GOA Pollock Updates

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2025 September Plan Team
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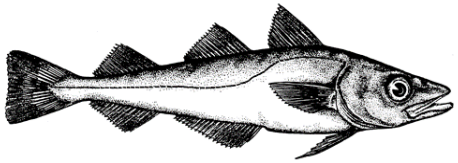


Road map for today

- Proposed changes:
  - Drop age 3 Shelikof fish (not recommended)
  - Update initial age structure
  - Adding additional priors
  - Updated acoustic data
  - Model 23e: last 3 of these minor changes
- Revisit priorities for assessment updates
- Issues: data conflict, ongoing scale uncertainty, index misfit
- Research updates

Stock + assessment overview

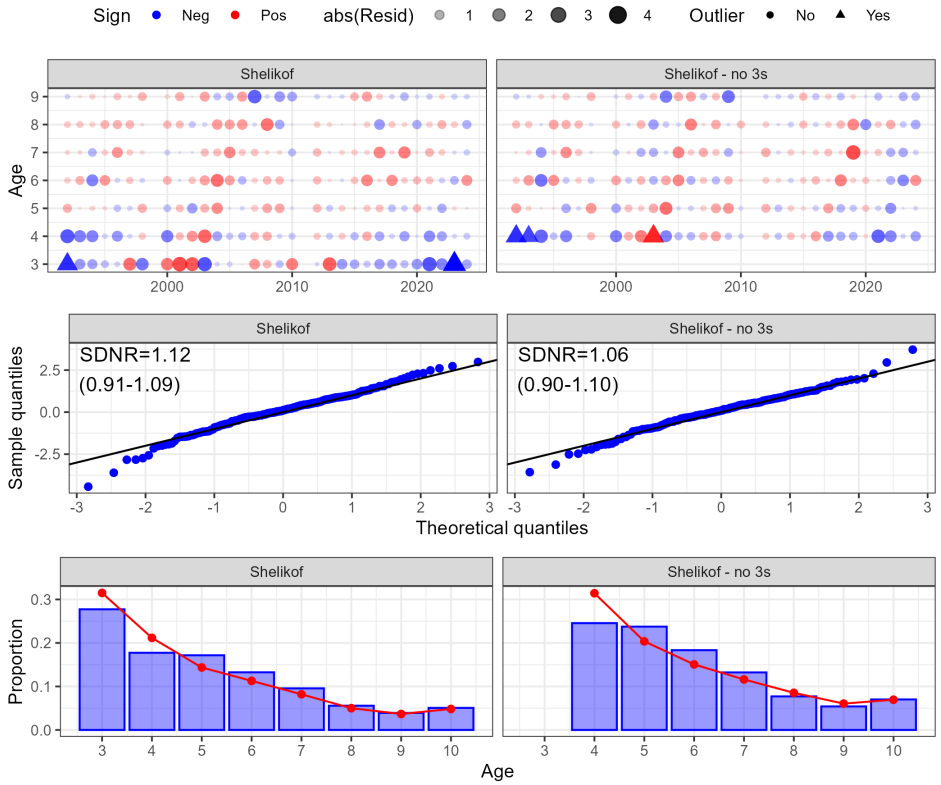
- W/C/WYK is a Tier 3 (West of 140W) – typical catch 135 kt
- Stock is healthy: B45, big recent cohorts
- Single-sex, single-fleet, ages 1-10+
- Empirical weight at age
- Fishery selectivity: double-logistic w/ time-varying ascending
- Fitted to 4 surveys
  - NMFS winter (Shelikof) + summer (coast wide) acoustic
  - NMFS & ADF&G summer bottom trawl
- Time-varying *q* for Shelikof (covariate) and ADF&G (RW)
- Dirichlet-multinomial for composition weighting

Assessment methodology history

- 2020 – No changes (19.1)
- 2021 – Transition from Dorn to Monnahan (19.1)
- 2022 – Estimate summer AT selex + consistent σ_R (19.1a)
- 2023 – Migration to TMB (23)
- 2024 – CIE: Revised data weighting, covariate on catchability, remove age 1 & 2 indices, Dirichlet-multinomial (23d)

Explore dropping age 3 Shelikof fish

- 2024 PT recommended as an alternative
- Same logic for age 1 & 2s
- Slightly better fit (SDNR)
- **Better to use dome-shaped selex?**
- Why not drop 4s too?
- **Needs more thought & experimenting with using data outside of Shelikof**



