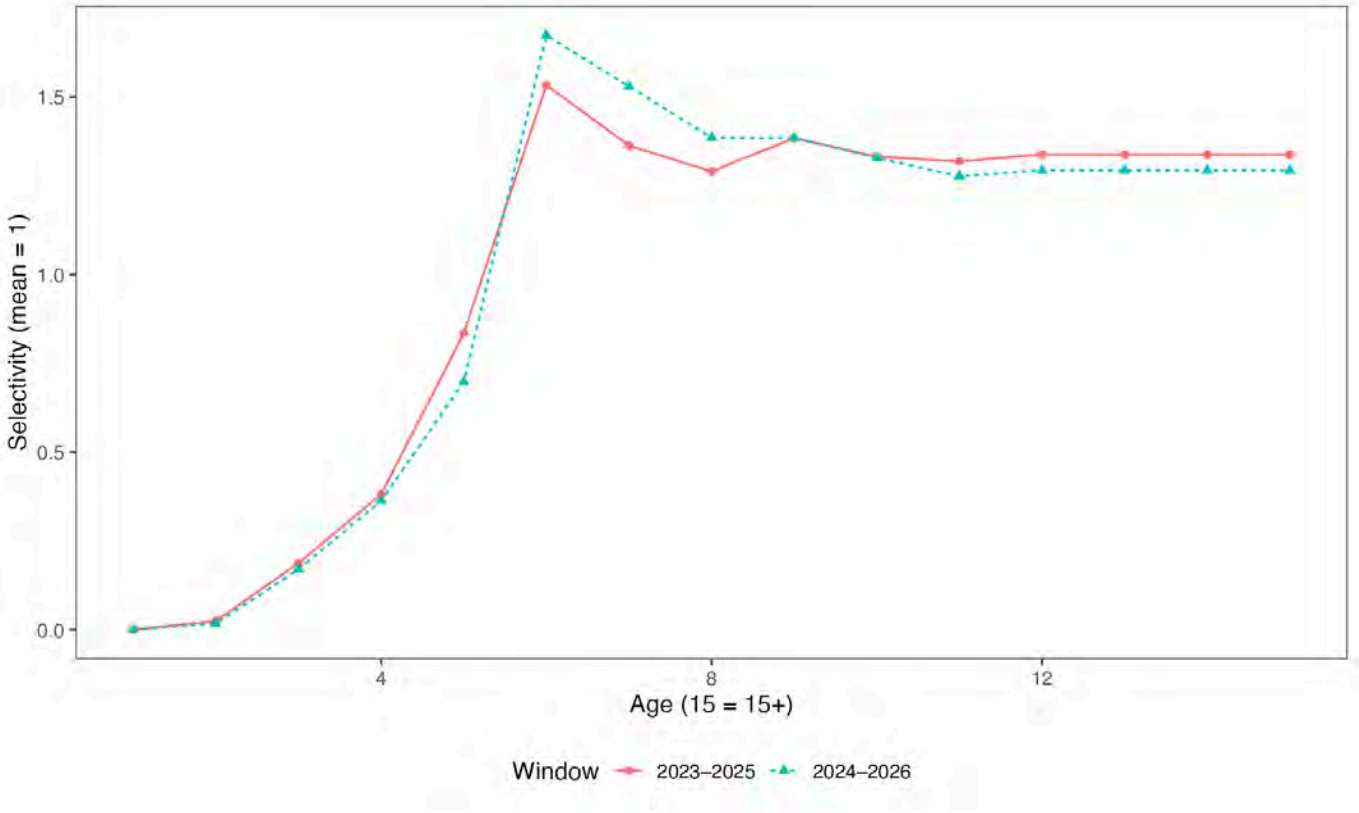
Strong parameter correlations		
Parameter 1	Parameter 2	Correlation
P0001: Recruitment level: EBS Pollock; R0	P0039: Recruitment deviation: EBS Pollock; 2001	−0.96375
P0001: Recruitment level: EBS Pollock; R0	P0051: Recruitment deviation: EBS Pollock; 2013	−0.96370
P0001: Recruitment level: EBS Pollock; R0	P0047: Recruitment deviation: EBS Pollock; 2009	−0.96198
P0001: Recruitment level: EBS Pollock; R0	P0052: Recruitment deviation: EBS Pollock; 2014	−0.96036
P0001: Recruitment level: EBS Pollock; R0	P0028: Recruitment deviation: EBS Pollock; 1990	−0.95676
P1133: Logistic midpoint: Ascending; BTS; Sex combined	P1207: BTS midpoint deviation: Ascending; BTS; Sex combined; 2011	−0.95670
P1133: Logistic midpoint: Ascending; BTS; Sex combined	P1213: BTS midpoint deviation: Ascending; BTS; Sex combined; 2017	−0.95529
P0001: Recruitment level: EBS Pollock; R0	P0040: Recruitment deviation: EBS Pollock; 2002	−0.95229

Strong parameter correlations		
Parameter 1	Parameter 2	Correlation
P0001: Recruitment level: EBS Pollock; R0	P0035: Recruitment deviation: EBS Pollock; 1997	−0.95002
P0001: Recruitment level: EBS Pollock; R0	P0045: Recruitment deviation: EBS Pollock; 2007	−0.94802

Note. Ten largest absolute pairwise correlations among Model 26.0 estimated parameters. IDs link to the complete parameter table; correlations close to plus or minus one identify parameter combinations that change together. These are parameter correlations rather than correlations between survey observations.

Appendix E Proposed Projection Input Curves

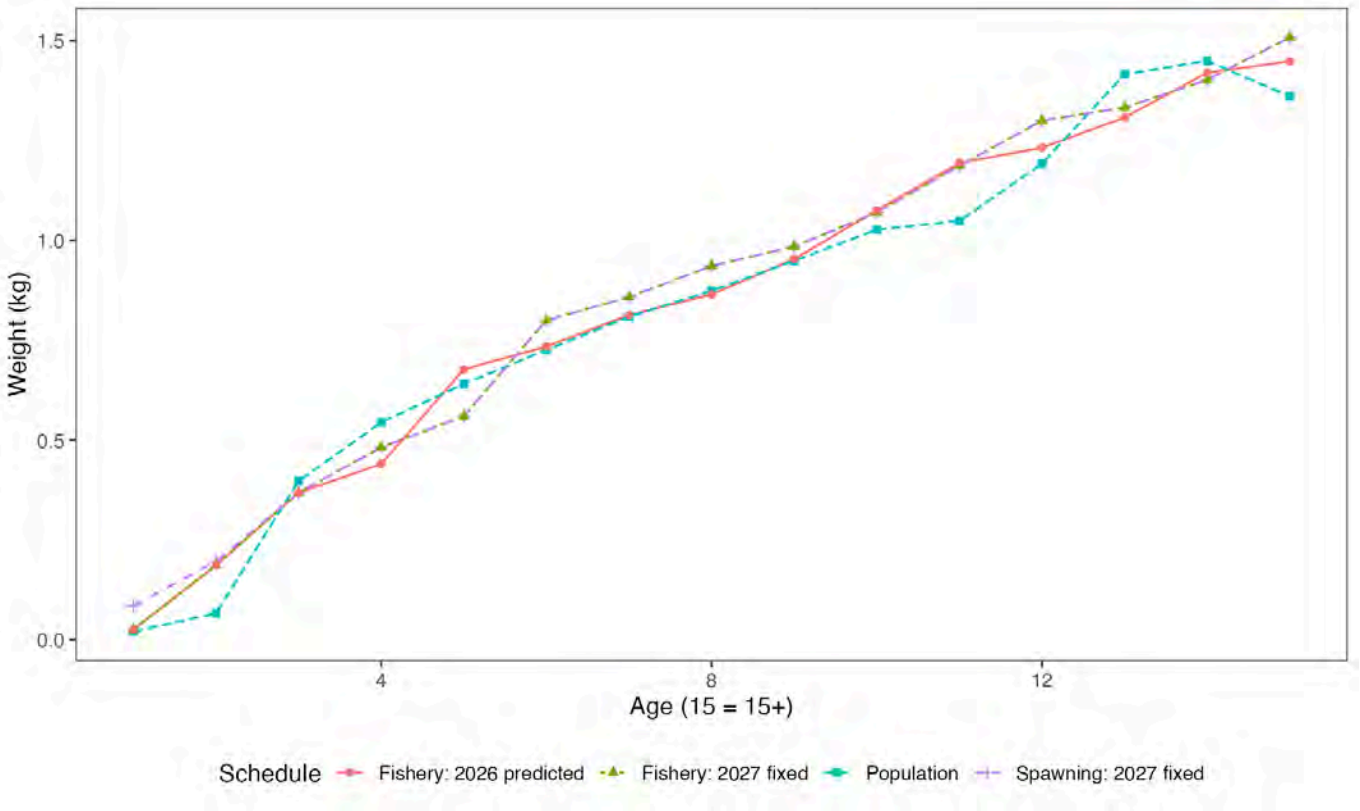
The proposed three-year fishery-selectivity average was compared with the window including the inferred 2026 curve (Figure E1). The technical appendix records their conditional projection effects.



Note. Proposed three-year fishery selectivity and the alternative window check. The two curves were distinguished by colour, line type and point shape.

Figure E1 Proposed Fishery Selectivity and Alternative Averaging Window

The projection used the fixed 2027 fishery forecast for both catch and spawning weights, alongside the population-weight schedule (Figure E2).



Note. Projection weight schedules: the fixed 2027 fishery forecast supplied catch and spawning weights at ages 3–15+; population weights retain the schedule.

Figure E2 Weight Schedules for the Proposed Projection

Appendix F Model Equations

Scope. This appendix carried forward the structure and model components of the 2024 *Appendix EBS Pollock Model Description* (SAFE pp. 172–182). The equations describe the Model 23.0 ADMB comparison. The proposed Model 26.0 configuration and its weight schedules were described in Section 5 and Section 4.1.3. The historical Tier 1 material documents an available calculation; the December 2024 SSC adopted Tier 3a.

