Research and developments on the eastern Bering Sea walleye pollock stock assessment

Last year activities

- Part 1: Discussion paper presented to CIE review
- Part 2: Assessment research developments for NPFMC review
- Part 3: Three-parameter double-logistic selectivity

Last year activities pre-CIE review

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Discussion paper for CIE review of the eastern Bering Sea walleye pollock stock assessment

May 2025, CIE review

AUTHOR
Jim Ianelli, Carey McGilliard, Sophia Wassermann

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2025-05-01 00:00

Executive Summary

This report builds on the 2024 pollock stock assessment, using the same datasets but extending the evaluation through new tools, data comparisons, and sensitivity analyses. The primary goal is to evaluate how alternative data sources, modeling approaches, and assumptions affect the perception of stock status and management advice.

The first section introduces the **R library** `ebswp` (see 1), which streamlines compilation and visualization of assessment results. This provides a foundation for reproducible workflows across different model scenarios.

The second section presents **comparisons of FT-NIR and traditional microscope age estimates** (see 2). FT-NIR offers efficiencies but showed lower cohort consistency in bottom-trawl data compared to traditional ageing. Model runs incorporating FT-NIRs demonstrated that treatment of ageing error (fleet-aggregated vs. fleet-specific) influences perception of spawning biomass and reference points, though management quantities remained broadly comparable.

In the next section we explore **leave-one-out survey sensitivity analyses** (see 3). Results indicated that the influence of the bottom-trawl survey (BTS) was largest. Spawning biomass and recruitment estimates changed considerably when BTS data were downweighted. Other data sources, such as ATS and AVO indices, contributed less to overall stock trends.

The next sections examine incorporation of **multi-species natural mortality (M-at-age and year) estimates and revised acoustic-trawl survey uncertainty** (see 4). CEATTLE-based M estimates led to higher mortality at many ages, resulting in higher recruitment but lower near-term spawning biomass relative to the 2024 base model. Alternative acoustic estimates (Urmy, Ressler, and De Robertis (2025)) had smaller effects on management benchmarks, but highlight areas for further

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perception of stock status and manage

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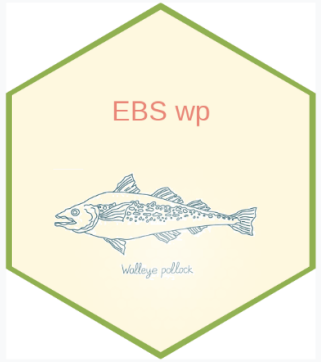

Preface

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Research and developments on the eastern Bering Sea walleye pollock stock assessment

September 2025, Plan Team Draft

AUTHOR
Jim Ianelli, Carey McGilliard, Sophia Wassermann

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2025-09-25 13:57

1 Summary

This document is a follow-up to the discussion paper presented to the Center for Independent Experts (CIE) review panel prepared in May 2025 (link here; part 1 of this report). The review panel provided a set of recommendations to enhance the model structure, address key uncertainties, and improve transparency. This is Part 2 in which we show actions taken since the review and is intended inform the September 2025 NPFMC review. It focuses on migrating the operational model from ADMB to RTMB and begins to examine ways to evaluate the influence of the Russian fishery.

Since the May 2025 CIE review, several key developments have been made in the EBS pollock assessment. The most significant is the completed transition from ADMB to RTMB. The ported model successfully reproduces ADMB results for spawning biomass and recruitment with negligible differences, while enabling greater flexibility in estimating random-walk selectivity and recruitment deviations, propagating error through marginal likelihood, and integrating random effects. This provides a more modern and transparent framework for assessment. Work is also underway to address one of the reviewers' main concerns—the absence of Russian removals. Scenario modeling is being conducted using Russian catch levels equivalent to 20–45% of U.S. catch, following reviewer guidance and recent publications. These runs will help bound the potential influence of transboundary removals before more collaborative modeling efforts are considered. Other areas highlighted by the review, such as process uncertainty, growth, weight-at-age, and alternative data-weighting approaches, remain planned or deferred. The tools for

Last year activities post-CIE review

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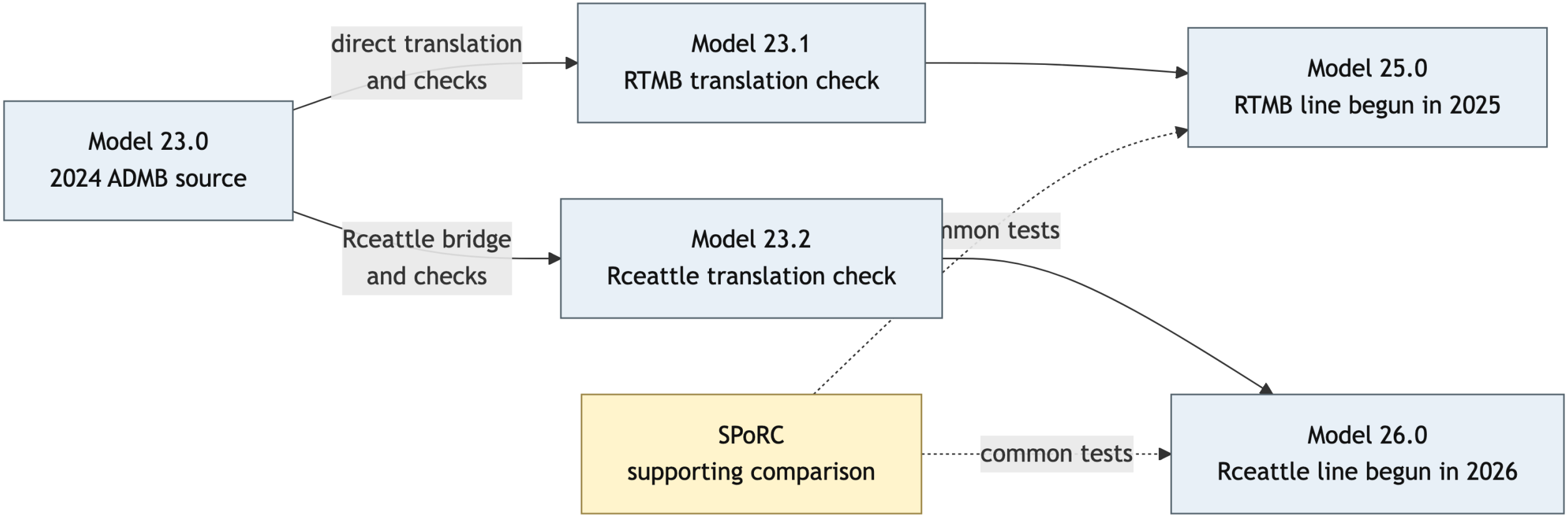
Figure 1 Model numbering and development history



- Model 23.2 is the direct reference for Model 26.0 implementation checks.
- Research on pollock movement between U.S. and Russian waters continues under SPoRC.

Data product issues:

1. Traditional microscopic age-determination (TMA) method switching to near-infrared approach (FTNIRs)
    - Big impacts to age-error for older fish
    - Affects BTS and Fishery data
    - AFSC Scientists actively improving machine-learning with updated data
    - Smaller TMA data available as “tester”

2. For BTS, estimator expanding age samples to annual proportions changed.
    - Largest revisions are in the plus-group ages of 2023–2024.

Figure 2 Changes in BTS proportions at age

Estimator expanding age samples to annual proportions changed.

Largest revisions are in the plus-group ages of 2023–2024.