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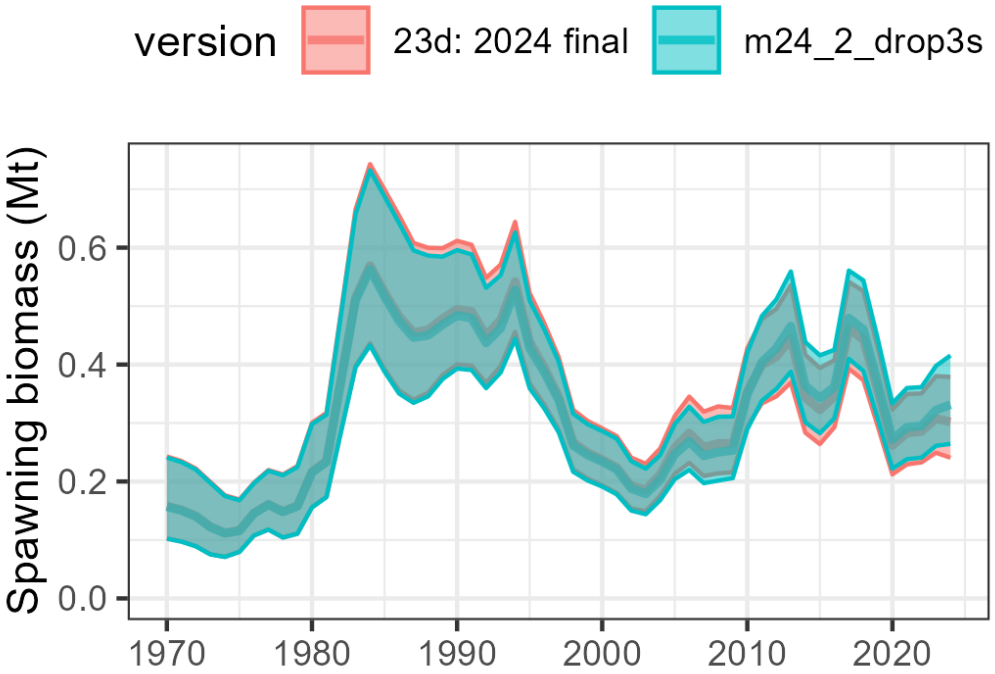


Updating initial NAA

- 23d initialized NAA with initial recdev and assumed equilibrium + F=0
- New approach:

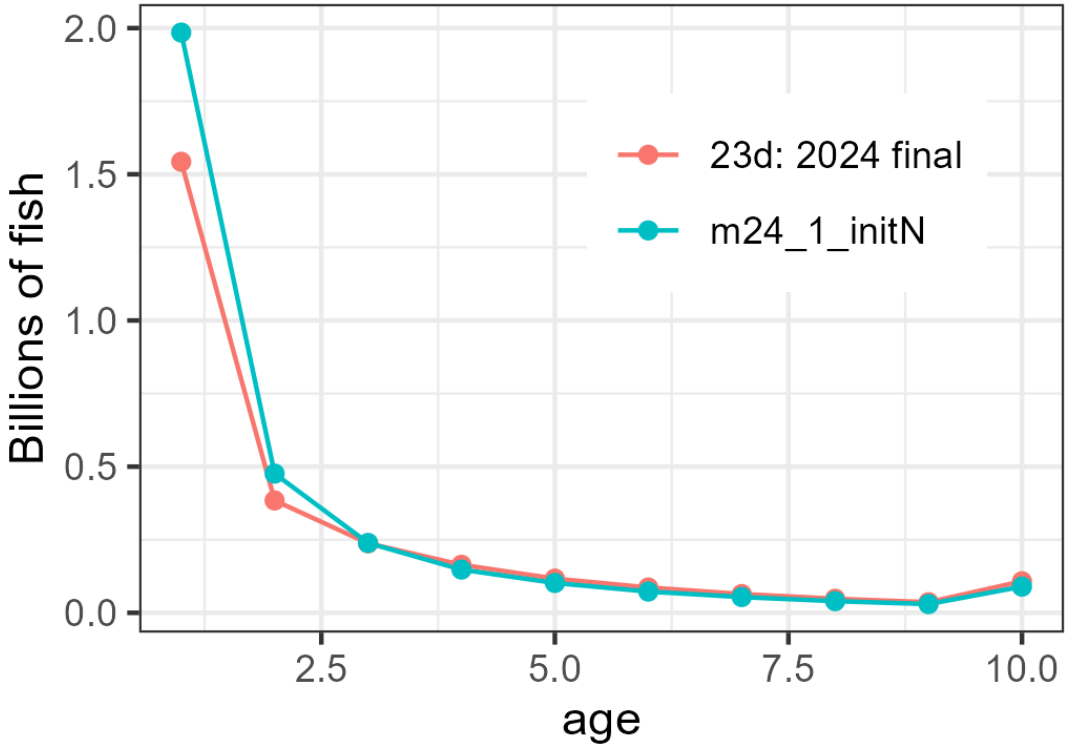
$$log\_initN0 \sim N(\mu, 1.0)$$

$$N(1) = \exp(log\_initN0)$$

$$N(a+1) = \mathrm{N(a)} * \exp(-\mathrm{M(a)})$$

$$N(10) = \frac{N(9)e^{-M(9)}}{1 - e^{-M(10)}}$$

- This separates recdev[1] from initialization and makes them "exchangeable"
- Makes more sense from a population dynamics perspective
- **Minor impact, but an improvement so recommended**