Dynamics

The statistical age-structured model combined the catch equation with annual survival and an accumulating terminal age group (Fournier and Archibald 1982; Hilborn and Walters 1992; Schnute and Richards 1995; McAllister and Ianelli 1997). Let t index years, $a = 1, ..., A$ index ages, and $A = 15$ denote ages 15 and older. $N_{t,a}$ was abundance at the start of the year, $F_{t,a}$ and $M_{t,a}$ were annual instantaneous mortality rates, and $Z_{t,a}$ was their sum. Catch at age and catch biomass were

$$\begin{aligned} Z_{t,a} &= F_{t,a} + M_{t,a}, \\ C_{t,a} &= N_{t,a}\tfrac{F_{t,a}}{Z_{t,a}}(1 - e^{-Z_{t,a}}), \\ Y_t &= \textstyle\sum_{a=1}^{A} C_{t,a} w^f_{t,a}, \qquad p^f_{t,a} = \tfrac{C_{t,a}}{\sum_b C_{t,b}}. \end{aligned} \tag{2}$$

Here $w^f_{t,a}$ is fishery weight-at-age. Abundance in millions of fish multiplied by kg per fish gives biomass in kt. The population advances as

$$\begin{aligned} N_{t+1,1} &= R_{t+1}, \\ N_{t+1,a+1} &= N_{t,a} e^{-Z_{t,a}}, \qquad 1 \le a < A, \\ N_{t+1,A} &= N_{t,A-1} e^{-Z_{t,A-1}} + N_{t,A} e^{-Z_{t,A}}. \end{aligned} \tag{3}$$

The middle line applied to entry from each younger age; the final line added surviving members of the plus group. This corrects the age subscript in 2024 Eq. 14.2, which printed $a - 1$ on the right side while advancing a to $a + 1$ on the left.

Fishing mortality separated annual intensity from selectivity at age:

$$F_{t,a} = s^f_{t,a} \mu_F e^{\epsilon_t}. \tag{4}$$

The assessment estimates selectivity coefficients with penalties on changes over time and on curvature across ages (Butterworth et al. 2003). In a general penalty notation, $\Delta_t \log s_{t,a}$ controls annual changes and $\Delta^2_a \log s_{t,a}$ controls smoothness across ages. Their weights and allowed change years come from the run controls.

The bottom-trawl survey (BTS) used logistic selectivity above age one and a separate age-one term. The implemented form was

$$\begin{aligned} s^b_{t,a} &= \{1 + \exp[-k_t(a - a_{50,t})]\}^{-1}, \qquad a > 1, \\ \log s^b_{t,1} &= b_1 \exp(d_t), \\ k_t &= \bar{k} \exp(u_t), \qquad a_{50,t} = \bar{a}_{50} \exp(v_t). \end{aligned} \tag{5}$$

This followed `compute_selectivity()` and the age-one assignment in `Get_Selectivity()`. It replaces the ambiguous slope/intercept and age-one expressions printed in 2024. The 2024 description reported a process variance of 0.04 for an earlier random-walk formulation. The retained controls instead select the penalty on changes in log-selectivity at the specified ages, plus the separate age-one deviation penalty. Its coefficient was 8 for the squared first differences of d_t. The actual controls and source identify which parameter or log-selectivity penalty was applied.

Acoustic-trawl survey (ATS) selectivity was flexible across ages; the optional separate age-one index leaves ages 2–15+ in its composition likelihood. Constant survey catchability and time-varying selectivity represent separate model components.

Recruitment

Recruitment was abundance at age one. Female spawning biomass accounted for survival from the start of the year to spawning:

$$B_t = \sum_{a=1}^{A} N_{t,a}\exp(-\tau Z_{t,a})\phi_a w^s_{t,a}, \qquad \tau = 0.25. \qquad (6)$$

Here $w^s_{t,a}$ is spawning weight and ϕ_a includes both maturity and the female fraction. The assessment reads a maturity schedule and applies the female fraction internally; the one-sex SPM handoff reads maturity and halves total abundance. Applying the female fraction once preserves the same biomass definition. The spawning time is April 1 (month 4).

Annual recruitment deviations accompany a stock–recruit function, $R_t = f(B_{t-1})\exp(\varepsilon_t)$, with log-scale deviation penalties and the implementation's bias adjustment. The Ricker option selected by `SrType=1` was

$$f(B) = \frac{B}{\psi_0}\exp\left[\alpha_R\left(1-\frac{B}{B_0}\right)\right], \qquad B_0 = R_0\psi_0, \qquad \alpha_R = \log\left(\frac{4h_{\mathrm{ADMB}}}{1-h_{\mathrm{ADMB}}}\right). \qquad (7)$$

ψ_0 was unfished spawning biomass per recruit. The final expression was the source code's transformation of its parameter named steepness; it was retained as h_{ADMB} to identify that convention. The 2024 printed Ricker equation misplaced R_0 in the biomass ratio. The expression here followed `SRecruit()` and `Get_Bzero()` in the preserved template.

The alternative Beverton–Holt relationship (Francis 1992) was

$$f_{\mathrm{BH}}(B) = \frac{B}{\alpha_{\mathrm{BH}} + \beta_{\mathrm{BH}}B}, \qquad \alpha_{\mathrm{BH}} = \psi_0\frac{1-h}{4h}, \qquad \beta_{\mathrm{BH}} = \frac{5h-1}{4hR_0}. \qquad (8)$$

For this alternative, h was the fraction of unfished recruitment at 20% of unfished spawning biomass. The 2024 controls fix $\sigma_R = 1$ and specify a symmetric beta prior with shape parameters 14.93209877 for the selected stock–recruit parameter. The earlier Beverton–Holt example in the 2024 appendix used a different prior; it remained an alternative rather than the selected 2024 setting.

Diagnostics

The historical replay diagnostic retained fitted recruitment anomalies while adjusting recruitment for the change in spawning biomass under a hypothetical history with fishing set to zero:

$$R_t^{'} = \widehat{R}_t\frac{f(B_{t-1}^{'})}{f(B_{t-1})}. \qquad (9)$$

Retrospective analyses repeat estimation after removing recent years and compare estimates for common years (Parma 1993; Ianelli and Fournier 1998). Their fit controls and terminal years accompany each saved run.

The effective number of ages contributing to spawning biomass was the exponential of Shannon entropy (Jost 2006):

$$D_t = \exp\left(-\sum_a p^B_{t,a}\log p^B_{t,a}\right), \qquad p^B_{t,a} = \frac{N_{t,a}e^{-\tau Z_{t,a}}\phi_a w^s_{t,a}}{B_t}. \qquad (10)$$

The mean-age diagnostic used observed and predicted composition means and the predicted variance at age (Francis 2011):

$$\begin{aligned} \bar{a}_t &= \textstyle\sum_a a p_{t,a}, \qquad \widehat{\bar{a}}_t = \sum_a a \widehat{p}_{t,a}, \\ V_t &= \textstyle\sum_a (a - \widehat{\bar{a}}_t)^2 \widehat{p}_{t,a}, \\ z_t &= \frac{\bar{a}_t - \widehat{\bar{a}}_t}{\sqrt{V_t / n_t}}, \qquad \nu = \{\mathrm{Var}_t(z_t)\}^{-1}. \end{aligned} \tag{11}$$

The implied adjusted sample size was νn_t. This diagnostic supported evaluation of weighting; changing assessment inputs required a decision. The expression for V_t replaces the malformed κ_t formula in the printed 2024 appendix.

Parameter estimation

The objective added negative log likelihoods, prior densities and selectivity penalties. Phase-based estimation introduces parameters in stages. For age compositions, the multinomial contribution, up to a data-only constant, was

$$\ell_{\text{age}} = -\sum_t n_t \sum_a p_{t,a} \log(\widehat{p}_{t,a} + c), \qquad \widehat{\boldsymbol{p}}_t^{\text{read}} = \widehat{\boldsymbol{p}}_t^{\text{true}} E. \tag{12}$$

c was the small numerical constant in the implementation. When enabled, $E_{a,b}$ was the probability that true age a was read as age b. The selected historical controls had `use_age_err=0`. The original appendix also described a robust composition option (Fournier et al. 1990), with variance inflation and a small outlier component. In the retained 2024 controls its activation phase was 1350; the six-phase completed comparison used the multinomial form. This distinction prevents the general software description from implying that the robust option was active.

For survey s at within-year time τ_s, expected abundance and biomass at age were

$$\widehat{N}^s_{t,a} = q_s s^s_{t,a} N_{t,a} e^{-\tau_s Z_{t,a}}, \qquad \widehat{I}^s_t = \sum_a \widehat{N}^s_{t,a} w^s_{t,a}. \tag{13}$$

An abundance index omitted the weight multiplier. The original description used midyear survey timing; actual run inputs specify the timing used in each comparison. The AVO index shares ATS selectivity and its documented weight basis, while retaining a separate catchability coefficient.

The independent lognormal-index and multivariate BTS contributions had the forms

$$\ell_s = \frac{1}{2} \sum_t \frac{[\log I^{\text{obs}}_{s,t} - \log \widehat{I}_{s,t}]^2}{\sigma^2_{s,t}}, \qquad \ell_{\text{BTS}} = \frac{1}{2} \boldsymbol{r}^{\mathsf{T}} \Sigma^{-1} \boldsymbol{r}, \quad r_t = \log I^{\text{obs}}_t - \log \widehat{I}_t. \tag{14}$$

Fixed-variance normalization terms were constant for these comparisons. The normal-index option described in 2024 instead used residuals on the original scale. The BTS covariance provided Σ for the multivariate lognormal fit. Catch biomass enters the implemented objective as $\lambda_C \sum_t [\log(Y^{\text{obs}}_t + c) - \log(\widehat{Y}_t + c)]^2$, with $\lambda_C = 200$ in the retained controls. This equals $1/(2\sigma^2_C)$ for $\sigma_C = 0.05$ and removed the extra factor of two in the printed 2024 likelihood expression. Priors and penalties retain their actual source-code weights.