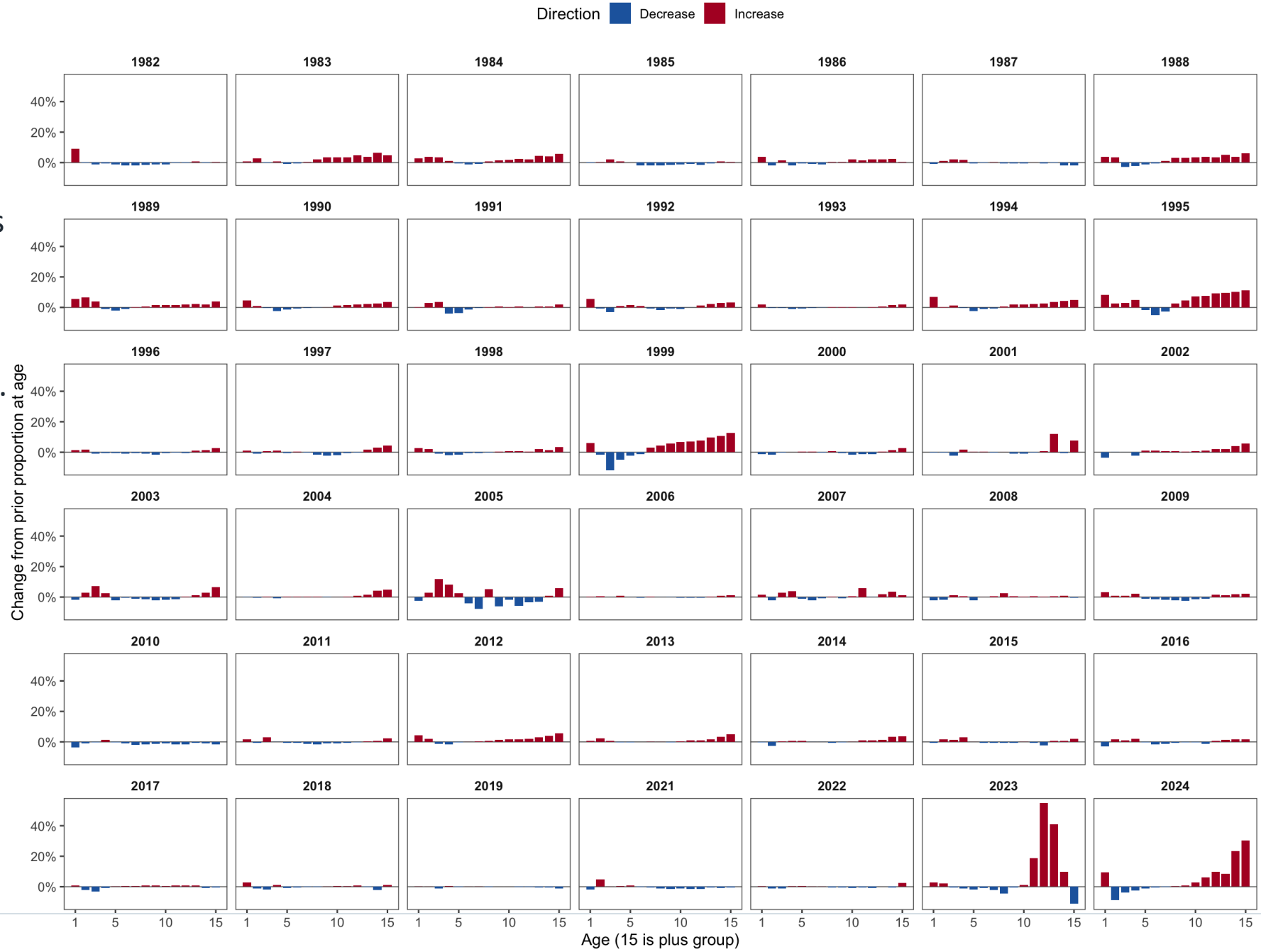


Figure 3 Effects of revised BTS age data on model outputs

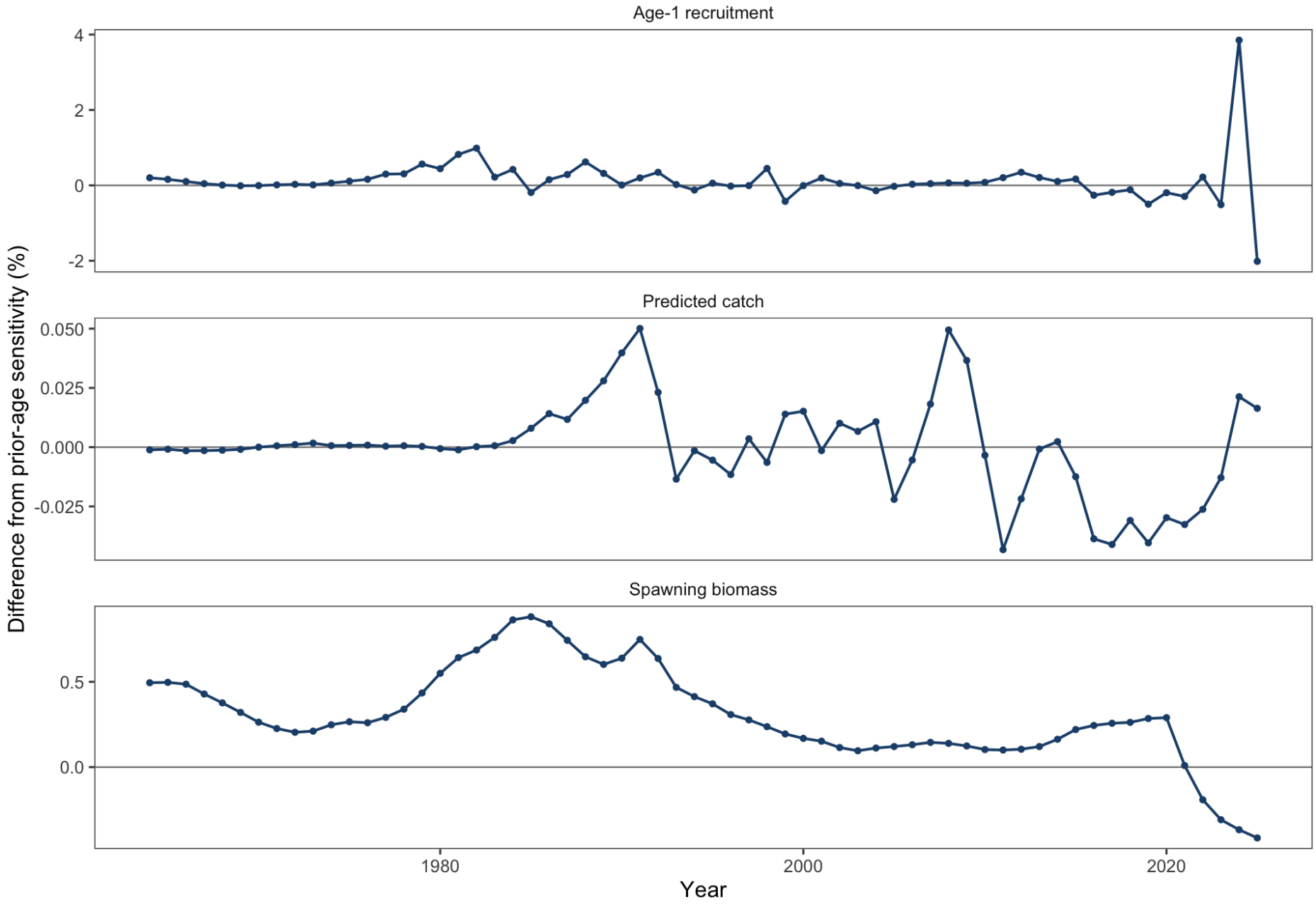
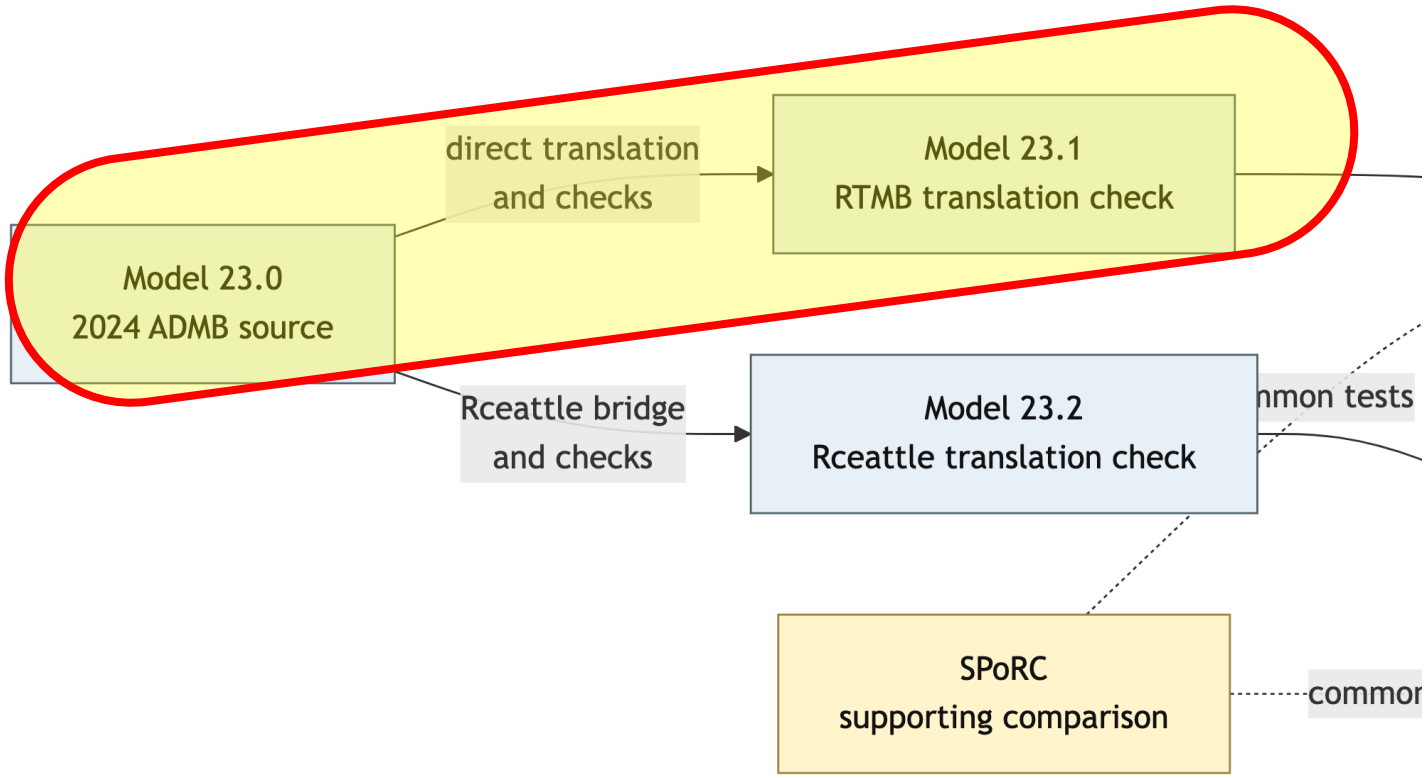
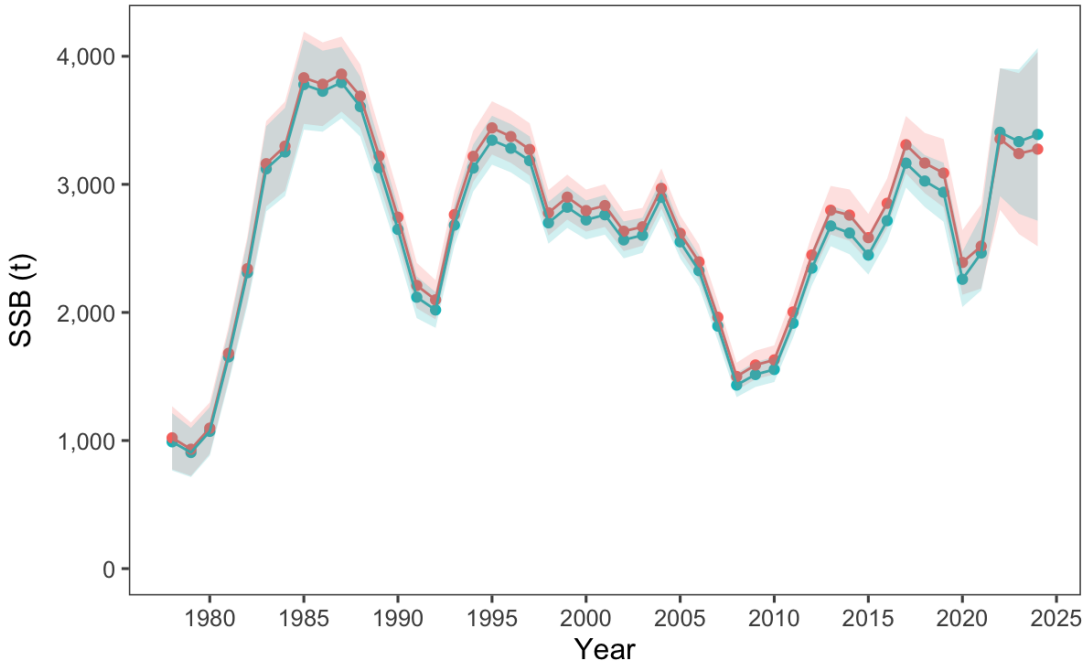


Figure 4 Original and modified ADMB bridge results—**model 23.0 to 23.1**





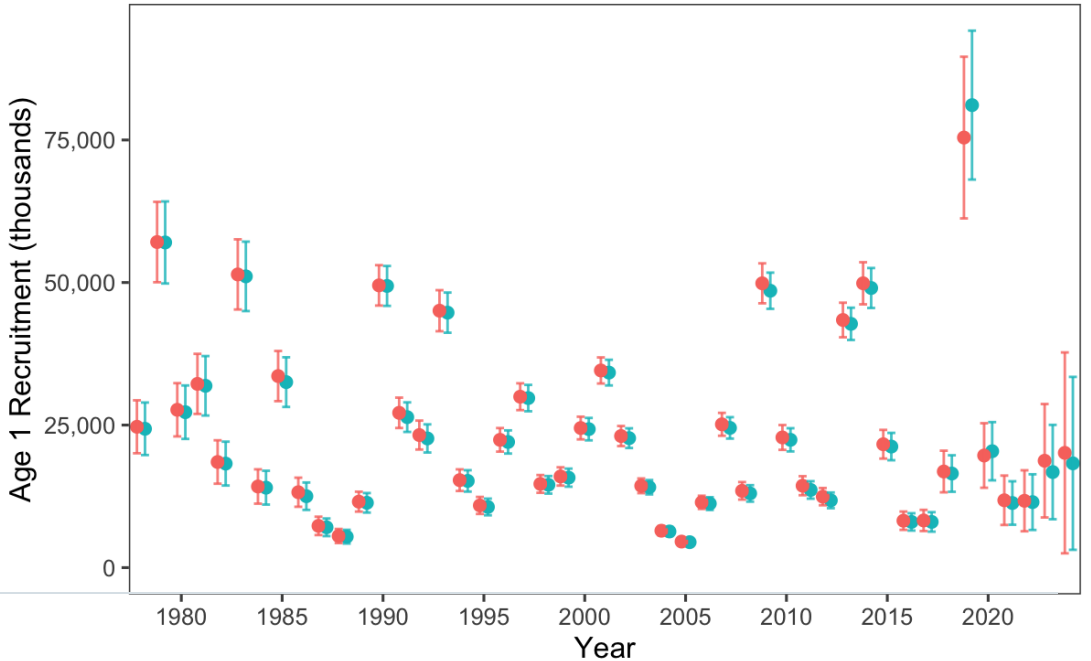


Figure 5 Model 26.0 data and analysis workflow

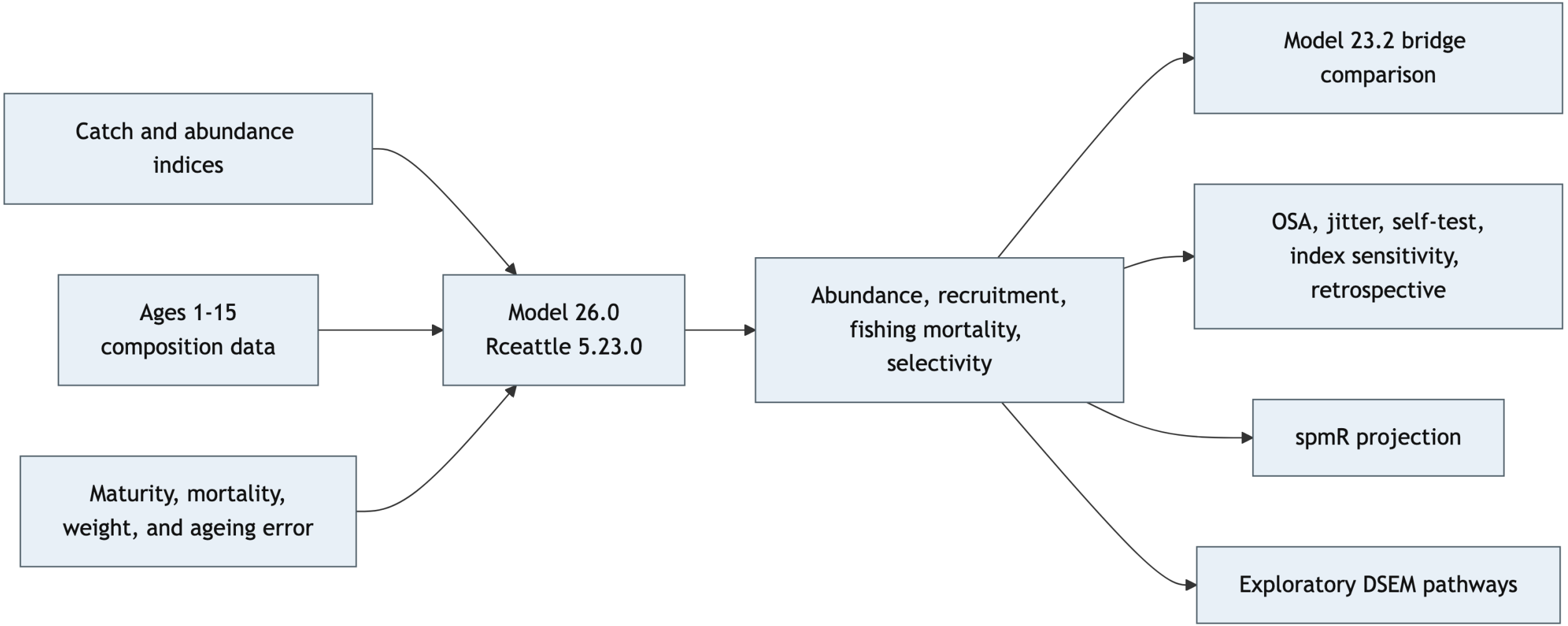
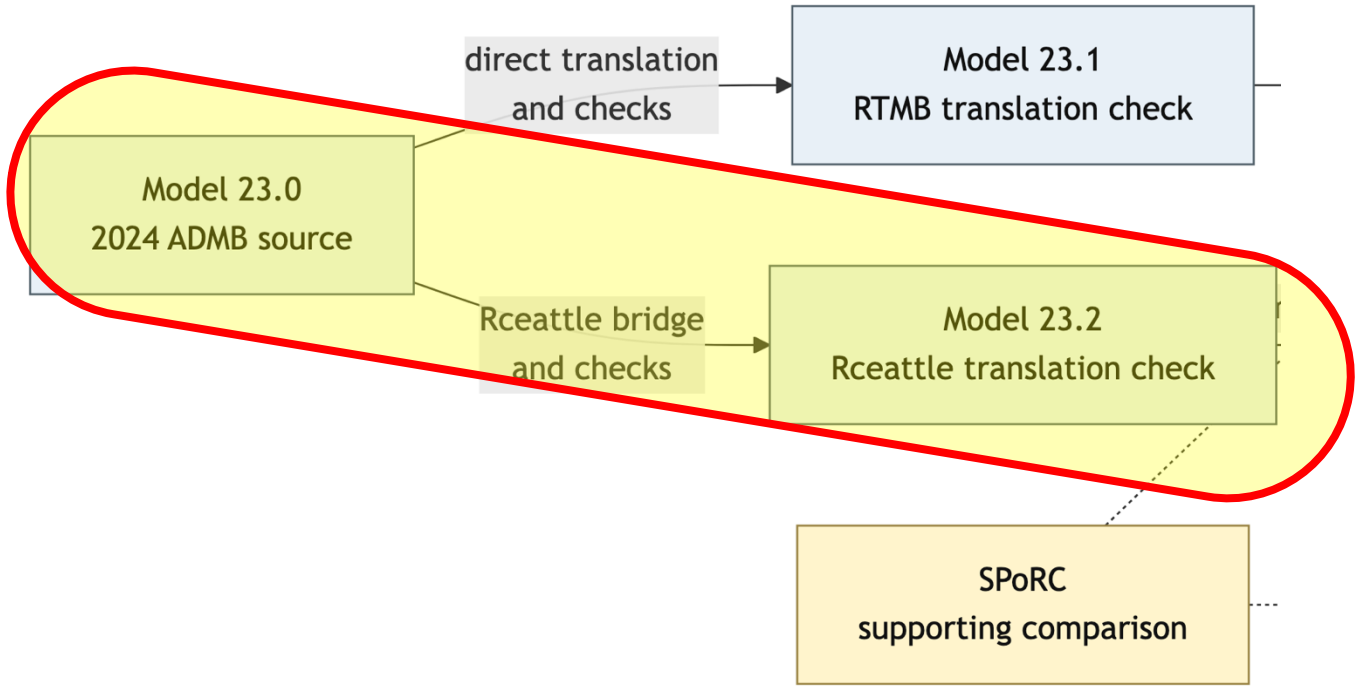
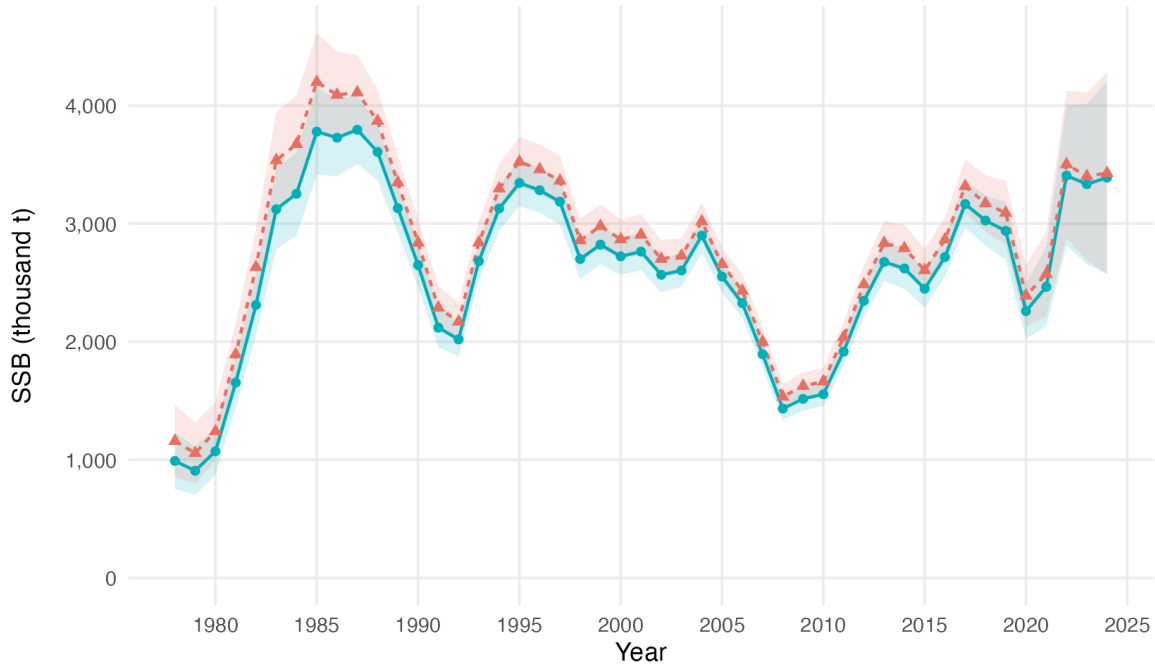