Uncertainty in mean body mass

Ianelli et al. (2001), Section 1.14.2, described calculating fishing mortality at maximum sustainable yield within the assessment model. The 2007 assessment extended that approach to propagate uncertainty in future weight-at-age. That option used $w^{\text{future}}_a \sim \mathcal{N}(\bar{w}_a, \sigma^2_{w,a})$. The retained implementation fits a mean growth curve plus cohort and year effects. For starting modeled age a_0, its mean curve was

$$\bar{w}_a = \alpha_w \left\{ L_1 + (L_2 - L_1) \frac{1 - K^{a - a_0}}{1 - K^{A-1}} \right\}^3. \tag{15}$$

At the final estimation phase, the recurrence in `Est_Fixed_Effects_wts()` was

$$\begin{aligned}\widehat{w}_{t,\,a_0} &= \bar{w}_{a_0}\exp(\sigma_c^2/2+\sigma_c c_t),\\ \widehat{w}_{t,\,a} &= \widehat{w}_{t-1,\,a-1}+(\bar{w}_a-\bar{w}_{a-1})\exp(\sigma_y^2/2+\sigma_y y_t),\quad a>a_0.\end{aligned}\tag{16}$$

The initial year starts at $\bar{w}_a$; dataset-specific scale vectors map the latent weights to observation series. This notation corrects the increment index in 2024 and explicitly retained the implementation's sigma scaling and final-phase offsets. The cohort and year deviations receive standard-normal penalties. The four-term weight objective was

$$\ell_w=\frac{1}{2}\sum_{h,t,a}\frac{\left(w^{\text{obs}}_{h,t,a}-\bar{w}_a\right)^2}{\sigma^2_{h,t,a}}+\frac{1}{2}\sum_{h,t,a}\frac{\left(w^{\text{obs}}_{h,t,a}-\widehat{w}_{h,t,a}\right)^2}{\sigma^2_{h,t,a}}+\frac{1}{2}\sum_t c_t^2+\frac{1}{2}\sum_t y_t^2.\tag{17}$$

The 2026 numerical baseline allocated all four terms and retained their sum.

Tier 1 projections: historical calculation

The 2024 description retained a Tier 1 calculation based on fishable biomass, the harmonic-mean harvest rate at MSY, and a spawning-biomass adjustment:

$$\begin{aligned}ABC_t &= B^f_{\text{GM},\,t}\,\widehat{u}_{\text{HM}}\,\zeta_t,\\ B^f_{\text{GM},\,t} &= \exp\{\log\widehat{B}^f_t-\sigma^2_{\log B^f}/2\},\\ \widehat{u}_{\text{HM}} &= \exp\{\log\widehat{u}_{\text{MSY}}-\sigma^2_{\log u}/2\},\\ \zeta_t &= \begin{cases}(B_t/B_{\text{MSY}}-0.05)/0.95, & B_t<B_{\text{MSY}},\\ 1, & B_t\ge B_{\text{MSY}}.\end{cases}\end{aligned}\tag{18}$$

The geometric and harmonic adjustments assume the documented lognormal approximations. This historical formula described the earlier calculation over its applicable biomass range; final advice used the adopted tier and the complete corresponding harvest-control rule.

Tier 3 projections

For fixed mortality, maturity, weights and selectivity, equilibrium spawning biomass per recruit at fishing intensity F was

$$\begin{aligned}l_1(F) &= 1,\qquad l_a(F)=l_{a-1}(F)e^{-M_{a-1}-Fs_{a-1}},\qquad 1<a<A,\\ l_A(F) &= \tfrac{l_{A-1}(F)e^{-M_{A-1}-Fs_{A-1}}}{1-e^{-M_A-Fs_A}},\\ \psi(F) &= \textstyle\sum_a l_a(F)\phi_a w^s_a e^{-\tau(M_a+Fs_a)},\\ B_{100\%} &= \bar{R}\psi(0),\qquad B_{x\%}=\tfrac{x}{100}B_{100\%},\qquad \tfrac{\psi(F_{x\%})}{\psi(0)}=\tfrac{x}{100}.\end{aligned}\tag{19}$$

Tier 3a used $F_{40\%}$ for maximum ABC and $F_{35\%}$ for OFL, with the adopted biomass-dependent rule applied when needed. Projection catch followed Equation 2. The 2024 SPM calculation used one sex category split equally into females and males, fixed biological schedules and selectivity, and stochastic recruitment generated from the historical arithmetic and harmonic means with an inverse-Gaussian distribution. Its 1,000 simulations retained recruitment process variability; uncertainty in fitted abundance, mean recruitment, selectivity and weights was omitted. The saved seed was 123 in the historical SPM source.

Appendix G FT-NIRS Age Prediction for EBS Pollock

Authored by: Derek Chamberlin, Esther Goldstein, Beth Matta, and Jason Conner

FT-NIRS Team: John Brogan, Jason Conner, Derek Chamberlin, Esther Goldstein, Brenna Hsieh, Beth Matta, Jon Short

FT-NIRS predicted age from otolith spectra and associated specimen information, using traditional microscopic ages for calibration and validation. The workflow proceeds from age prediction through tester-age conversion to the assessment likelihood (Table G1). The 2024 and 2025 fishery age compositions used their respective independent tester-age keys applied to released FT-NIRS predictions. The 2025 source was model a00-d3. The year-specific keys also convert biological weight inputs (Table G2). Both composition series use the assessment's identity ageing-error assumption after their selected age treatment.

Year-specific conditional keys redistribute source abundance and biomass among tester ages. Mean weights were then calculated as converted biomass divided by converted abundance, with terminal ages pooled using those totals. The partial 2024 fishery diagnostic leaves abundance and biomass at FT-NIRS age 13 unallocated because the 2024 key had no pairs at that age (Table G3). The selected assessment weight conversion fills the age-13 row using pooled age offsets and assigned a 100% CV to the target-age-15+ weight observation. The 2025 conversion used 668 independent tester pairs and fills the age-13 row, which had no pairs, with the midpoint of the age-12 and age-14 conditional probabilities. The same key supplied the 2025 age composition and weight observations (Table G4).

BTS 2025 and 2026 use separate tester-age keys. The 2026 key retained 307 pairs after excluding 22 flagged pairs, with exact TMA ages 1–18 converted before ages 15–18 were pooled into 15+. Total abundance and biomass were conserved. Converted weight SEs propagate the saved joint abundance–weight covariance (Table G5). The fitted weight model retained its existing marginal observation likelihood, and empirical-key uncertainty was excluded. Numerical checks distinguish fitted use from the retained full-pair conversion diagnostics (Table G6).

Provisional 2026 ATS ages use the BTS age–length key (ALK) applied to expanded ATS length distributions that extend to 0.5 m above the seafloor, followed by conversion to the TMA basis. The full 2026 ATS age dataset was expected in 2027. Fish in length bins outside the BTS key remain unallocated. The resulting weights also supply the 2026 AVO predictions.

Fourier transform near-infrared spectroscopy (FT-NIRS) Overview

Fourier transform near-infrared spectroscopy (FT-NIRS) emerged as an effective secondary age prediction tool and had successfully been implemented in production ageing settings (Matta and Helser, 2024), with FT-NIRS predicted ages recently being used to produce stock assessment age composition data (Dick et al., 2025; Ianelli, 2025). FT-NIRS was a non-destructive technique that interrogates a sample using light in the near-infrared region of the light spectrum (typically 4,000 to 12,000 cm^{-1}).

Scanning with FT-NIRS produced a spectral signature of the sample based on the absorption of near infrared light by different chemical bonds, such as C-H (aliphatic), C-H (aromatic), C-O (carboxyl), O-H (hydroxyl), and N-H (amine and amide) (Murray and Williams, 1987). For otoliths, these spectra capture changes in the organic protein matrix (otolin) relative to the inorganic calcium carbonate structure. This relationship correlates strongly with fish growth and age (Passerotti et al., 2022) and was used to develop models, calibrated with traditional microscopic ages (TMA) and FT-NIR spectra, to predict the age of unknown samples based on their spectral signatures with an estimated time-cost saving of 23-40% (Adamack et al., 2025). FT-NIRS was applied to estimate age for a multitude of fish species from Australia (Wedding et al., 2014), the Mediterranean Sea (Basilone et al., 2024), the eastern Bering Sea (Benson et al., 2023), and the Atlantic Ocean (Adamack et al., 2025).

Traditional Microscopic Ageing (TMA) QA/QC

The FT-NIRS models rely on traditional microscopic ageing (TMA) to calibrate the model, thus the accuracy of the age predictions was directly impacted by the accuracy of the calibration ages (Chamberlin et al., 2026). The AFSC Age and Growth Program (AGP) had a long history of ageing walleye pollock by microscopic

examination of otolith growth patterns (Matta et al., 2026) and had employed a rigorous quality control program since 1983 (Kimura and Anderl, 2005). In TMA of pollock, presumed annual marks ("annuli") were enumerated from the otolith surface in younger fish or from burned or toasted otolith cross sections in older fish (Matta and Kimura, 2012; Matta et al., 2026). The accuracy of the AGP's TMA for pollock was independently corroborated using a variety of methods, including radiometric ageing, edge and marginal increment analysis, year-class tracking, and captive-rearing studies (Kastelle and Kimura, 2006; Kimura et al., 2006; Kimura et al., 2007; Lai, 1985).

To test FT-NIRS model prediction skill, random 20% subsamples of pollock otoliths from each collection source (fishery, bottom-trawl survey, and hydroacoustic midwater trawl) were subjected to TMA. Spectral outliers (i.e., those that predicted fish lengths outside an established threshold) were also selected for TMA; see FT-NIRS QA/QC below for more details. Each otolith selected for TMA was independently aged by two experienced readers. The TMA subsamples were evaluated for inter-reader precision and bias. All discrepancies between the two readers were resolved. Any TMA age-length outliers were reexamined, and re-aged or classified as collection errors when appropriate (Kimura and Anderl, 2005).

FT-NIRS QA/QC

In addition to the TMA QA/QC, the FT-NIR spectra underwent a three-step QA/QC process to identify poor quality spectra due to data collection errors, instrument issues, or otolith irregularities such as crystallization, contamination, or fragmentation (Goldstein et al., 2024). Spectrometer operators conducted qualitative QA/QC concurrent with data collection to identify missing data and unusual spectra using length predictions from a species- and region-specific partial least-squares regression (PLSR) model in comparison to observed lengths. Real-time length predictions were used to identify transcription errors and provide assurance of proper instrument function.