Figure 6 Model 23.0 and Model 23.2 ADMB comparison





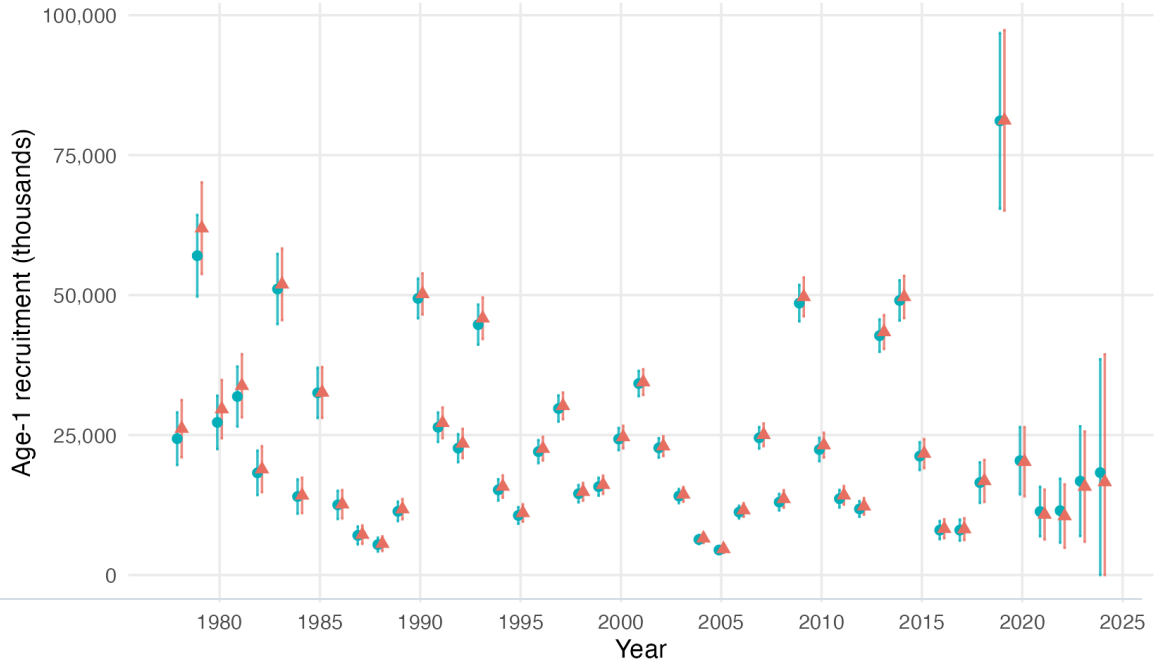
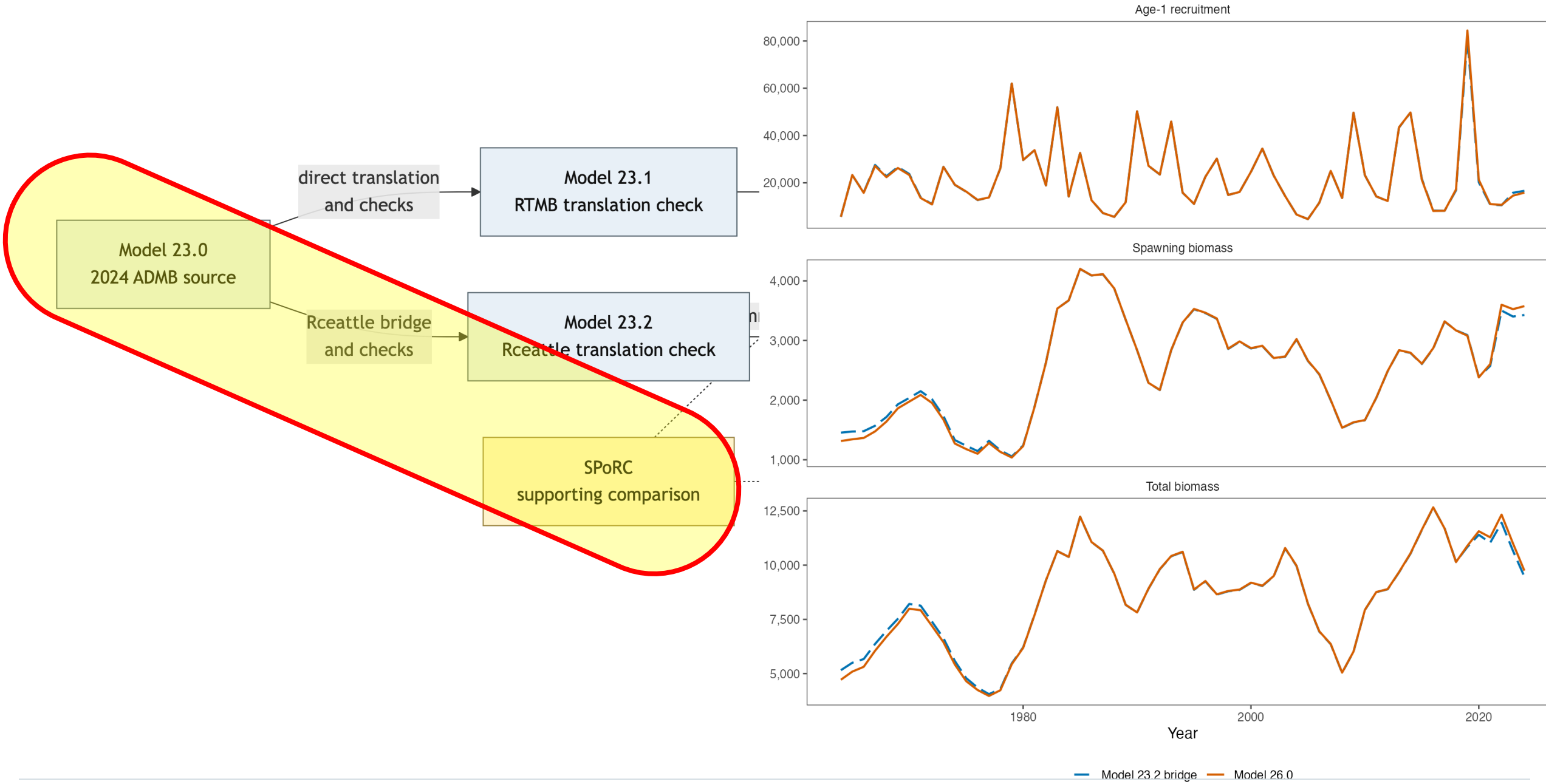
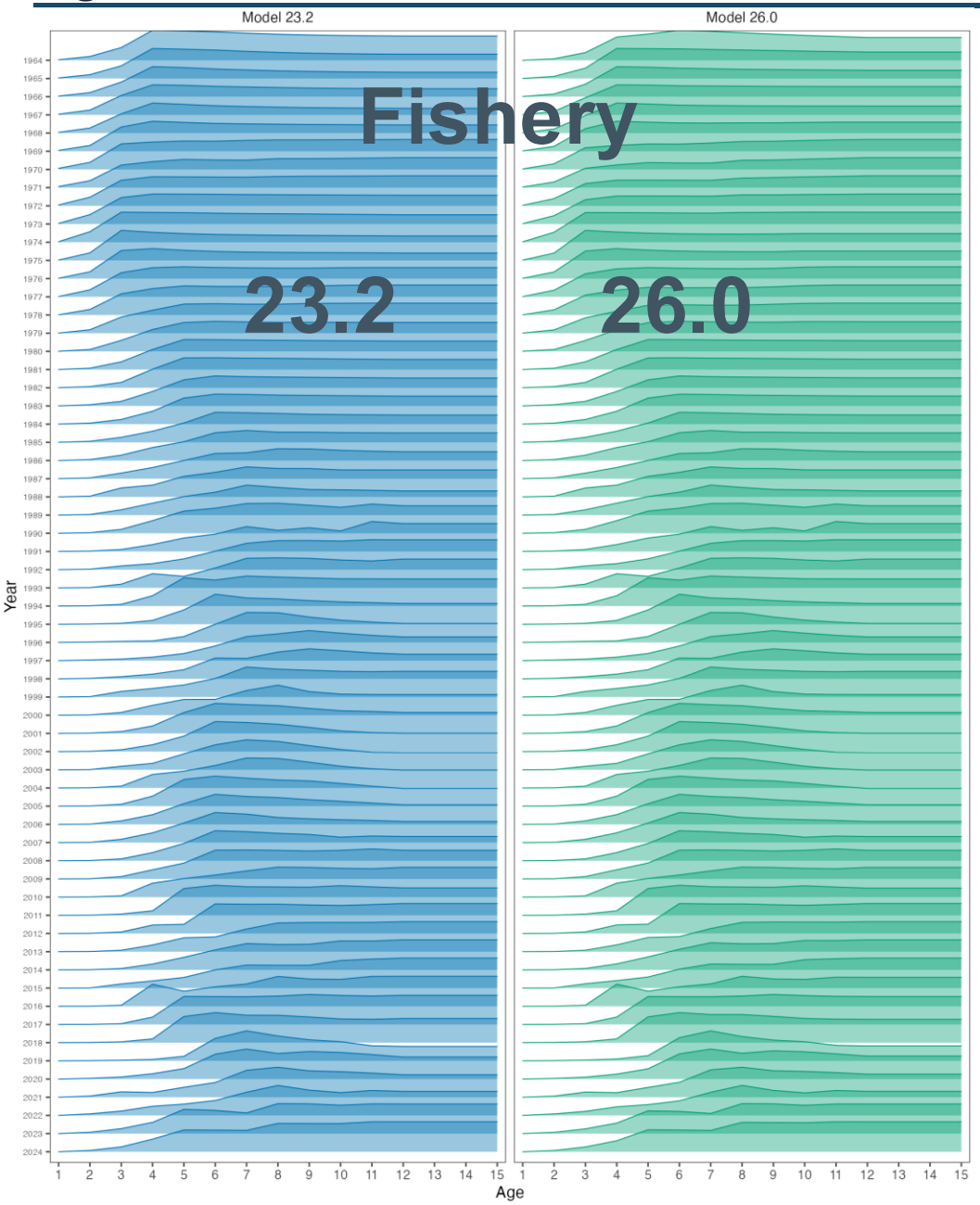


Figure 7 Model 26.0 and Model 23.2 trajectories



Figures 8, 9 selectivity in Models 23.2 and 26.0



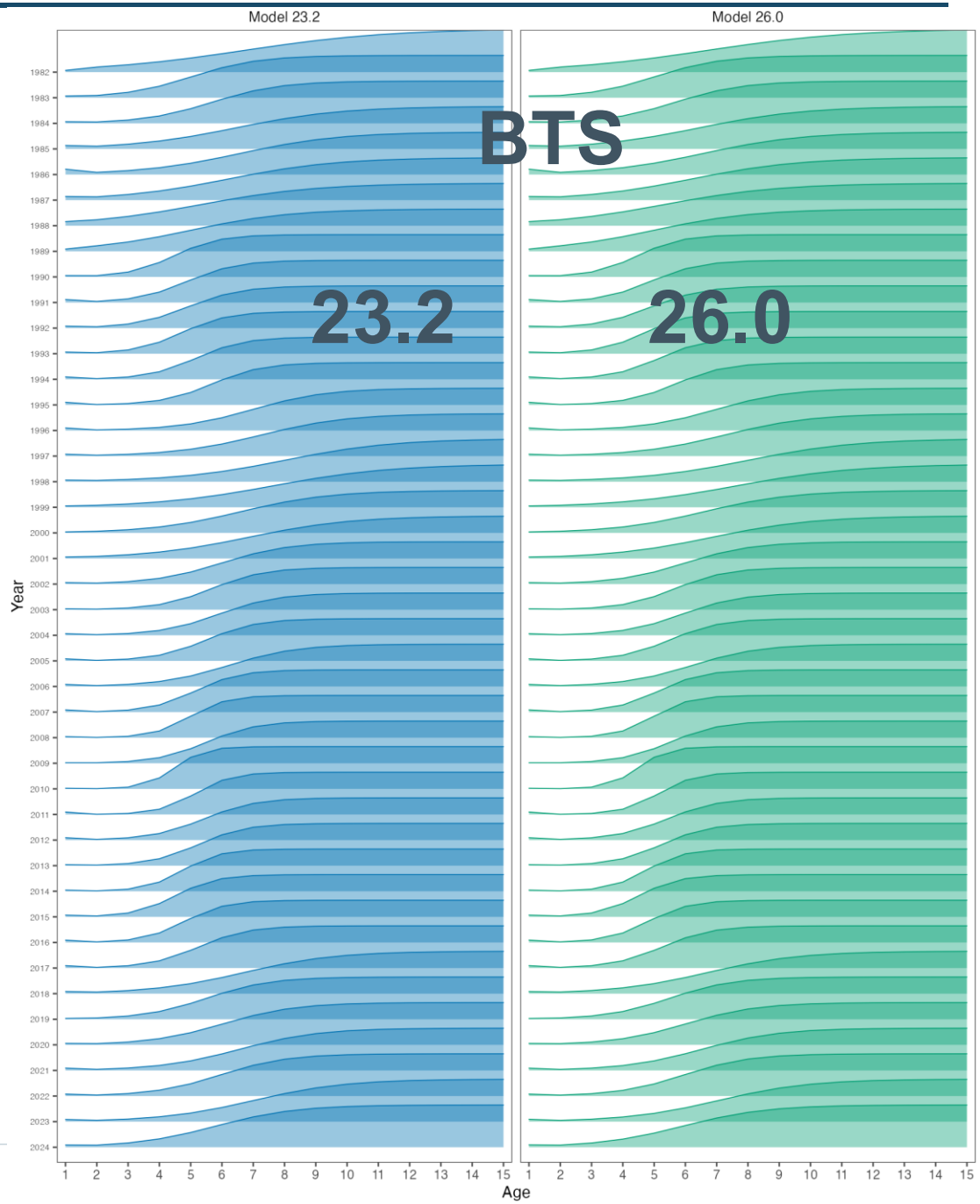
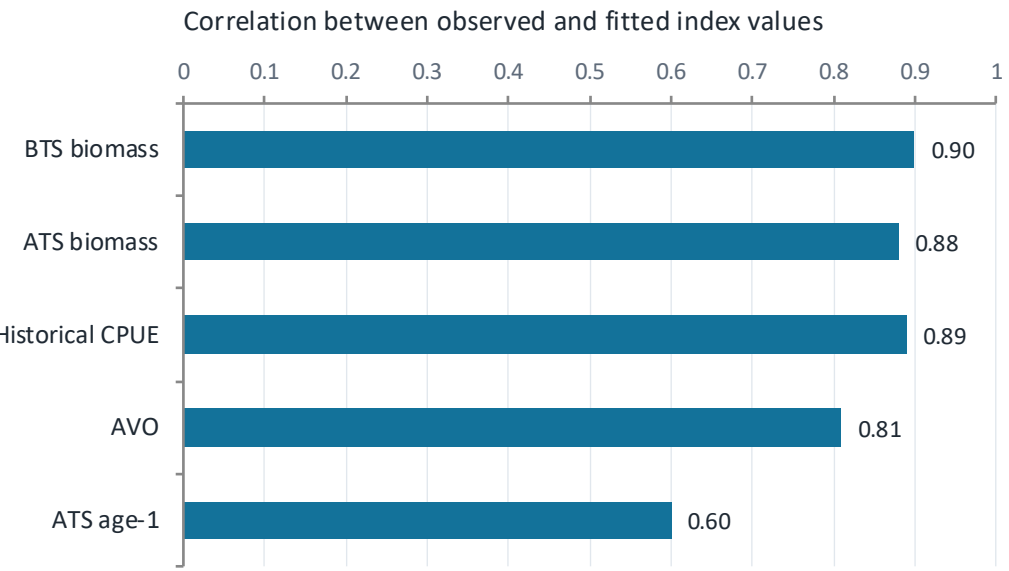


Figure 11 Observed and fitted abundance indices



Fitted indices follow the observed changes through time

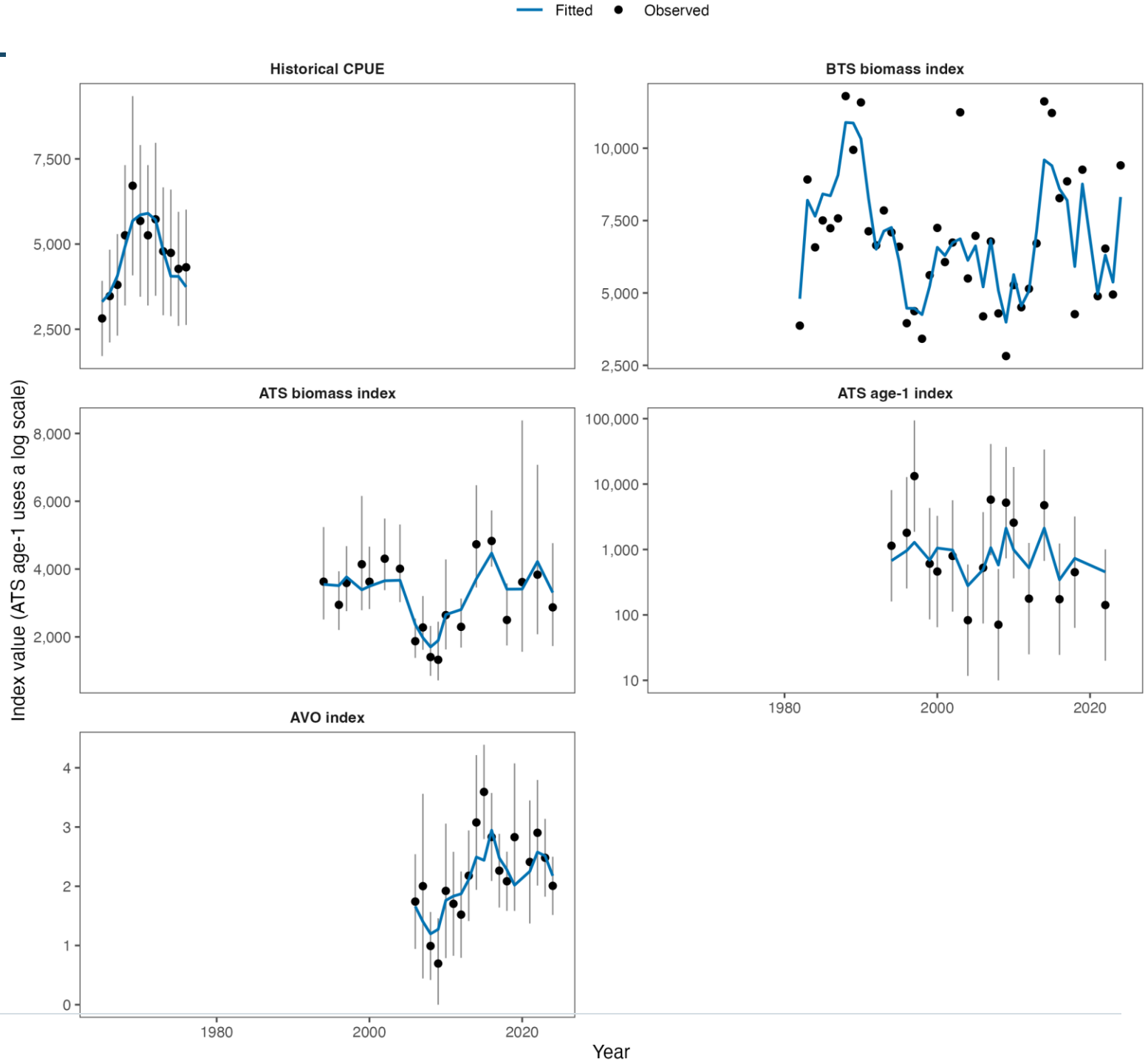


Figure 12 Fishery age-composition fits, 1964-1993

0.024

RMS difference, observed vs fitted proportions fishery (60 yr)

0.024

RMS difference — BTS (42 yr)

0.029

RMS difference — ATS (18 fitted yr, ages 2–15)