Following data collection, rigorous QA/QC was conducted to identify outliers using principal component analysis (PCA) and PLSR models developed from a multi-year collection of spectral data from each data source (AFSC groundfish survey, AFSC hydroacoustic survey, fishery data) and projections (PCA) and predictions (PLSR) of new data. PCA scores by scan date were used to visually identify instrument drift. Gross spectral data outliers were identified from PCA using Hotelling's T^2 and Q residuals (Pomerantsev and Rodionova, 2014) and PLSR outlier analyses identified discrepancies between spectra and specimen length by combining Hotelling's T^2 and Q residuals (full X-distance) and Y-distance (observed vs. predicted; Rodionova and Pomerantsev, 2020). Analyses used a threshold of 1% to identify outliers. Outliers were then aged using traditional microscopic methods. Once aged, outlier spectra were excluded from the final dataset if age predictions from the MMCNN models were also outside the MMCNN 95% Monte Carlo dropout prediction intervals discussed below.

FT-NIRS Model

Age was predicted from FT-NIR spectra using a multimodal convolutional neural network model (MMCNN). MMCNNs identify non-linear relationships in spectral data, incorporate additional inputs such as fish length or capture location, and learn relevant spectral features during training. Classical chemometric approaches such as PLS require the user to select key wavenumbers (Chen and Wang, 2019). The MMCNN used here was an updated version of the MMCNN presented in Benson et al. (2023) and Chamberlin et al. (2026). The MMCNN included one convolutional layer and six dense layers to predict age from spectral and fish-length data.

The first layer of the MMCNN was the spectral input data which was fed to a 1D convolutional layer, which acts as an automated feature extractor to identify patterns in the spectra. This output was then processed with a Rectified Linear Unit (ReLU) activation function to introduce nonlinearity into the network necessary for approximating continuous functions (Brownlee, 2019; Géron, 2019). The data were then flattened into a one-dimensional array and passed through a dense layer (all dense layers use Exponential Linear Unit (ELU) activation). This reduced the dimensionality of the spectral input and balances its contribution relative to the metadata. The metadata input was fed to a dense layer, then concatenated with the spectral input layer. The output was passed through a fully connected dense layer with ELU activation to model the interactions between spectral data and metadata. To mitigate overfitting, 5 dropout layers follow each dense layer to

randomly ignore a subset of neurons and prevent codependency between nodes (Srivastava et al., 2014). Crucially, these dropout layers remain active during the inference phase, a technique known as Monte Carlo (MC) dropout, allowing the model to perform multiple forward passes per sample to generate a distribution of age estimates and calculate Monte Carlo prediction intervals. Finally, a fully connected dense layer with a single node and a batch normalization layer were used to produce a continuous age estimate, allowing for loss estimation via a Mean Absolute Error (MAE) function. The model's hyperparameters (the number of filters in the convolutional layer, the number of nodes in the concatenated layer, learning rate, batch size and the dropout rate) were optimized using hyperband optimization (Li et al., 2018) with early stopping.

The walleye pollock model was trained on spectra and TMA ages from 2014-2025 using an "n−1" annual model updating approach. Under this scheme, spectral and age data from all fleets up to the year prior to the target prediction year were included (for example, predicting 2025 fishery ages used data from 2024 and earlier). For MMCNN training, input data were first split into development (80%) and testing (20%) pooled using a randomly shuffled split that was stratified on fleet and year. Samples receive a normalized weighting score based on 2 coefficients: *decay* was an integer [1, 2, 3] that defined the rate of exponential decay for samples based on year, and *alpha* [0, 0.1, 0.2, ..., 1.0] defined whether sample year or sample age frequency had more influence in weighting the sample, with $alpha = 1$ turning decay off. This allowed for testing of whether model performance improves when more recent calibration data or rare age classes were weighted more heavily. For hyperparameter optimization, the development data were further split into training (90%) and validation (10%) datasets to inform early stopping, using the previously defined sample weights. For each scenario a series of 10 trainings, with random seeds, were run to estimate the median number of epochs needed to train the model but avoid overfitting, prior to a final training run based on the median number of epochs.

In total, 31 training models were produced with a grid search for the 2 sample weighting coefficients, and age predictions were generated for bottom trawl survey, hydroacoustic survey and fishery fleets. The final candidate model for each fleet was selected using four statistical metrics: Lin's concordance correlation coefficient (Lin's CCC), the mean Winkler score, R^2, and the slope of the regression between FT-NIRS predicted ages and corresponding TMA ages. Lin's CCC measures how closely the observed data aligned with a 45° line of perfect agreement, while the mean Winkler score evaluated average performance based on the width of the Monte Carlo prediction intervals and the frequency of samples falling outside them. The four metrics capture different aspects of model accuracy, and visual assessments complemented them. Ultimately, the best-performing model was identified by synthesizing these visual and quantitative criteria. Age predictions were then finalized by removing any samples that were both flagged as a spectral outlier and an outlier from the Monte Carlo prediction intervals. This finalized dataset was then transmitted to end users and coded as FT-NIRS predicted ages.

Age conversion and assessment use

The assessment used year-specific independent tester TMA conversions for the 2024 and 2025 fishery compositions, matching annual weight conversions and separate survey-specific age conversions (Table G1). These treatments serve different purposes: predicting age from spectra, allocating abundance and biomass among ages, and specifying the assessment likelihood were separate steps. Current input and fit records establish their use; the retained partial-conversion diagnostics document which source ages had calibration pairs and how the diagnostic quantified uncertainty.

The 2026 BTS conditional tester-age key excluded calibration pairs marked `nir_outlier = Y`, removing 22 of 329 complete pairs and retaining 307. It targets independent `test_age` conditional on FT-NIRS `final_nir_age`; each FT-NIRS row was normalized by its retained paired count. Conversion used exact TMA ages 1–18 before pooling ages 15–18 into 15+. Screening applied to calibration pairs, preserving the released abundance vector. All unflagged complete pairs were eligible, including checks outside the systematic 20% sample.

Screening changed the exact mean converted age from 5.318978 to 5.316448 years, with a largest age-proportion change of approximately 0.124 percentage points and unchanged total abundance. The same 307-pair key supplied BTS weight means and their joint-covariance delta-method SEs, provisional ATS age allocations and biomass-derived weights, and the 2026 AVO prediction weights. The standalone RE-WAA refit

and assessment fits using these inputs were complete S10. The 2025 BTS key was unchanged. The original 329-pair products remain historical evidence. Empirical-key uncertainty was excluded; the fitted weight model retained its existing marginal observation likelihood rather than using the full converted covariance as a new likelihood.

The contribution described 31 MMCNN training candidates, distinguished by sample-weight settings and fleet-specific selection. PCA and PLSR provide spectral QA/QC; PLSR also provided length predictions. The `a00-d3` and `a03-d1` labels on the saved 600-fish comparison identify prediction sets, separately from the assessment's cumulative `0.x` input sequence.

Table G1 FT-NIRS Use and Transformations by Data Source and Year

Gear or survey	Collection year	Input or model version	Age basis and year-specific key	Application and verified status
Commercial fishery, pelagic trawl (NORPAC gear 2)	2024	Saved `sampler_2024_2025_20261016T160737Z`; current fishery CAA	Released FT-NIRS ages; distinct 2024 key recovered from the earlier release: 2,985 released records and 693 independent tester pairs. Specimen/age-field hashes match the original-release verification record.	The ordinary assessment uses the independent tester TMA composition key, with the source-age-13 row completed from pooled 2024 source-age offsets at ages 9–12 (34 pairs) and likelihood N=578. The selected weight input uses the same key and a 100% CV for the target-age-15+ observation. The retained partial weight diagnostic uses only source ages with paired tester observations. The accepted marginal Model 26.1.2 fit uses the same year-specific composition and weight inputs. S2, S3, S6, S10.

Gear or survey	Collection year	Input or model version	Age basis and year-specific key	Application and verified status
Commercial fishery, pelagic trawl (NORPAC gear 2)	2025	FT-NIRS model a00-d3; annual catch-at-age expansion	Independent tester TMA ages; year-specific conditional key from 668 complete pairs. FT-NIRS age 13 has no paired tester ages. Its conversion probabilities average the age-12 and age-14 rows.	Converted proportions use ages 1–14 and 15+ with selected likelihood N = 530 and identity ageing error. Total numbers are preserved. The matching weight observations use the same key. Key and interpolation uncertainty are additional to sampling uncertainty. S1, S2, S3, S10.
Commercial fishery, pelagic trawl	2025	Matching annual weight observations	Same independent tester-age key and source-age-13 midpoint. Source age 1 has zero abundance.	The key redistributes abundance and biomass in each of 1,000 saved bootstrap draws; weight ratios and SDs are calculated from the converted quantities. These observations supply the selected fitted weights. Target ages 13 and 14 have no converted abundance. Empirical-key and interpolation uncertainty are excluded. S3, S10.

Gear or survey	Collection year	Input or model version	Age basis and year-specific key	Application and verified status
Bottom-trawl survey (BTS), EBS/NBS	2025	Revised `tinyVAST_abundance.csv` / `tinyVAST_props.csv`; saved `bts_2026_candidate` lineage	FT-NIRS age estimates; `bts_2025` independent tester key, dated 2025-09-24, 390 pairs.	Converted abundance and age proportions are used in the working assessment. Exact TMA ages 1–18 are converted before ages 15–18 are pooled into 15+. This key transfer supplies no additional abundance SE or empirical-key uncertainty. The earlier candidate exclusion is retained only in the historical staging record. S1, S4, S6, S10.
Bottom-trawl survey (BTS), EBS/NBS	2026	Revised spatial estimates; screened 29 October rerun input	Independent `test_age` conditional key from the 2026-09-24 release: 329 complete pairs before screening, 307 after excluding 22 `nir_outlier = Y` pairs.	Screened key applied to working CAA and WAA inputs. Exact TMA ages 1–18 are converted before 15+ pooling; source abundance, sample-size choices and 2025 key are retained. Original full-pair products are retained unchanged. S1, S4, S10.