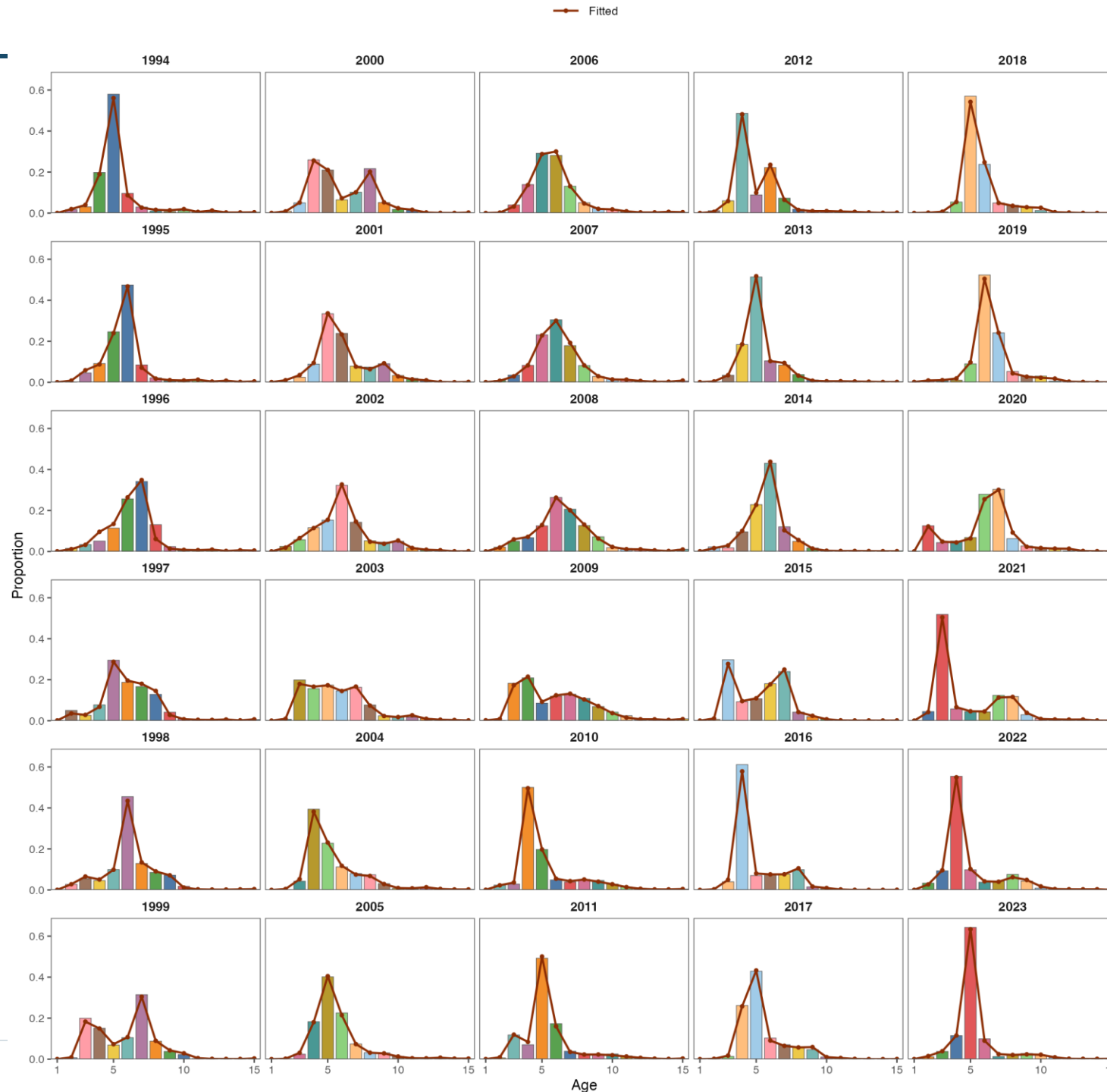


Figure 17 Age-composition OSA diagnostics

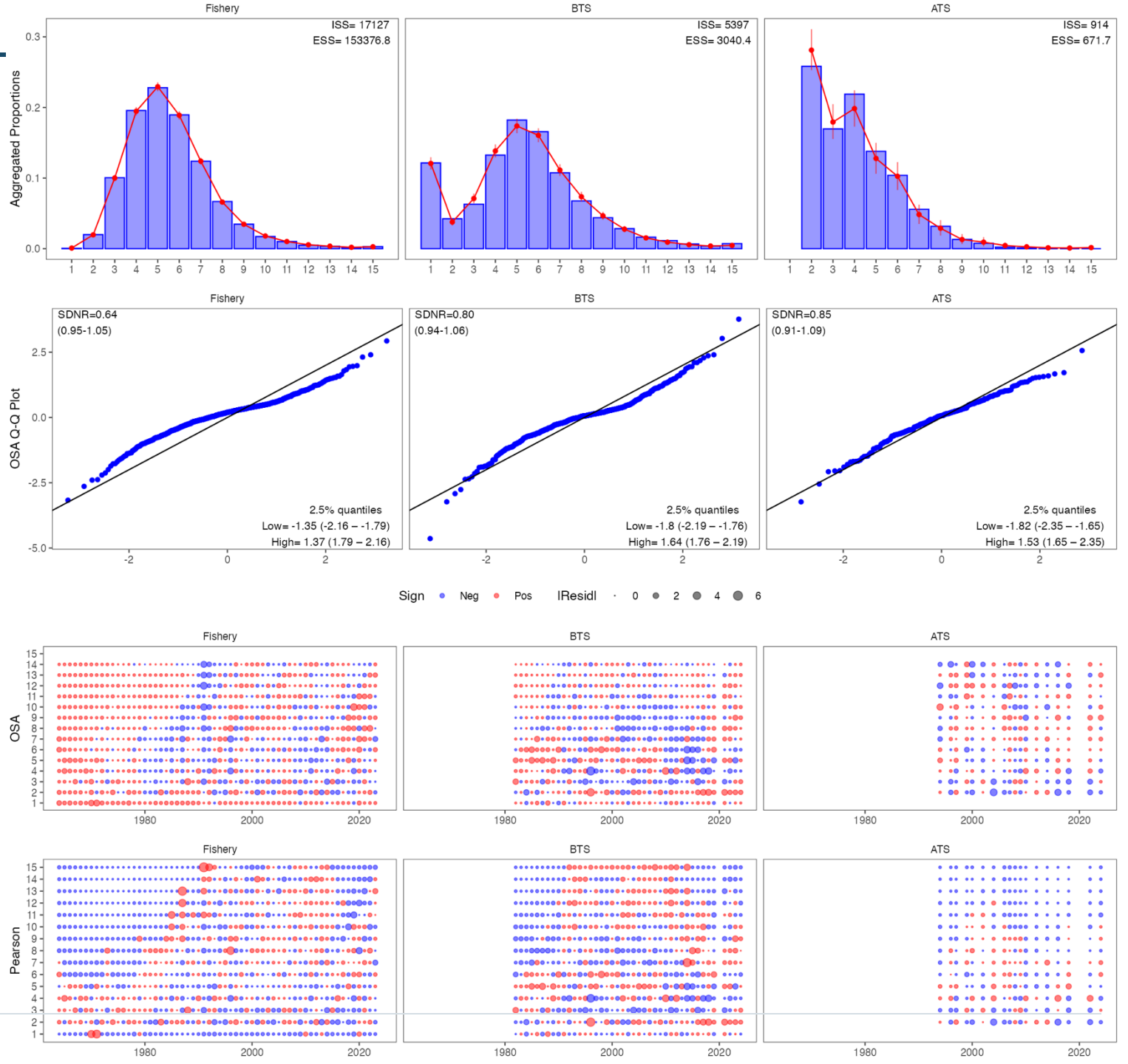


Figure 18 Model 26.0 self-test recovery

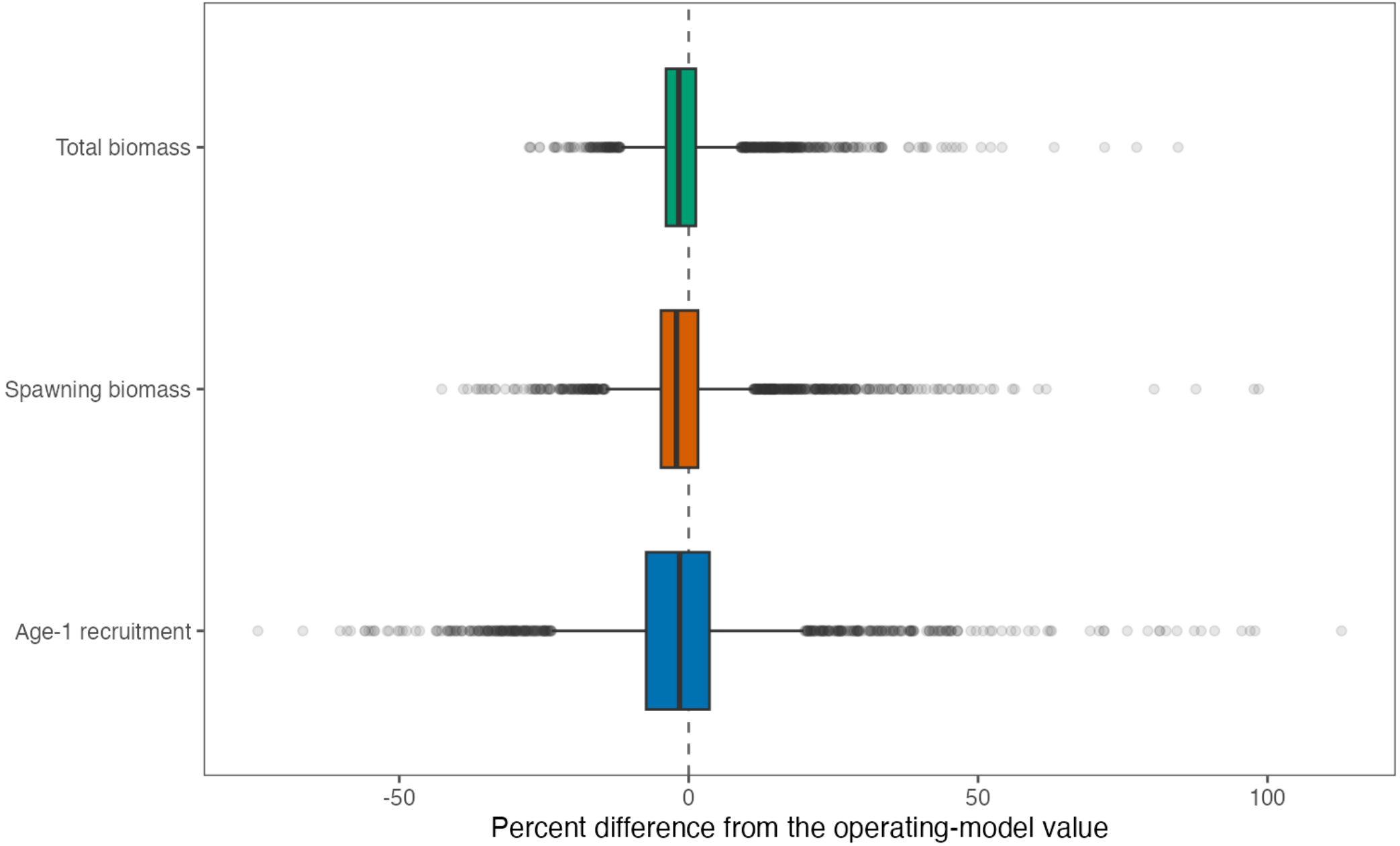
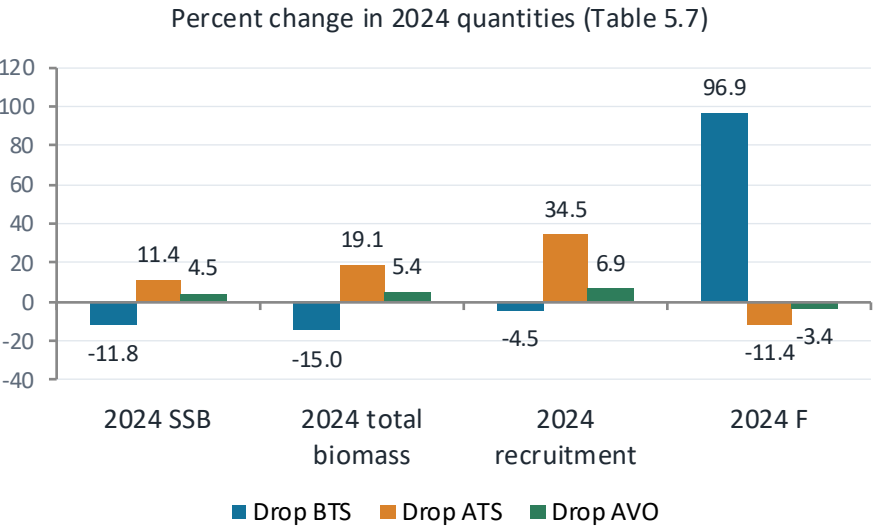


Figure 19 Whole-index sensitivity results



Dropping BTS nearly doubles 2024 F

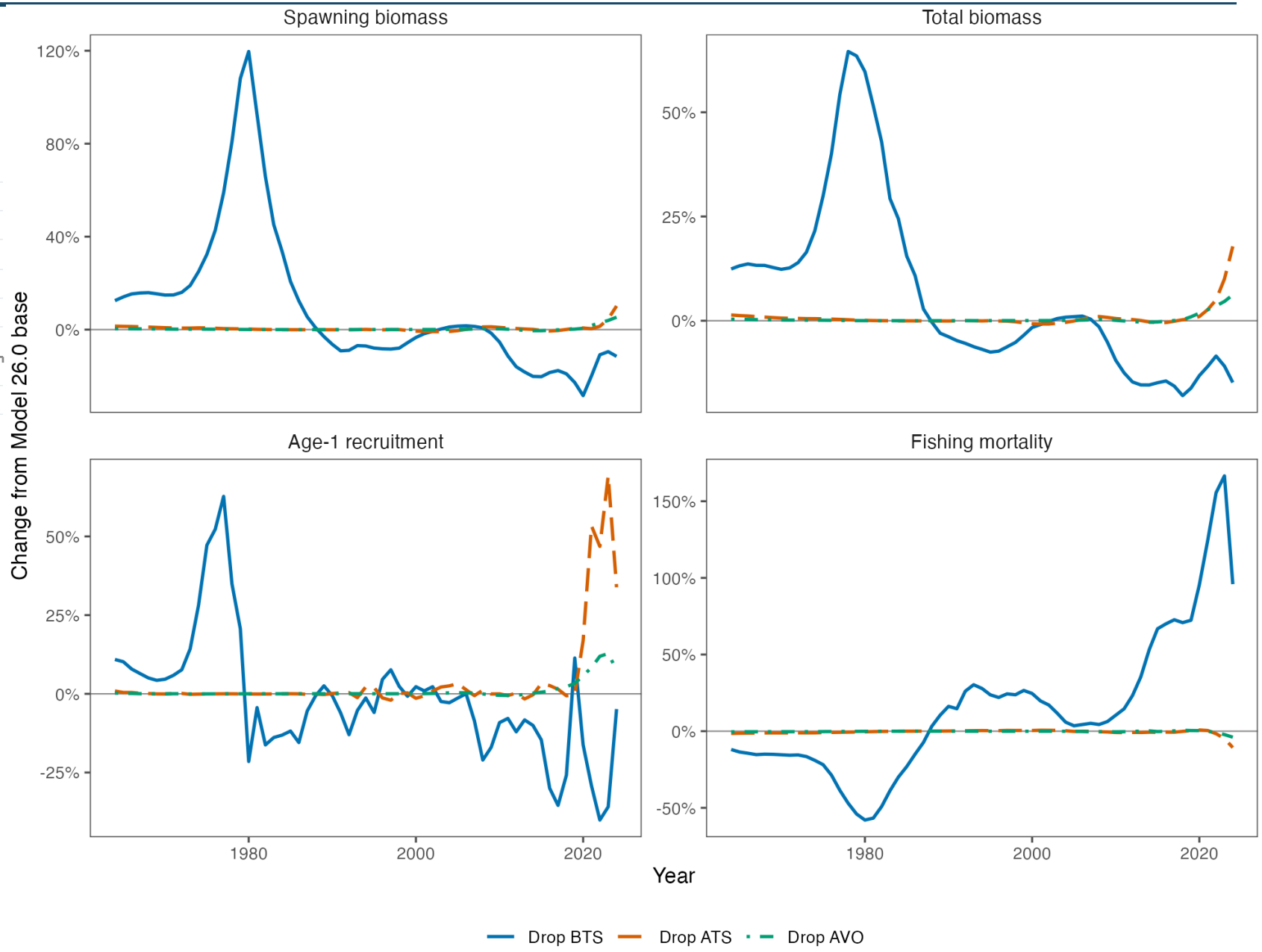


Figure 20 Model 26.0 retrospective trajectories

- Largest for SSB and concentrated in the 2015–2020 terminal years
- The 2020 → 2021 peel transition carries the main downward revision and is dissected on the next slide

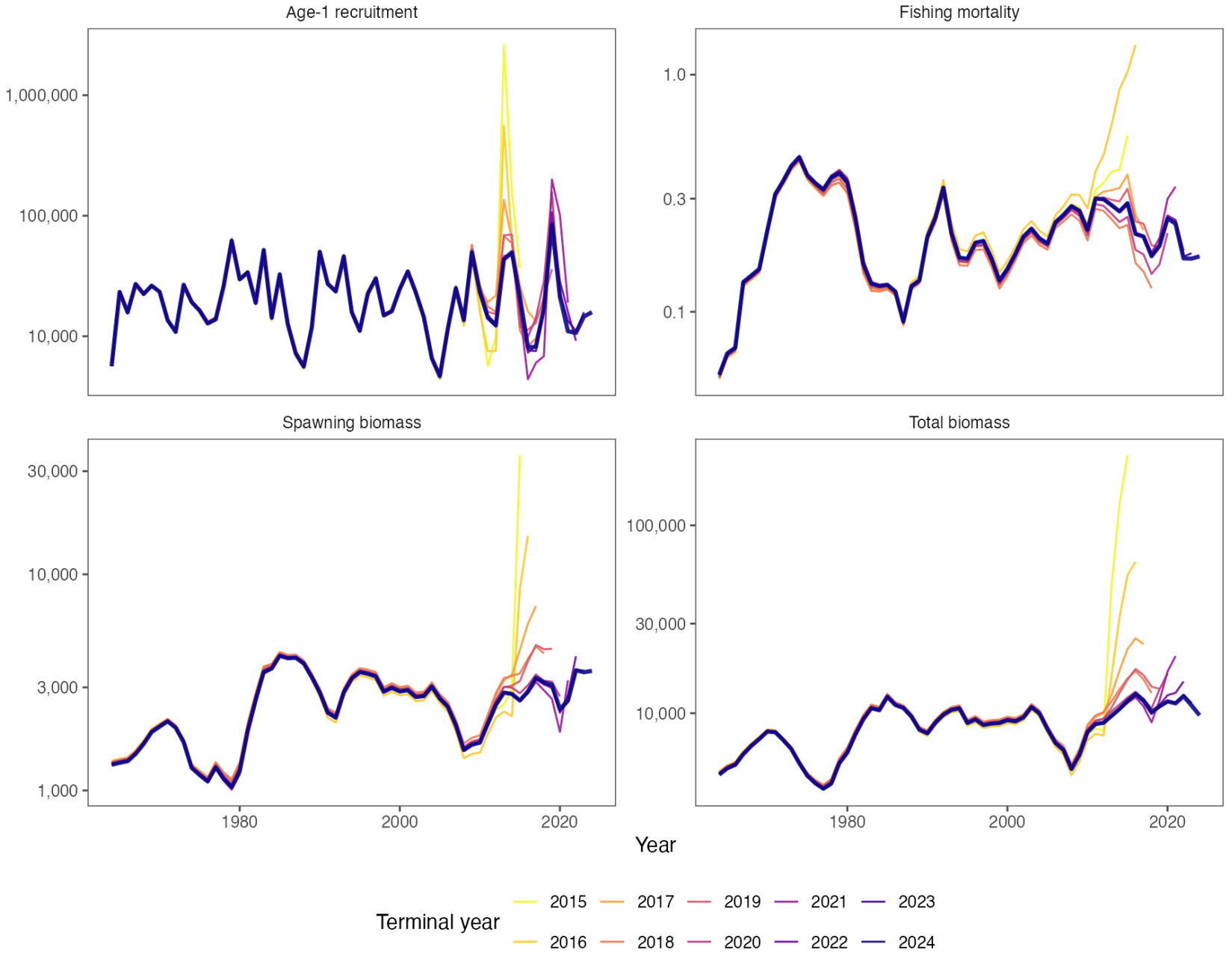
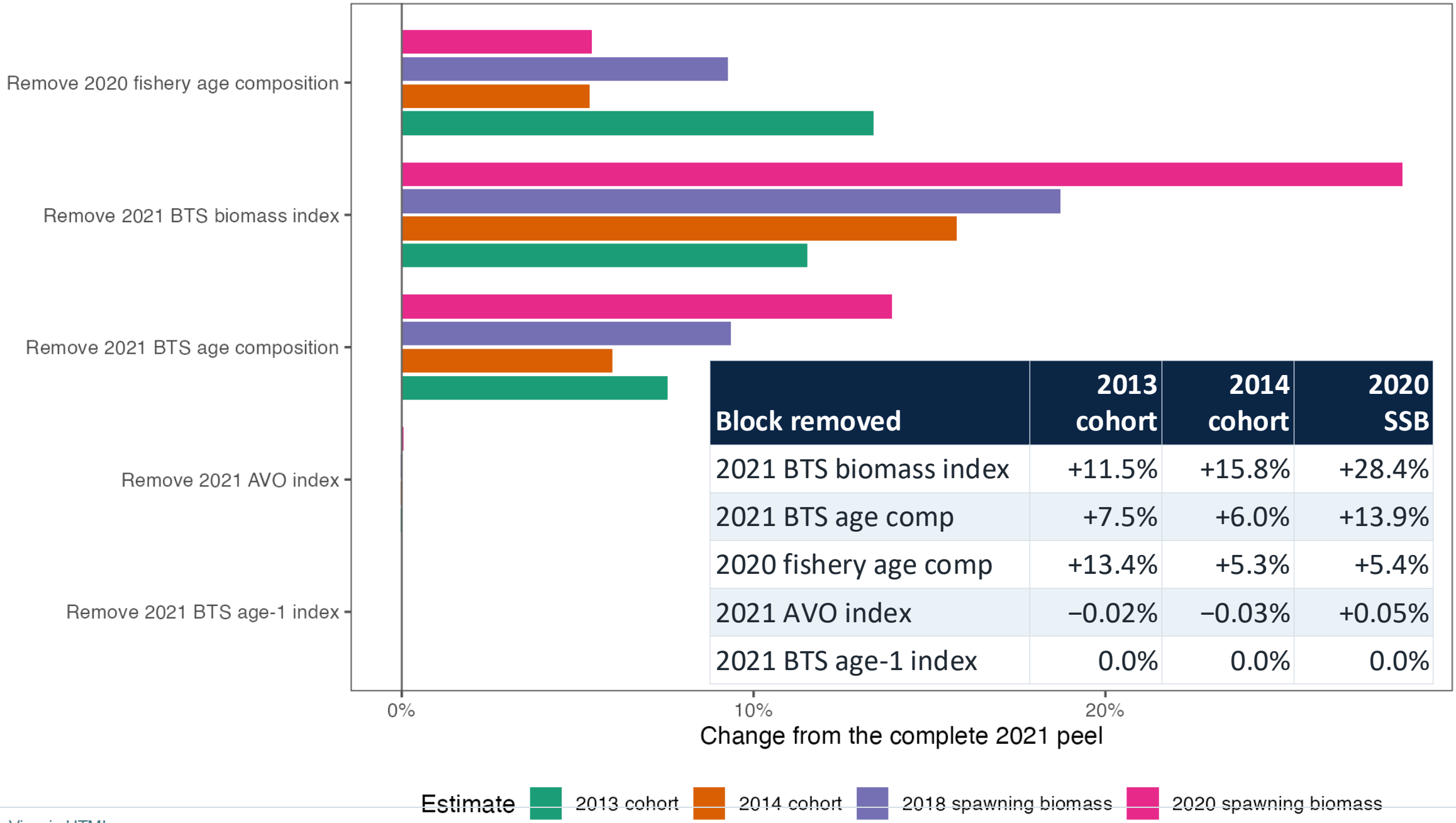


Figure 21 Data-block effects in 2020-2021 retrospective peels



Block removed	2013 cohort	2014 cohort	2020 SSB
2021 BTS biomass index	+11.5%	+15.8%	+28.4%
2021 BTS age comp	+7.5%	+6.0%	+13.9%
2020 fishery age comp	+13.4%	+5.3%	+5.4%
2021 AVO index	−0.02%	−0.03%	+0.05%
2021 BTS age-1 index	0.0%	0.0%	0.0%

Figure 21 Data-block effects in 2020-2021 retrospective peels

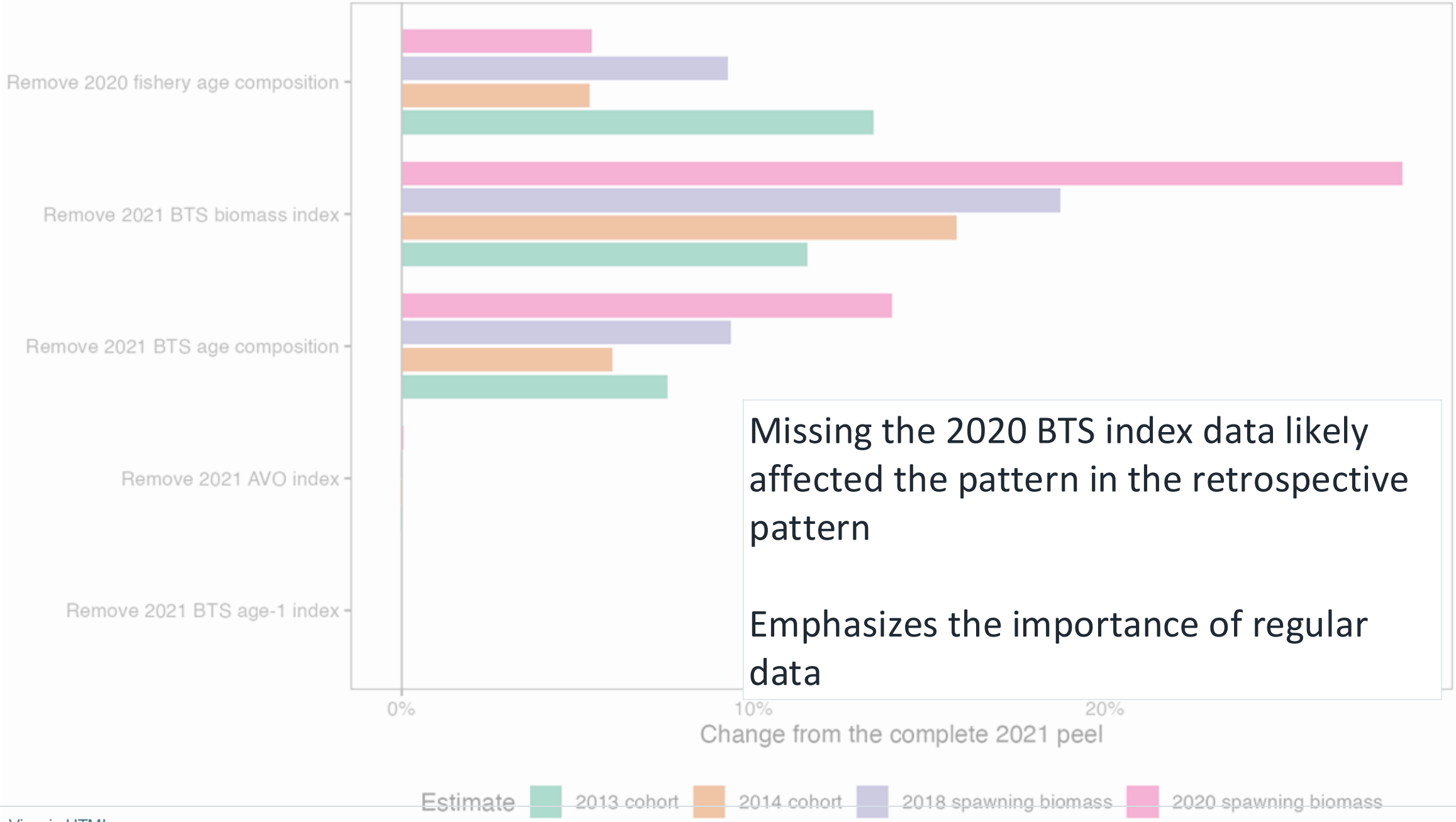


Figure 22 Spawning biomass projections

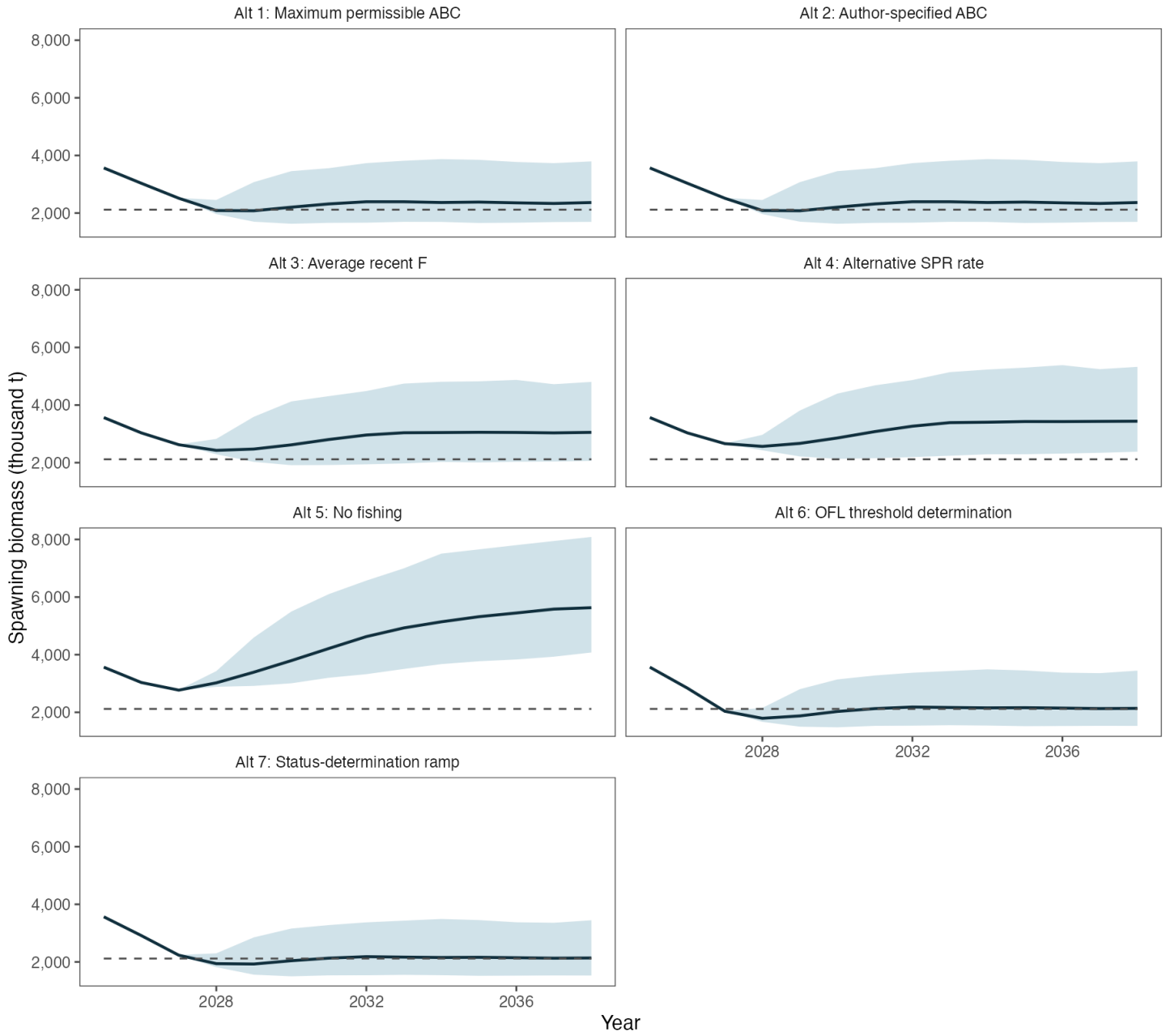


Figure 24 Conceptual environmental recruitment pathways

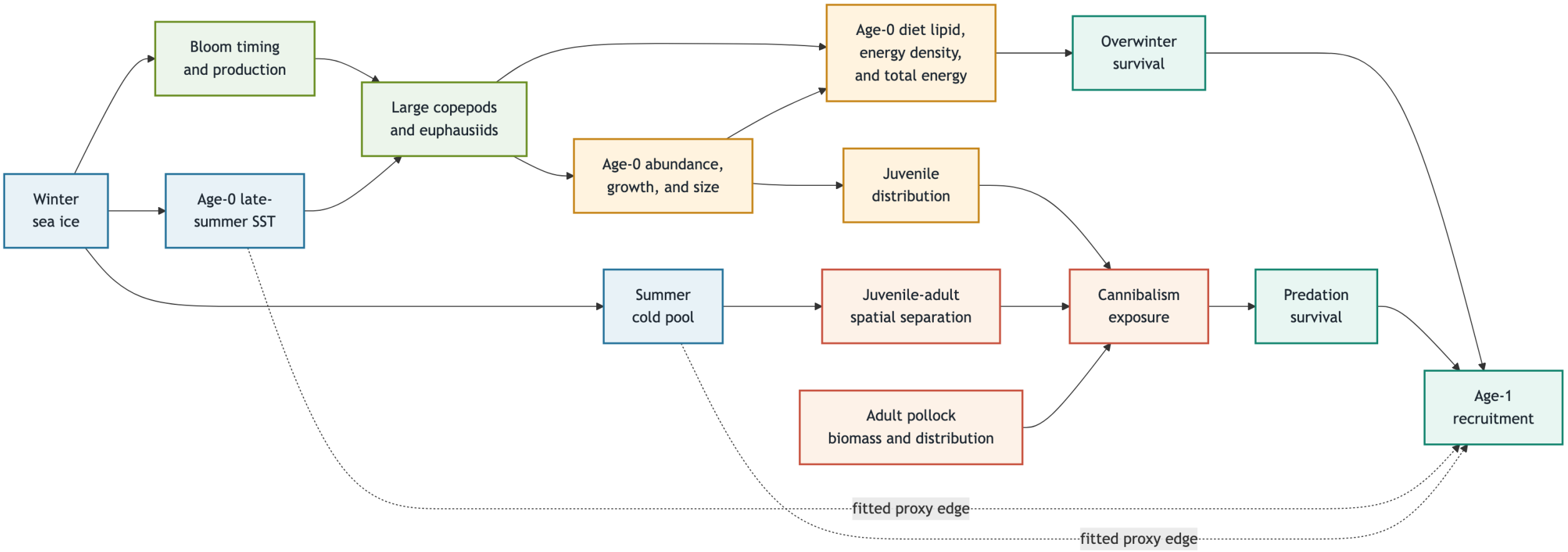


Figure 25 DSEM recruitment-pathway coefficients

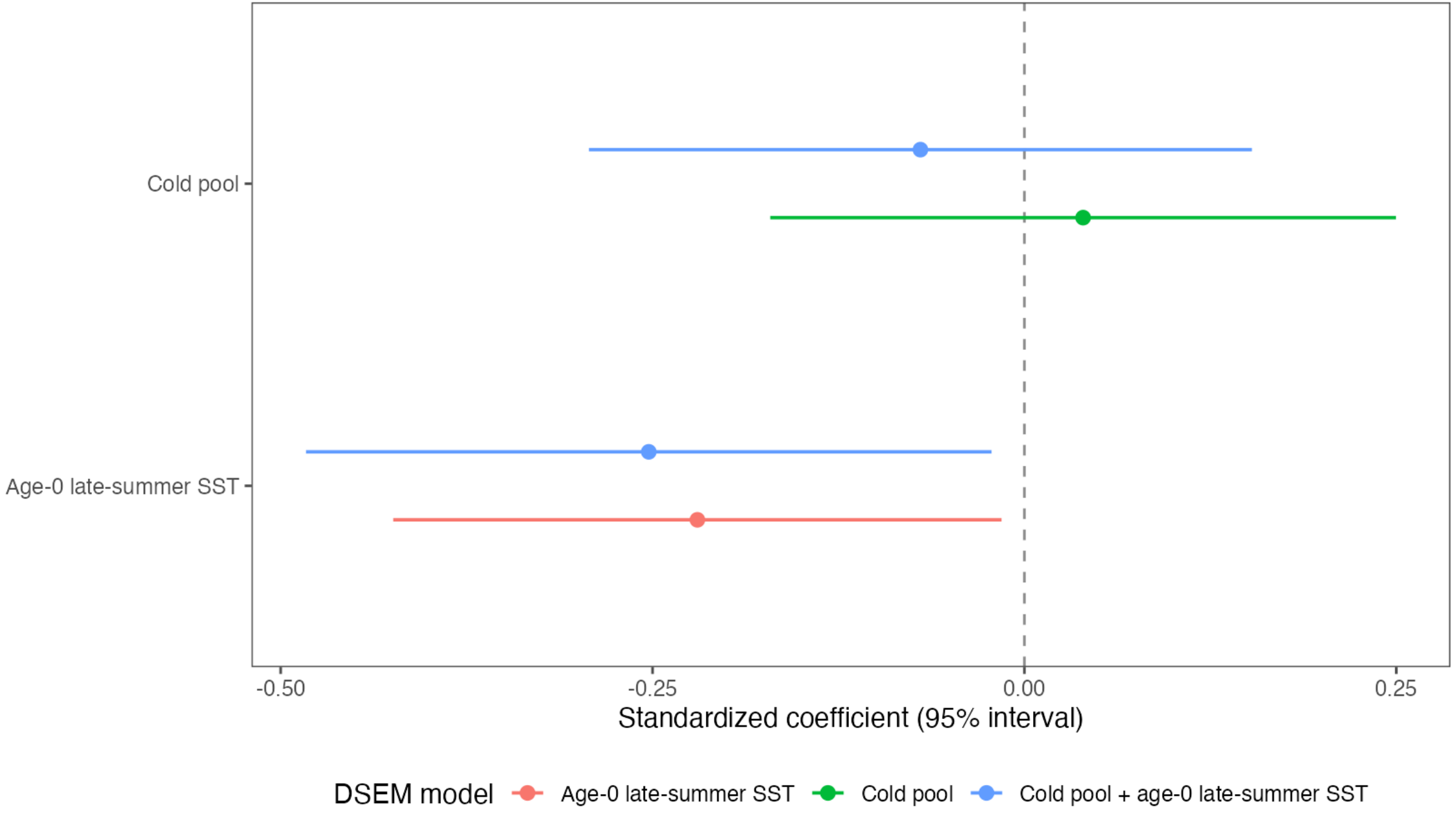


Figure 26 BTS biomass variation from selectivity

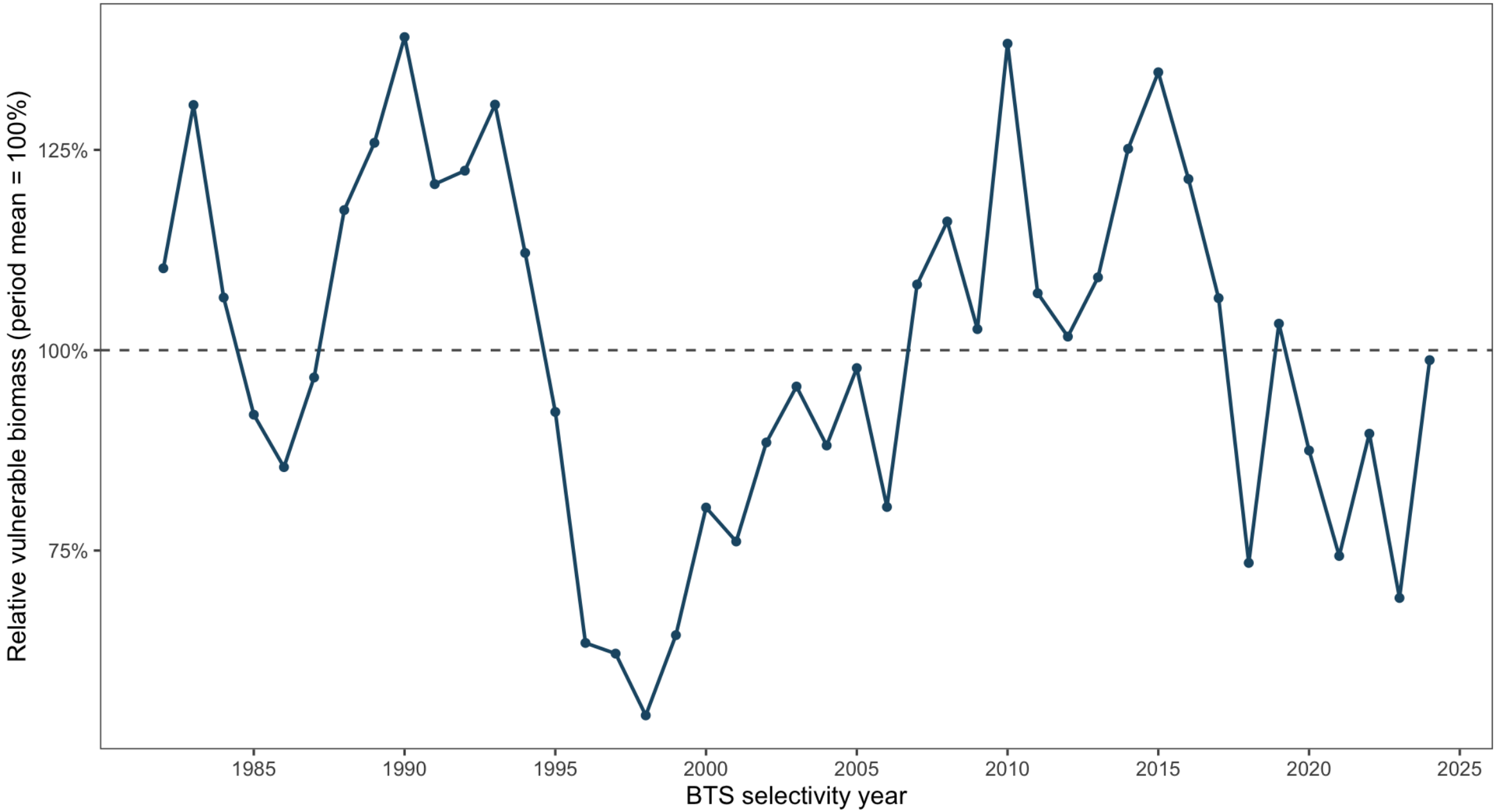


Figure 31 SparseNUTS parameter traces

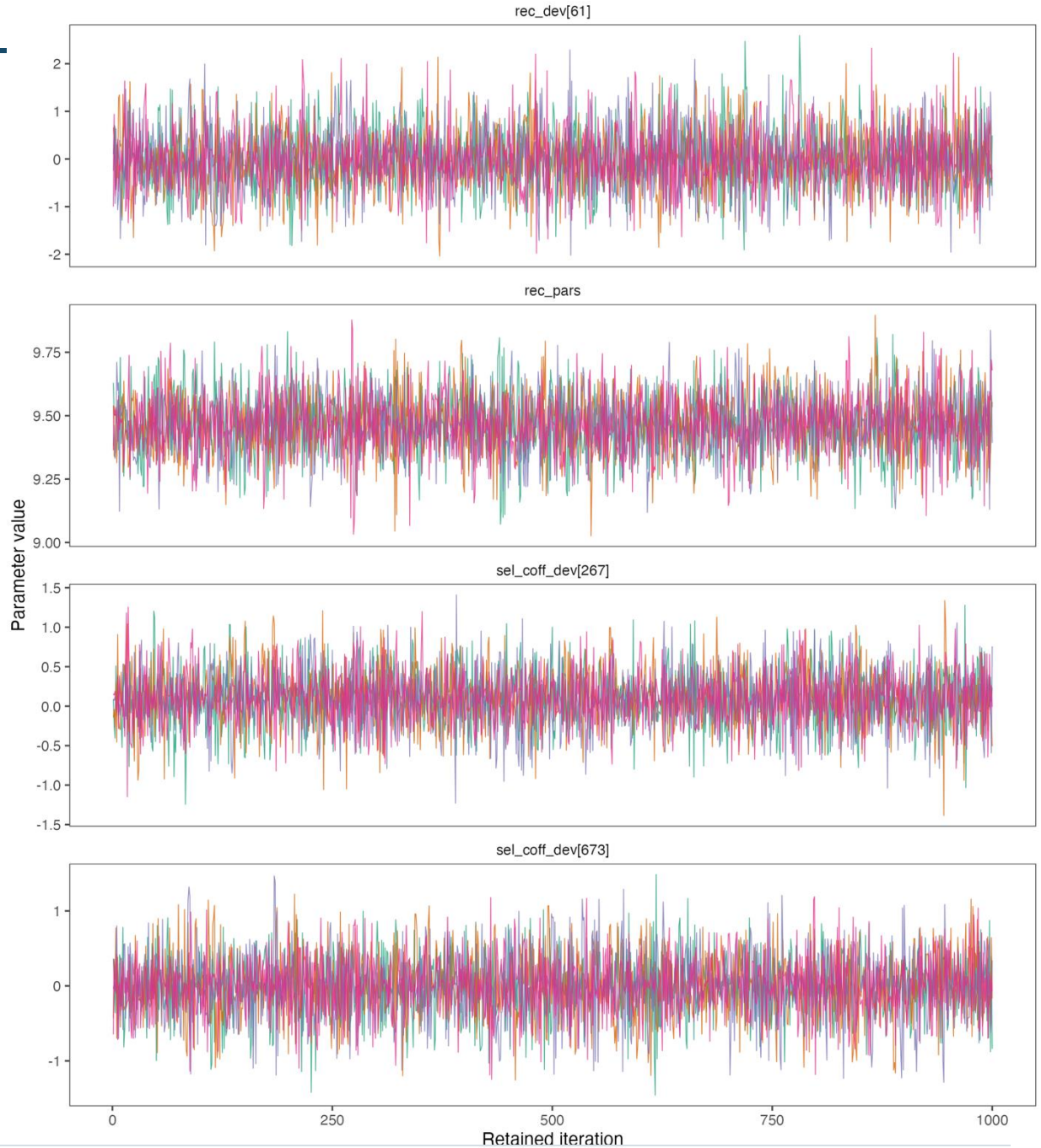


Figure 35 Observation continuity, 2014-2026

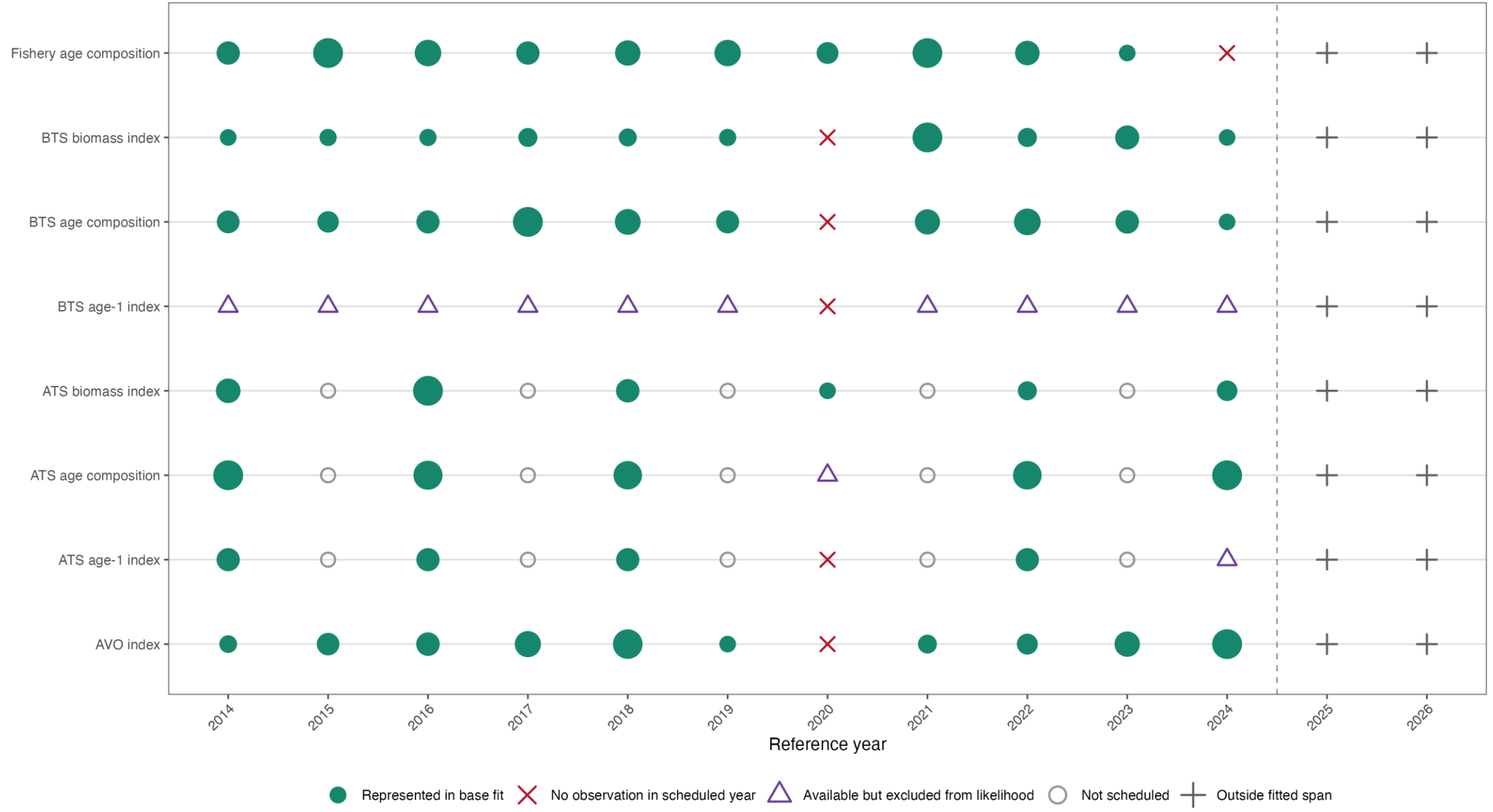


Figure 36 Sampling-event deletion influence

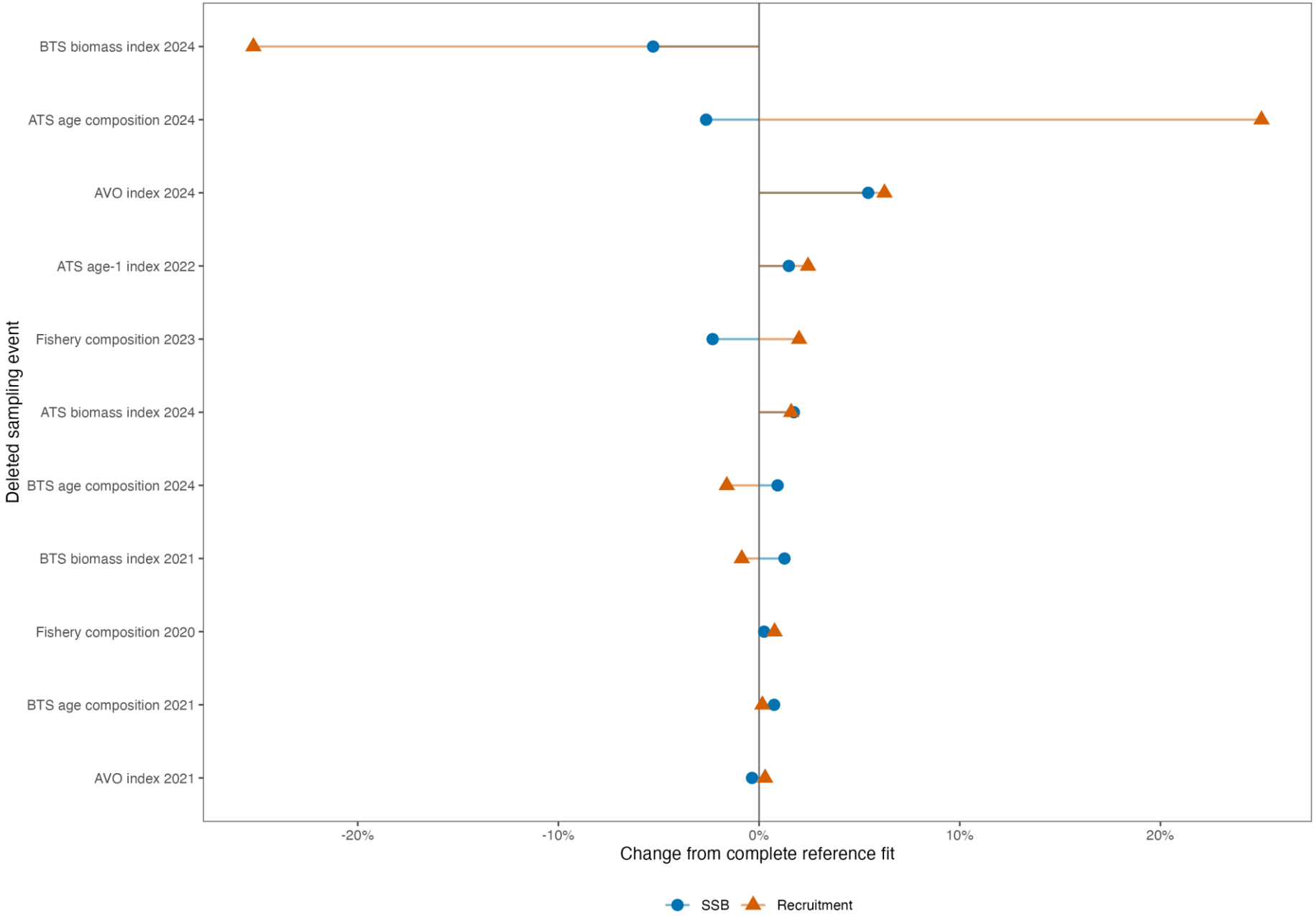