Gear or survey	Collection year	Input or model version	Age basis and year-specific key	Application and verified status
Bottom-trawl survey, Indivero/VAST weight products	2025 and 2026, converted separately	Saved VAST joint N/W covariance; 29 October screened-key preparation and standalone RE-WAA refit	The 2025 full tester key is retained; 2026 uses the screened 307-pair key with the matching VAST abundance and weight estimates.	Ratios and delta-method SEs use abundance–weight and cross-age/year covariance under the same method. Nine 2026 observation means and nine SEs change; 2025 observations remain unchanged. The standalone RE-WAA numerical checks pass. Empirical-key uncertainty is excluded. S3, S5, S10.
BTS historical age-comparison material	2014–2018	`FTNIR Compare.qmd` uses historical fishery/survey paired releases	Historical comparison data span 2014–2018. The new contribution describes training data spanning 2014–2025 with annual n−1 updating.	These series use different data updates. The historical comparison files alone do not establish the precise training set/model ID used for each 2025/2026 release; do not transfer old keys to new years. S7, contribution above.
Acoustic-trawl survey (ATS), acoustic expansion with trawl biological samples	2024	`ATS_2024_age comp ALK.xlsx`, length totals × age-length proportions	The preparation record quotes the 2025-09-08 email as TMA ages sent to MACE. The workbook has a 2024 age-length pivot and matrix multiplication of expanded numbers/biomass.	This local workbook verifies a length-to-age step, not an automatic FT-NIRS designation. A separate ATS age-age conversion and exact predictive model/key lineage are unverified here. S3, S8.
Acoustic-trawl survey (ATS)	2026	`ATS/stock_assessment_output/*202604.csv`; 29 October provisional rerun products	Released BTS FT-NIRS length key followed by the screened 307-pair BTS conditional tester-age key; source FT-NIRS allocations are preserved	and lengths outside the BTS key remain unallocated.

Note. FT-NIRS use and transformations by collection and year. Current fitted applications are distinguished from retained historical preparation diagnostics. Unfiltered counts describe the original complete released tester pairs; the 2026 screened input excludes the 22 flagged complete pairs.

The original keys contain 693 and 668 pairs for fishery 2024 and 2025, and 390 and 329 for BTS 2025 and 2026 before screening. The current 2026 BTS key retained 307 pairs. The fishery gear label followed the saved NORPAC records: gear 2 was PELAGIC in both 2024 and 2025. The contribution's fishery, bottom-trawl survey and hydroacoustic categories retain their own age basis and sampling conditions.

Predictive model and assessment input differences

The MMCNN combined spectral and fish-length information, MC dropout prediction intervals, hyperband optimization and 31 sample-weight settings. Its annual n−1 updating rule used information available before the prediction year; for example, a 2025 prediction used data through 2024. The selected fleet-by-year model checksum, coefficient setting and exact mapping to the saved 600-fish prediction files remain to be documented.

The full tester-key release used `final_nir_age` as predictor and independent `test_age` as target, excluding resolved `final_age` as the calibration target. It contained 3,000 fishery-2025 records, 1,638 BTS-2025 records and 1,586 BTS-2026 records; 2,992, 1,619 and 1,582 released FT-NIRS ages. Their complete-pair counts were 668, 390 and 329, respectively; the screened 2026 BTS application retained 307 S1.

For the 2025 fishery, model a00-d3 FT-NIRS ages were converted to independent tester ages using the 668 complete paired observations. The conditional probability of tester age j given FT-NIRS age i was $K_{ij} = n_{ij} / \sum_j n_{ij}$. Converted numbers were $N_j^{\mathrm{TMA}} = \sum_i N_i^{\mathrm{FTNIR}} K_{ij}$. Empirical rows retain the released paired observations, including flagged pairs. FT-NIRS age 13 had no paired tester ages. Its conversion probabilities use the midpoint of the age-12 and age-14 rows, $K_{13,\,j} = (K_{12,\,j} + K_{14,\,j})/2$, giving probabilities of one third at tester age 10, one sixth at age 11 and one half at age 15. The age-12 row had six pairs and the age-14 row had one pair. Source and tester ages in the release were exact ages 2–15; the assessment terminal group contained ages 15 and older. The selected likelihood sample size was 530. The key was treated as fixed; empirical-key and interpolation uncertainty were excluded.

The 2024 fishery composition used its 693-pair independent tester key. FT-NIRS age 13 had no paired tester ages. Its conversion row used pooled TMA-minus-FT-NIRS offsets from the same year's source ages 9–12 (34 pairs). Empirical rows remain unchanged; the selected likelihood input was 578. Both recent years were converted before fitting and use a 15-by-15 identity ageing-error matrix, equivalent to the ADMB setting with ageing error switched off. Key and tail-allocation uncertainty were additional to the sampling precision represented by the selected likelihood weights.

Weight conversion applied the same conditional key to source numbers and biomass, then divides converted biomass by converted numbers. Terminal-age weights use pooled totals. The partial empirical 2024 diagnostic leaves abundance and biomass at FT-NIRS age 13 unallocated. The selected weight treatment fills that row using pooled offsets from source ages 9–12 and assigned a 100% CV to the target-age-15+ observation. Those fixed approximations add no empirical calibration pairs; their uncertainty differed from a sampling SE. The 2025 weight observations use the same source-age-13 midpoint as the age composition. Their zero-abundance source-age-1 padding contributed no converted numbers or biomass. The midpoint was specific to 2025; source age 14 also lacks pairs in the 2024 key.

The older staging record S6 described a 2024 endpoint in `pm_26_candidate.dat`: fishery CAA at 0.4, provisional BTS WAA/biomass at 0.5/0.6, ATS at 0.7, and separate AVO-only 0.8/0.9 components. These were historical input-sequence labels from the incremental-model plan. Current fitted use followed the documented working input and run records, not those earlier staging exclusions.

Source and validation limits

The partial 2024 empirical diagnostic keeps abundance and biomass at FT-NIRS age 13 unallocated. Selected assessment weights use the pooled-offset rule and 100% CV described above. The 2024 and 2025 compositions use their respective tester-age keys and the age-13 allocation rules described above. Weight SEs propagate the

available joint abundance–weight covariance, while the fitted model retained its marginal observation likelihood. Empirical-key uncertainty remained excluded.

The assessment author identified a00-d3 as the selected 2025 fishery model. The exact training-run checksum, coefficient setting and complete collection-by-year release record remain to be documented. The 31 predictive candidates and the assessment's cumulative input stages identify different choices. The earlier mixed-basis BTS workbook remained unavailable; the separately identified current workbook was excluded from assessment assembly. Its source basis must be established before using it in a comparison.

Provisional ATS products retain their transferred BTS age–length and tester-age keys, length-bin coverage of the BTS key and separate sampling conditions. Direct ATS age and weight validation remained open, with the full 2026 ATS age dataset expected in 2027. Archived full-pair calibration products remain available alongside the screened-key input records. Prior fit, projection and posterior records retain their original dates and input identities. Final model and recommendation selection remain separate review decisions.

Sources and reproducibility

The paired-age releases, preparation products and current run records retain their source identities. Detailed file locations, checksums and the original preparation narrative were preserved in the technical source record.

- S1 — Paired tester-age release: the full year-specific tester-key workbook and tidy release, with independent tester ages as the calibration target.
- S2 — Fishery observations: catch-expanded annual numbers based on released FT-NIRS ages, with year-specific tester-age conversions: 693 pairs and N=578 for 2024; 668 pairs and N=530 for 2025.
- S3 — Weight conversion: year-specific fishery conversion keys, partial 2024 diagnostics and independent fishery arithmetic checks.
- S4 — Survey age compositions: revised BTS abundance and proportion estimates, with their source age assignments.
- S5 — Survey weights and covariance: matching model-based abundance and weight estimates, joint covariance and delta-method validation.
- S6 — Historical staging: the earlier preparation sequence, retained separately from current selected input and fit records.
- S7 — Earlier age comparison: fishery and survey comparisons for 2014–2018, distinct from later training and prediction releases.
- S8 — ATS length-to-age calculation: the 2024 age–length workbook and expanded number/biomass calculations.
- S9 — ATS survey products: regional survey length and biomass products used for the provisional BTS-key transfer.
- S10 — Current screened-key inputs and fits: the 307-pair calibration, completed standalone RE-WAA refit and current assessment run records. The original 329-pair products retain their historical identity.

Year-specific weight-conversion diagnostics

The retained full-pair conversion record separated three completed year-specific conversions from the partial 2024 fishery diagnostic (conversion-status table). Fishery 2025 and BTS 2025–2026 use independent tester-age keys. The partial 2024 fishery diagnostic leaves abundance and biomass at FT-NIRS age 13 unallocated.

Mean weights generally increase with age, with the largest source-versus- converted differences concentrated at older ages (2024 fishery weight table). The partial fishery 2024 values at TMA ages 13 and 14 were both 1.2878 kg, while its target 15+ weight remained missing. Its prepared older-age SEs were large relative to the means; the partial converted SDs condition on the fixed key and source ages with paired observations.

The 2025 fishery conversion raises the 15+ mean from 0.8102 to 1.2676 kg; target ages 13 and 14 retain missing weights because converted abundance was zero (fishery weight comparison). Conversion changes both which older ages had weight estimates and the values of those estimates.

BTS 2025 converted weights were generally below the source weights from age 5 upward; in 2026, weights at ages 3–8 remain close to or above their source values, while older-age weights were lower (BTS weight comparison; Figure G1). The 15+ mean changes from 1.7646 to 1.5474 kg in 2025 and from 1.8390 to 1.3665 kg in 2026. These were conversion contrasts that vary by age and year. The smaller conditional SEs in several converted cells retain the stated fixed-key uncertainty scope.

Independent fishery arithmetic, preservation of earlier fishery values and survey covariance/derivative checks establish computational consistency (conversion checks). The partial 2024 diagnostic leaves abundance and biomass at FT-NIRS age 13 unallocated. Current selected weights use the separate pooled-offset tail treatment and 100% CV, and the screened-key standalone RE-WAA and assessment fits were complete. These distinctions preserve the historical diagnostic's restriction to ages with paired observations and the current fit's fixed-key uncertainty scope.

Adjustments to FT-NIRs for assessment application

The following tables retain the full-pair calibration used to evaluate conversion arithmetic, including the partial 2024 fishery results. Current assessment inputs use the separately documented selected tail treatment and screened 2026 key. The table values preserve their original calibration basis.

Complete conversion report, including Table 3 for fishery 2024–2025

Diagnostic basis and current use

The retained diagnostics convert fishery 2025 and BTS 2025–2026 abundance and biomass with their year-specific independent tester-age keys. Fishery 2024 had a distinct 693-pair key, but its empirical partial conversion leaves positive source-age-13 mass unallocated. The selected assessment weight treatment fills that row using pooled offsets from source ages 9–12 and assigned a 100% CV to the target-age-15+ weight observation. The current standalone RE-WAA refit and assessment fits were complete; the historical partial diagnostic remained separate. The BTS tables below retain the original full-pair calibration, while the current 2026 fit used the screened 307-pair key.

Table G2 Conversion Status by Data Source

Stream	Conversion key	Current action
Fishery 2024	Distinct 2024 key: 693 pairs	Partial diagnostic; source age 13 unallocated
Fishery 2025	2025 fishery tester-age key: 668 pairs	Converted with two approved probability rules
BTS 2025	2025 BTS tester-age key: 390 pairs	Converted with joint model uncertainty
BTS 2026	2026 BTS tester-age key: 329 pairs	Converted with joint model uncertainty

Note. Conversion status by new data source.

Conversion and approved approximations

Each key gave the distribution of TMA tester age conditional on FTNIR age. Abundance and biomass were redistributed together, using the same conditional probabilities. Converted mean weight was converted biomass divided by converted abundance. Within a source FTNIR bin, this calculation assigned the same source mean weight to every target age.

For fishery 2025, Jim approved two rules for source ages without paired tester observations:

- Age 1: a dummy identity row assigned FTNIR age 1 to TMA age 1. All saved source age-1 catch estimates were zero, so this row retained zero catch.
- Age 13: each target-age probability was the arithmetic average of its probabilities in the source age-12 and age-14 rows. The resulting row sums to one. This approximation used the existing age-12 and age-14 pairs.

Converted target-age 13 and 14 abundances were zero in the 2025 fishery key. Their weights and SEs remain paired missing observations. The historical data continue to inform these ages in the future wtAgeRE fit. All pre-2025 fishery mean/SE decimal values were preserved exactly.

Exact BTS target ages 1–18 were retained during conversion. Target ages 15–18 were then pooled into 15+, conserving total abundance and biomass. The 2024 fishery key also retained exact target ages through 18; the 2025 fishery key had target ages through 15. The same terminal pooling convention applied. Age selection for wtAgeRE occurs after conversion; its input bins were 3–15+.

Fishery 2024 results and remaining gap

The recovered 2024 release contained 2,985 released FTNIR ages and 693 complete independent tester pairs. The target was `test_age`; the resolved `final_age` was a separate field. Canonical specimen and age-field hashes match the independent original-workbook verification record. The original workbook itself remained outside this local snapshot. The empirical key used all complete released pairs, including additional QA/QC selections; their representativeness remained an assumption.

Source ages 1–12 had empirical probability rows. Source ages 13–15 lack pairs; only age 13 had positive mass in the saved sampler draws. Its unallocated observed-point mass was 0.0323% of abundance and 0.0817% of biomass. Allocated plus unallocated totals balance across all 1,001 saved rows to relative errors below 6.7e-16. The diagnostic retained that mass separately and preserved the original totals.

The table and figure report the partial, fixed-key bootstrap mean and SD from source ages with paired tester observations. Every converted 2024 bin remained conditional on the unresolved source-age-13 allocation. Target TMA age 15+ receives zero allocated abundance, so its mean and SD remain missing. Source FTNIR age 13 and target TMA age 13 were distinct: other source ages with paired tester observations can contribute to target ages 13 and 14.

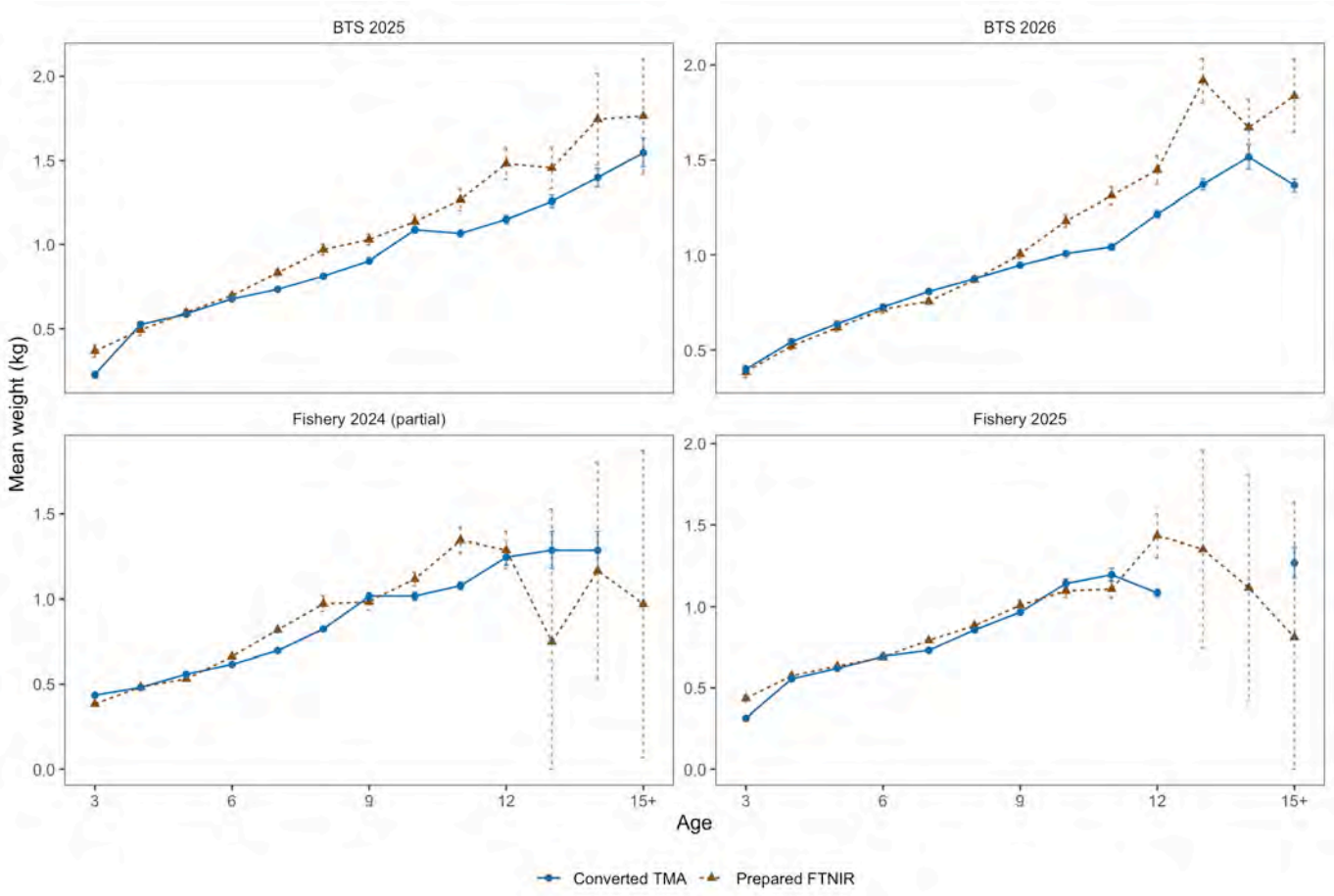
The 2025 midpoint rule stays specific to its approved key. In 2024, source age 14 also lacks calibration pairs; applying the age-12/14 midpoint rule would require calibration pairs at age 14. The 2024 key included pairs at source age 1 and retained its catch.

Table G3 Fishery 2024 Weights and Partial Conversion Using Paired Ages

Age	Prepared mean	Prepared SE	Partial TMA mean	Partial TMA SD
3	0.3832	0.0093	0.4353	0.0053
4	0.4841	0.0067	0.4807	0.0033
5	0.5317	0.0035	0.5596	0.0021
6	0.6628	0.0040	0.6175	0.0023
7	0.8195	0.0166	0.6965	0.0060
8	0.9733	0.0439	0.8252	0.0138
9	0.9850	0.0469	1.0162	0.0182
10	1.1167	0.0401	1.0163	0.0227
11	1.3455	0.0774	1.0774	0.0227
12	1.2878	0.1082	1.2464	0.0455
13	0.7485	0.7800	1.2878	0.1082
14	1.1658	0.6356	1.2878	0.1082
15+	0.9705	0.9011	Missing	Missing

Note. Fishery 2024 weights in kilograms: preserved prepared values and partial conversion using source ages with paired observations. SDs are conditional fixed-key diagnostics; all converted bins remain incomplete.

Weight and uncertainty comparisons



Note. Mean weights before and after conversion, with source SEs and converted bootstrap SDs or survey SEs. Fishery 2024 showed a partial conversion using source ages with paired observations; source-age-13 mass remained unallocated.

Figure G1 Mean Weights Before and After Conversion

Converted fishery weights and bootstrap SDs were recalculated from the first 1,000 paired sampler bootstrap draws after transforming each draw's abundance and biomass. The final observed-data point row was excluded from those summaries. The previously selected legacy convention was retained: a target age absent in a bootstrap draw had zero weight for that draw. The SD used the sample denominator. Known limitations of the legacy sampler's resampling selectors remain in the source record.

BTS uncertainty used the saved joint VAST parameter covariance and conditional random-effect covariance. It included dependence between source abundance and weight, among ages through shared parameters, and between 2025 and 2026. The ratio's numerator and denominator both contribute to the delta-method SE. The calculation evaluated the saved VAST model at its parameter estimates.

All conversion keys were treated as fixed. The reported SEs exclude uncertainty in the empirical keys, the dummy row, and the interpolated row.