Figure 37 Length-frequency patterns by season

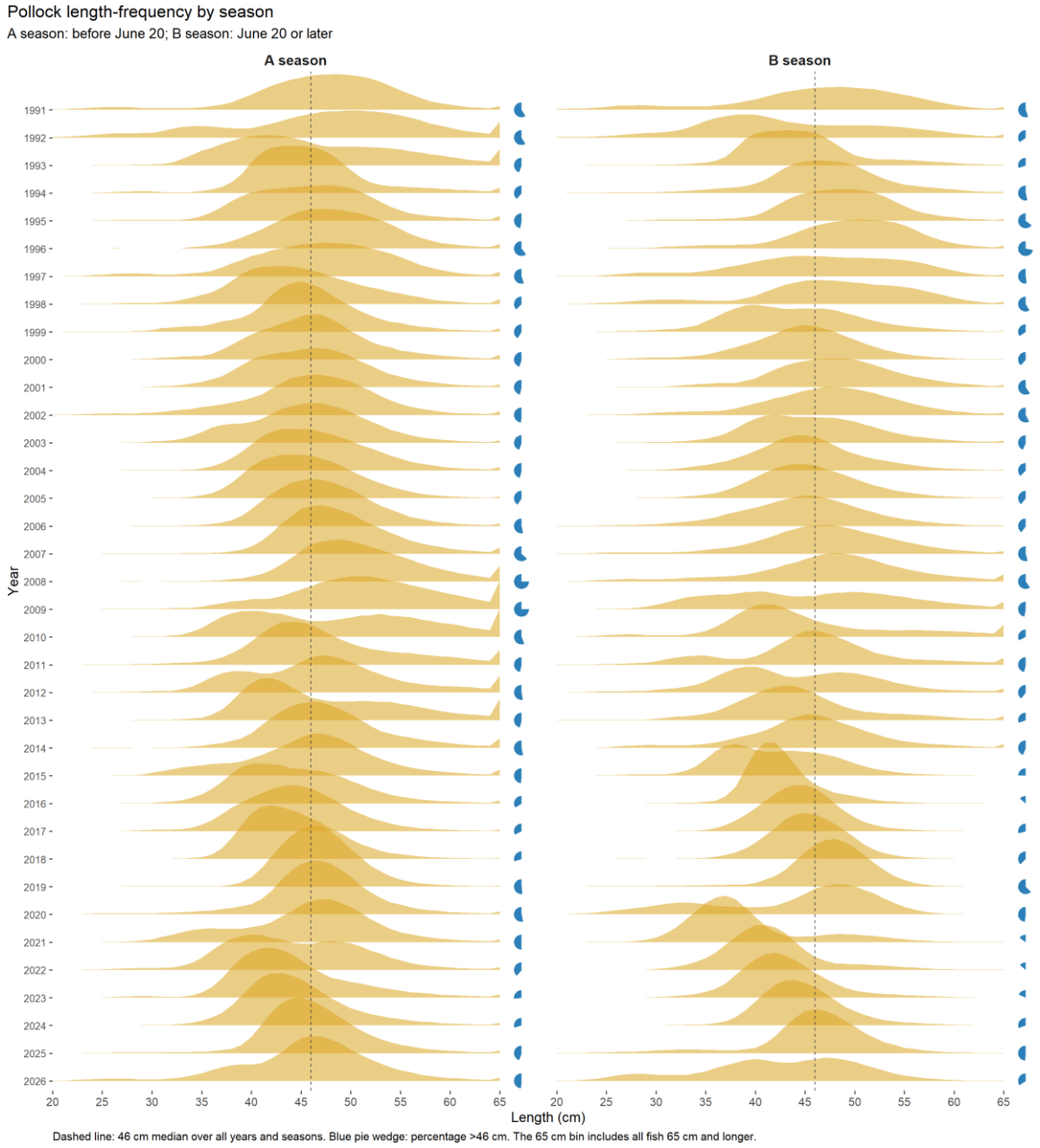
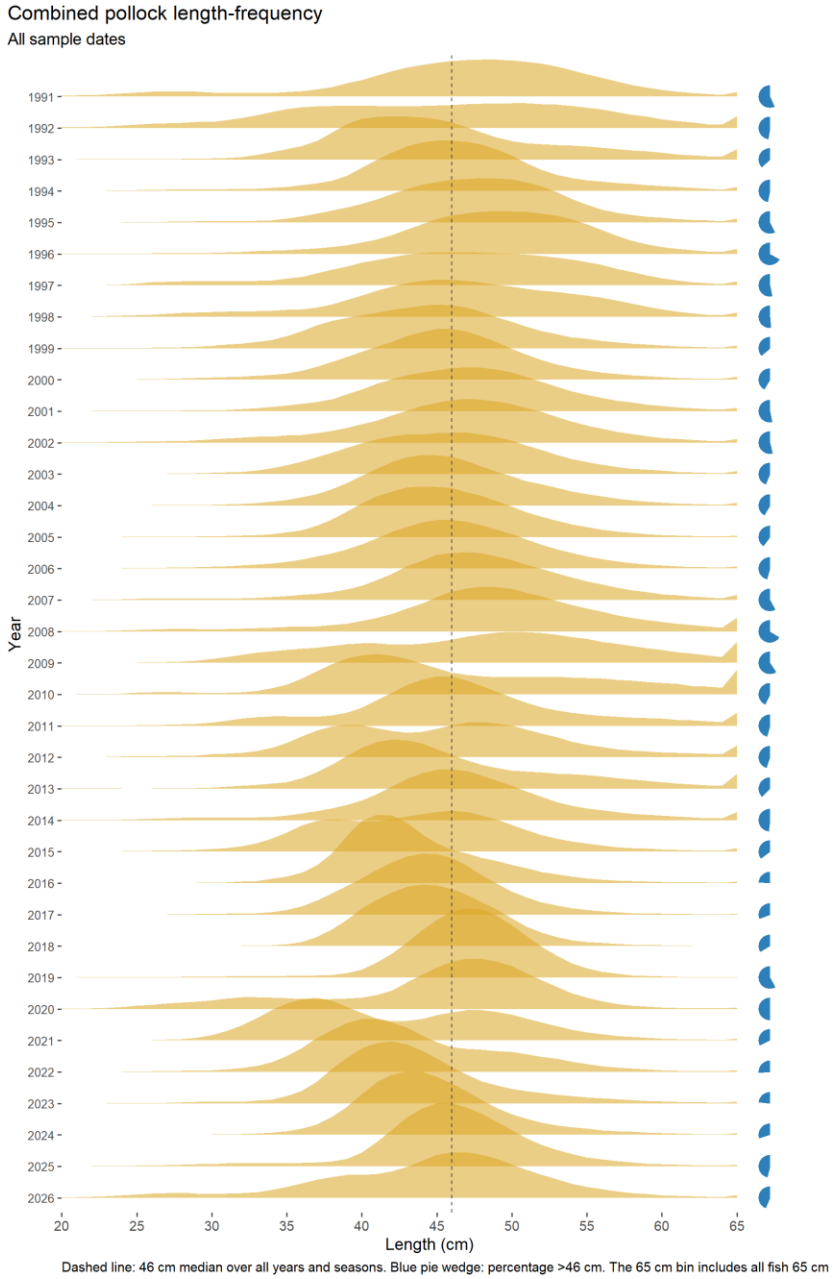
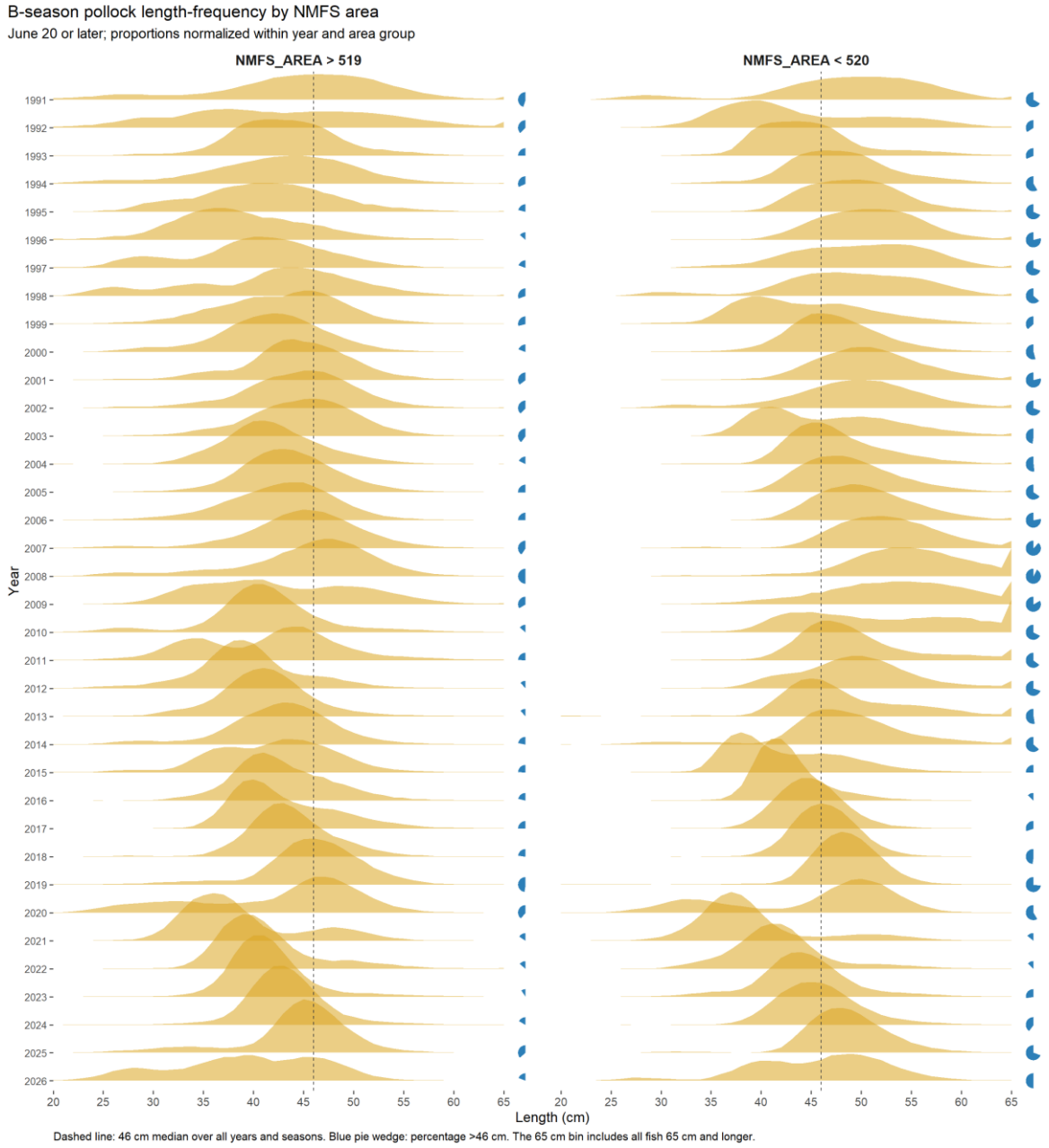


Figure 38 Combined-season length-frequency patterns



Dashed line: 46 cm median over all years and seasons. Blue pie wedge: percentage >46 cm. The 65 cm bin includes all fish 65 cm

Figure 39 B-season length-frequency patterns by area



Operational checklist for the production run

The diagnostics define a practical specification for the November–December 2026 assessment

1

Data

Finalize 2025–2026 fishery, BTS (2025 tinyVAST row), ATS 2026, and AVO inputs with sample sizes and ageing error; review BTS inputs closely.

2

Fit

Retain the two-stage fitting sequence and 50-start jitter evaluation; confirm the best mode, not the ~610-unit alternative.

3

Diagnostics

Repeat OSA residuals (afscOSA) and the nine-peel lag-preserving retrospective; report Mohn's rho and the block-deletion decomposition.

4

Projections

Carry the fitted state into spmR (write inputs → seven alternatives) for ABC, OFL, and status determination.

5

Research kept separate

DSEM = NULL operationally; environmental pathways, SparseNUTS, 2D AR1 selectivity, and BTS availability remain research evaluations.

6

Archive

Pinned Rceattle 5.23.0 commit, afscOSA 0.0.1, script register M23-01…M26-13, checksums, and one dated release.

Conclusion

- Model 26.0 is a reproducible Rceattle implementation that closely follows the Model 23.2 bridge, passes convergence and simulated-data recovery checks, standard Tier 3 projection model.
- BTS supplies the strongest information on scale and F; ATS contributes increasingly to recent biomass and recruitment
- Poor spawning-biomass retrospective ($\rho = 0.33$) driven mainly by the 2021 BTS index (and lack of 2020 data
- Rceattle proposed for GOA pollock
- Proposal
    - Plan Team and SSC adopt Model 26.0 for EBS pollock management advice in November–December 2026; Model 23.0 provides continuity until the transition is complete.

Model 26.0 · recommended

Full report, data, and scripts: noaa-afsc.github.io/EBS_pollock