Table G4 Fishery 2024–2025 Weights and Uncertainty

Year	Age	Original mean	Original SE	TMA mean	TMA SE / SD
2024	3	0.3832	0.0093	0.4353	0.0053
2024	4	0.4841	0.0067	0.4807	0.0033
2024	5	0.5317	0.0035	0.5596	0.0021
2024	6	0.6628	0.0040	0.6175	0.0023

Year	Age	Original mean	Original SE	TMA mean	TMA SE / SD
2024	7	0.8195	0.0166	0.6965	0.0060
2024	8	0.9733	0.0439	0.8252	0.0138
2024	9	0.9850	0.0469	1.0162	0.0182
2024	10	1.1167	0.0401	1.0163	0.0227
2024	11	1.3455	0.0774	1.0774	0.0227
2024	12	1.2878	0.1082	1.2464	0.0455
2024	13	0.7485	0.7800	1.2878	0.1082
2024	14	1.1658	0.6356	1.2878	0.1082
2024	15+	0.9705	0.9011	Missing	Missing
2025	3	0.4354	0.0217	0.3143	0.0115
2025	4	0.5753	0.0102	0.5559	0.0085
2025	5	0.6356	0.0063	0.6214	0.0066
2025	6	0.6891	0.0050	0.6929	0.0027
2025	7	0.7913	0.0086	0.7295	0.0029
2025	8	0.8824	0.0175	0.8555	0.0073
2025	9	1.0084	0.0296	0.9657	0.0115
2025	10	1.0939	0.0411	1.1395	0.0292
2025	11	1.1054	0.0557	1.1943	0.0406
2025	12	1.4336	0.1344	1.0815	0.0241
2025	13	1.3513	0.6052	Missing	Missing
2025	14	1.1133	0.6965	Missing	Missing
2025	15+	0.8102	0.8284	1.2676	0.0950

Note. Fishery 2024–2025 weights and uncertainty in kilograms. The 2024 TMA results are a partial conversion using source ages with paired observations; source-age-13 mass remains unallocated. Missing target ages have no converted abundance.

2024: partial bootstrap mean and fixed-key SD, conditional on the source ages with paired observations; target age 15+ remained missing. 2025: converted mean and bootstrap SE.

Table G5 BTS Mean Weights and Standard Errors After Joint Covariance Propagation

Year	Age	Original mean	Original SE	TMA mean	TMA SE
2025	3	0.3655	0.0357	0.2255	0.0161
2025	4	0.4928	0.0352	0.5260	0.0166
2025	5	0.5951	0.0186	0.5871	0.0134
2025	6	0.6964	0.0114	0.6758	0.0098
2025	7	0.8329	0.0206	0.7340	0.0100
2025	8	0.9690	0.0331	0.8125	0.0125
2025	9	1.0288	0.0325	0.9026	0.0131
2025	10	1.1360	0.0383	1.0872	0.0197
2025	11	1.2675	0.0653	1.0659	0.0200
2025	12	1.4825	0.0943	1.1496	0.0257
2025	13	1.4562	0.1232	1.2577	0.0358
2025	14	1.7453	0.2714	1.3987	0.0558
2025	15+	1.7646	0.3427	1.5474	0.0834
2026	3	0.3850	0.0291	0.3971	0.0190
2026	4	0.5211	0.0184	0.5440	0.0155
2026	5	0.6188	0.0218	0.6400	0.0165
2026	6	0.7139	0.0237	0.7254	0.0109
2026	7	0.7551	0.0162	0.8076	0.0101
2026	8	0.8707	0.0144	0.8755	0.0101

Year	Age	Original mean	Original SE	TMA mean	TMA SE
2026	9	1.0041	0.0203	0.9476	0.0125
2026	10	1.1782	0.0322	1.0064	0.0132
2026	11	1.3129	0.0472	1.0415	0.0156
2026	12	1.4490	0.0762	1.2159	0.0209
2026	13	1.9177	0.1171	1.3719	0.0298
2026	14	1.6711	0.1496	1.5171	0.0648
2026	15+	1.8390	0.1928	1.3665	0.0336

Note. BTS mean weights and SEs in kilograms after propagating the joint model covariance.

Validation and source record

Table G6 Validation of the Transformations

Check	Result
Fishery independent recalculation	PASS
Pre-2025 fishery decimal preservation	Pass
Survey source SE reconstruction: largest relative difference	1.22e-15
Ratio derivative check: largest scaled difference	1.68e-11
Analytic versus numerical converted SE: largest relative difference	3.15e-11
Survey random-effect gradient: maximum	4.36e-12
Saved survey fixed Hessian positive definite	Yes
2024 specimen/age-field identity and partial arithmetic	Pass: 22 checks; positive source-age-13 support unresolved
Input adapter	Selected inputs used in completed working fits; historical partial-conversion support limits retained
wtAgeRE optimization	Screened-key standalone RE-WAA fit complete; earlier partial-conversion branch remains a separate diagnostic

Note. Validation of the transformations. Numerical checks retain the full-pair conversion basis; current fitted inputs use the selected 2024 tail treatment and screened 2026 key.

The source records retain matching abundance and weight estimates from the same saved survey fit, along with input/output hashes and fixed-key approximation rules. The empirical key was treated as fixed. Current fitting records and the historical conversion diagnostics were identified separately in the technical source record.

The historical 2024 partial-conversion diagnostics preserve their original inputs and restriction to source ages with paired observations. The current selected tail allocation, screened BTS key and completed fits had separate source and run identities. Earlier preparation states and the original verification wording remain archived in the technical source record.

This was an internal methods record. It used a compact Quarto report and TAF-compatible source, transformation, output, and provenance stages. Assessment adoption was documented in the separate input and run records.

- Historical partial-diagnostic fishery input: converted 2025, preserved 2024
- Converted BTS input
- Fishery approximation key
- Conversion manifest
- BTS uncertainty validation
- 2024 empirical key
- 2024 partial bootstrap summaries

- 2024 exact and pooled point candidates
- 2024 calibration pairs by source age and unallocated abundance and biomass
- 2024 validation

Complete numbered conversion report · Editable analytical Quarto source · Subsection source manifest

Provisional ATS age compositions

In 2026, ATS age compositions were estimated by borrowing the BTS age–length keys and applying them to ATS abundance-at-length data. Following usual practice, age data for the 2026 ATS length samples will be applied in 2027.

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Appendix H BTS Spatiotemporal Biomass Index and Abundance at Age, Including the Northern Bering Sea

This appendix described the spatiotemporal modeling approach used to estimate the bottom-trawl survey (BTS) biomass index and abundance at age for the combined eastern and northern Bering Sea (EBS and NBS). This approach was adopted in the 2024 assessment for both abundance at age and survey indices and followed the approach used by the AFSC Groundfish Assessment Program (GAP) in previous assessments. The sections below describe its application to the 2026 survey data, including model specifications and uncertainty estimates.

Scope and relationship to the earlier VAST appendix

The earlier VAST appendix described a different software generation and mixed 1982–2023/2024 coverage. It was retained as a historical source. The description used the settings in the saved production fit objects. The saved production fit objects identify sdmTMB 1.0.0 for the biomass index and tinyVAST 1.6.3 for abundance at age. Model-based integration across EBS and NBS extended the approach used to address pollock distribution shifts (O'Leary et al. 2020). The sdmTMB framework was described by Anderson et al. (2022).

Both output series contain 44 years, 1982–2019 and 2021–2026. The survey was absent in 2020. The index fit retained 2020 as an additional latent time step representing a model prediction. The age fit retained annual time levels across 1982–2026, while the abundance and composition data files omit 2020. NBS sampling coverage varied among years within the prediction domain.

Biomass index

The pollock index code reads density-dependence-corrected station biomass density from the VAST-named input file. The file name was historical; the saved model class was sdmTMB. Input density was converted from kg/ha to kg/km² by multiplying by 100. The saved fit used a Poisson-link delta-gamma observation model with separate year effects and spatial and spatiotemporal fields. Both components had spatial fields and annual AR(1) spatiotemporal structure. The retained call enables geometric anisotropy and included a spatially varying coefficient for the environmental covariate.

The companion pollock code defined that covariate as standardized cold-pool area, the area of bottom water at or below 2°C (Rohan et al. 2022). The saved object contained its numerical covariate and the formula; the complete annual cold-pool release manifest remained unavailable. The exact environmental release and production script revision require confirmation.

Predicted density was integrated over a fixed regional grid. For grid-cell area (A_{r,j}) in km² and predicted biomass density (d_{t,j}) in kg/km², the regional biomass index in tons was

$$\widehat{I}_{r,t} = \frac{1}{1000} \sum_{j \in r} A_{r,j} \widehat{d}_{t,j}. \qquad (20)$$

The biomass-index estimates include separate EBS, NBS and combined Both products. The combined 2026 point estimate was 9,034,017.809 t; the separate EBS and NBS point estimates sum to that value within numerical precision. These survey estimates remain subject to assessment input selection and acceptance.

Abundance at age

The saved tinyVAST fit used numerical density at station and age, with age-by-year fixed effects in both delta components. All 15 labelled age classes had age-specific spatial variance terms and a common estimated lag-1 temporal coefficient in the spatiotemporal specification. The saved control had anisotropy disabled. This model used age-by-year effects with the environmental terms excluded.

The companion pollock code multiplies CPUE_num by 100, converting fish/ha to fish/km². Its comment describing this as a conversion of kg was inconsistent with the numerical input; the calculation was an abundance calculation. Numerical density was integrated over the combined EBS–NBS grid and scaled to billions of fish:

$$\widehat{N}_{r,t,a}\ [\text{billion fish}] = \frac{1}{10^9}\sum_{j\,\in\,r} A_{r,j}\widehat{n}_{t,a,j}, \qquad \widehat{p}_{r,t,a} = \frac{\widehat{N}_{r,t,a}}{\sum_b \widehat{N}_{r,t,b}}. \qquad (21)$$

The abundance-at-age matrix contained 15 rows and 44 year columns. Its row order agrees with the companion age_1 through age_15 composition columns: normalizing every matrix column reproduced the composition file to a maximum absolute difference of (8.4^{-16}). The 2026 combined total was 16.064690 billion fish. The companion composition file supplied the age labels for the matrix and must remain attached to it. Displayed ages were 1–14 and 15+; the terminal category represented fish aged 15 and older. The original source column names were retained in the data. The age export supplied only the combined EBS–NBS estimates (terminal-age interpretation).

These expanded compositions use the age assignments and age–length-key preparation in their station-level inputs. Age assignment and FT-NIRS-to-traditional-age conversion precede the tinyVAST expansion. The exact release, assignment rules for 2025–2026, and any age-age correction used in this production input remain part of the source reconciliation.

Verified settings and prediction-code evidence

The retained index fit used 250 interior mesh knots, anisotropy and a spatially varying environmental coefficient; the age fit used 50 interior knots with anisotropy disabled and a separate spatial variance structure by age (Table H1). Prediction-grid and integration settings were identified separately as companion-code evidence. The local code checkout was 2a9e6f26062d34ee0375f8eac9462e51273e65a3. Its default species selections were Pacific cod for the index and yellowfin sole for age compositions. The saved pollock fit objects supply the production evidence for this appendix; the generic default selections remain code context.

Table H1 Delivered 2026 Pollock Fit and Companion Prediction Settings

Setting	Biomass-index fit	Abundance-at-age fit
Platform and retained version	sdmTMB 1.0.0	tinyVAST 1.6.3
Response	Biomass density	Numerical density by age
Observation family	Poisson-link delta-gamma	Poisson-link delta-gamma
Fixed effects	Year in both components	Age × year in both components
Spatial mesh	250 interior knots; 307 total vertices	50 interior knots; 106 total vertices
Spatiotemporal structure	AR(1) in both components	Shared lag-1 coefficient; age-specific variance structure
Environmental coefficient	Spatially varying coefficient for env	None retained
Anisotropy	Enabled in saved call	Disabled in saved control
Observation years	1982–2019, 2021–2026	1982–2019, 2021–2026
Saved input rows	17,236	265,350 station–age rows
Reported output regions	EBS, NBS, Both	Both
Prediction grid in companion code	5 nmi; 1,578 EBS + 672 NBS cells	Same combined 2,250-cell grid
Integration bias/SE settings in companion code	get_index: bias_correct=TRUE	apply.epsilon=TRUE; bias.correct=FALSE; getsd=FALSE

Note. Retained settings in the 2026 pollock fit objects, with prediction-grid and integration settings identified separately as companion-code evidence. The complete production prediction record remains unavailable.

The code grid had 492,989.921 km² in the EBS and 198,866.805 km² in the NBS, summing to 691,856.726 km². Those grid files were hashed in the source record. The complete production prediction grid and expansion invocation remain unavailable. This draft therefore distinguished companion-code settings from verified saved-fit settings. The historical 2-nmi grid and 750-knot index describe the earlier VAST workflow.

Uncertainty, diagnostics and outstanding review

The index code requests bias-corrected integration. It also contained a 500-simulation covariance workflow. The assessment selects its covariance file and uncertainty treatment separately from those integration settings. The age expansion code sets bias.correct=FALSE and getsd=FALSE despite apply.epsilon=TRUE. Its age output therefore excluded epsilon bias correction and a full estimated age-composition covariance. Assessment weighting and the selected design-based covariance remain separate decisions.

The saved index object reports a positive definite Hessian and maximum absolute retained gradient 0.0138148. The saved age object reports optimizer return code 0, a positive definite Hessian and maximum retained gradient 0.000205084. These diagnostics required provider review for numerical acceptance. Both gradients exceed the workspace's (10^{-4}) assessment-model convergence guardrail; their suitability for these survey fits required provider review. This appendix used the saved survey fits by the provider.

The saved index data had 17,236 rows, while the adjacent raw index export had 17,237; the counts differ in 2026 (350 versus 351). The saved age fit had 265,350 rows, versus 258,555 in the adjacent age-density export. Historical differences occur in 1982, 1985, 1988, 1991, 1994, 2001, 2005, 2006 and 2018; 2026 had 5,250 fitted rows versus 5,265 exported rows. These differences prevent a claim that the saved objects exactly reproduce the neighboring raw files. Their causes, the intended final input versions and the fit-to-export chain require confirmation from the survey analysts.

Before finalizing this appendix, confirm the production script revision, prediction grid, annual environmental release, full R/TMB/dependency versions, age-assignment lineage, treatment of the input mismatches, and the accepted covariance and diagnostic assessment. The latest linked general writeup and terms-of-reference table remain unavailable through the connected source. Their agreement with this draft required author review. Historical VAST dependency versions retain their original dates.

Source and reproducibility record

The local provenance bundle retained saved-object metadata and checks, source file hashes, output consistency checks, and the read-only extraction scripts. It also preserved the original historical VAST text and historical PDF. The original fit objects and station-level inputs remain in their owning data directory. The report consumes saved metadata and aggregate outputs.

Current-method source code: index workflow and age-composition workflow. Author-documents awaiting access: general methods writeup and terms-of-reference settings.

Appendix I Assessment Development and Supporting Record

The September 2026 assessment development document (Ianelli et al. 2026), published 3 September, presents the starting model comparisons and exploratory appendices using data through 2024. Corrected through-2024 results were archived with that document; the main assessment used observations through 2026.

The Plan Team excerpt provided the seven recommendation summaries (Table A1). Its final report citation and any subsequent SSC direction require verification before release.

The source guidelines were *Alaska Groundfish Stock Assessment Guidelines*, July 2024, in a file named *Stock Assessment Guidelines Tier 3.docx*. Their publication procedures inform eventual release preparation. The development copy remained local under the user's release timing.

Early–late fishery sensitivity summaries

Model 26.1.2 evaluated sensitivity to separating the early and late fisheries. Model 26.0 supplied the assessment recommendations.

Model 26.1.2 Early-late fishery split comparison

Quantity	As estimated or specified in 2024 for:		Model 26.1.2 sensitivity for:	
	2025	2026	2027	2028
Natural mortality (annual rate, ages 3+)	0.300	0.300	0.300	0.300
Tier and sub-tier	3a	3a	3a	3a
Projected total biomass (ages 3+, t)	8,526,000	8,075,000	11,392,000	12,488,000
Projected female spawning biomass (t)	3,118,000	3,342,000	3,223,000	3,432,000
B100% (t)	5,902,000	5,902,000	6,220,000	6,220,000
B40% (t)	2,361,000	2,361,000	2,488,000	2,488,000
B35% (t)	2,066,000	2,066,000	2,177,000	2,177,000
F_OFL (annual rate)	0.513	0.513	0.377	0.377
Maximum F_ABC (annual rate)	0.394	0.394	0.296	0.296
Recommended F_ABC (annual rate)	0.394	0.394	Not selected	Not selected
OFL (t)	2,957,000	2,496,000	2,269,000	2,399,000
Maximum ABC (t)	2,417,000	2,036,000	1,855,000	1,958,000
Recommended ABC (t)	2,417,000	2,036,000	Not selected	Not selected

Historical source: December 2024 SAFE, Executive Summary, Tier 3 version, p. 4; B40% is printed in section 7.2, p. 35.

2027–2028 projections assume catch of 1,375,000 t in each year, mean 2023–2025 selectivity and fixed biological inputs. Total biomass covers ages 3+ at the start of the year. F_OFL and maximum F_ABC are the F35% and F40% rates under mean-one selectivity. Biomass and catch are rounded to the nearest 1,000 t.

Model 26.1.2 is a sensitivity analysis. Recruitment is fixed at the fitted 1978–2023 mean; these projections show point estimates. Model 26.0 supplies the assessment recommendation.

Model 26.1.2 Early-late fishery split stock-status summary. The 2025–2026 columns report status for 2025 and 2026; historical determinations are from the 2024 assessment.

Status	As determined in 2024 for:		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

Historical determinations are from the December 2024 EBS pollock SAFE, Executive Summary, p. 4.

Assessment conclusions are separate from final NMFS determinations. Updated 2025 catch (1,326,215.61 t) is below its 2,957,000-t OFL. For Model 26.1.2, 2026 spawning biomass (3.065 million t) and Alternative 7 biomass in 2028 (3.179 million t) both exceed B35% (2.177 million t), supporting the two 2026 "No" entries. Section 9 describes the status tests. Each two-year column pair reports overfishing for the earlier catch year and stock status for the later assessment year; cells outside those year-specific determinations are marked n/a. NMFS issues the final status determinations.

Assessment archive record

The assessment archive links model source and executable versions, prepared inputs, run controls, saved fits, diagnostics, retrospectives, projections and report products. Source manifests document provenance and access restrictions. Scientific acceptance was documented separately from numerical diagnostics and report preparation.

Annual data-update register

The annual register identified the input streams, observation years, revisions and weight-at-age treatments used in the assessment (Table I1).

Table I1 Annual Data Additions, Revisions and Weight-at-Age Assumptions

Annual data and weight-at-age register		
Data source	Year	Update or weight-at-age treatment
Fishery catch	2024	Historical catch revision check
Fishery catch	2025	Observed annual update
Fishery catch	2026	Year-to-date plus annual completion forecast
BTS index	2025	Observed annual update
BTS index	2026	Observed annual update
ATS index	2026	Observed annual update
AVO index	2025	Observed annual update
AVO index	2026	Observed annual update
BTS ages	2025	Observed annual update
BTS ages	2026	Observed annual update
ATS ages	2026	Observed annual update
Fishery ages	2024	Observed annual update
Fishery ages	2025	Observed annual update
Fishery weight-at-age	2024	Observed inputs plus forecast 2026
Fishery weight-at-age	2025	Observed inputs plus forecast 2026
Fishery weight-at-age	2026	Forecast schedule
Spawning weight-at-age	2024	A-season schedule correction
Spawning weight-at-age	2025	A-season schedule correction
Spawning weight-at-age	2026	A-season schedule correction
BTS weight-at-age	2025	Survey product with fills
BTS weight-at-age	2026	Survey product with fills
ATS weight-at-age	2025	Assumed carry of 2024 WAA
ATS weight-at-age	2026	Carry or provisional survey product

Note. Annual data additions, revisions and weight-at-age assumptions relative to the 2024 assessment. Listed updates are incorporated in the Model 23.x and 26.x fits. Cumulative input-update fits retain their stated stepwise history.