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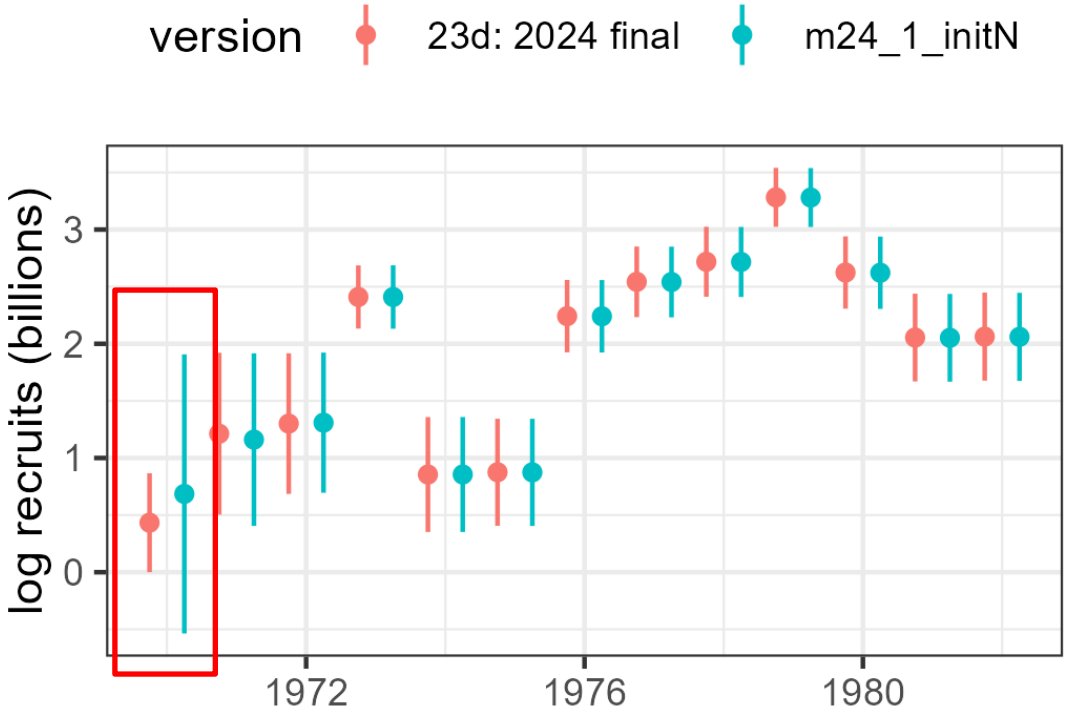
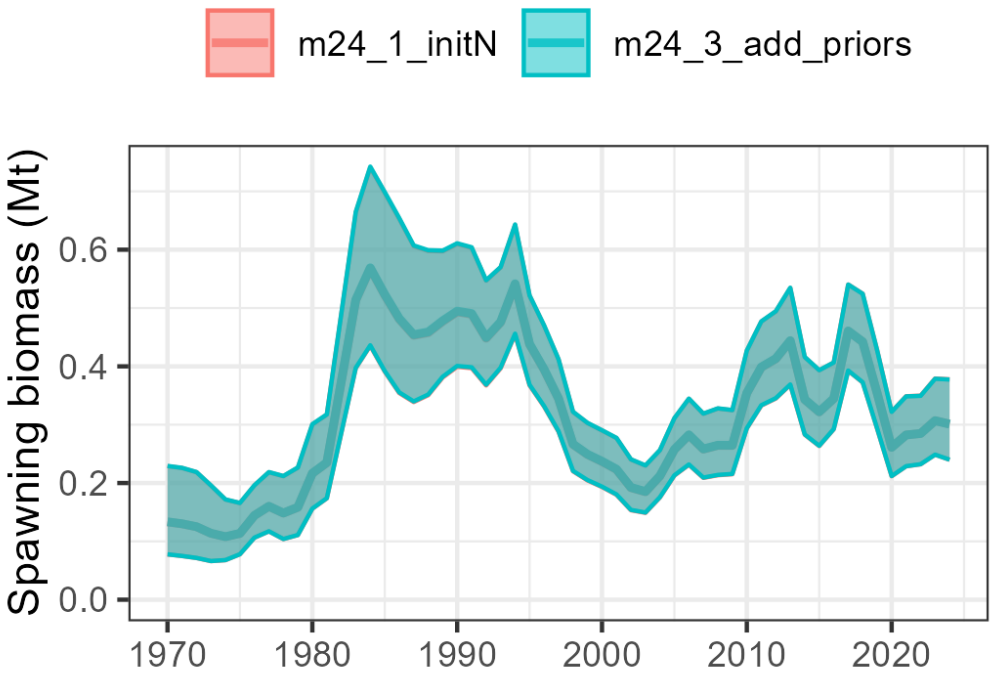


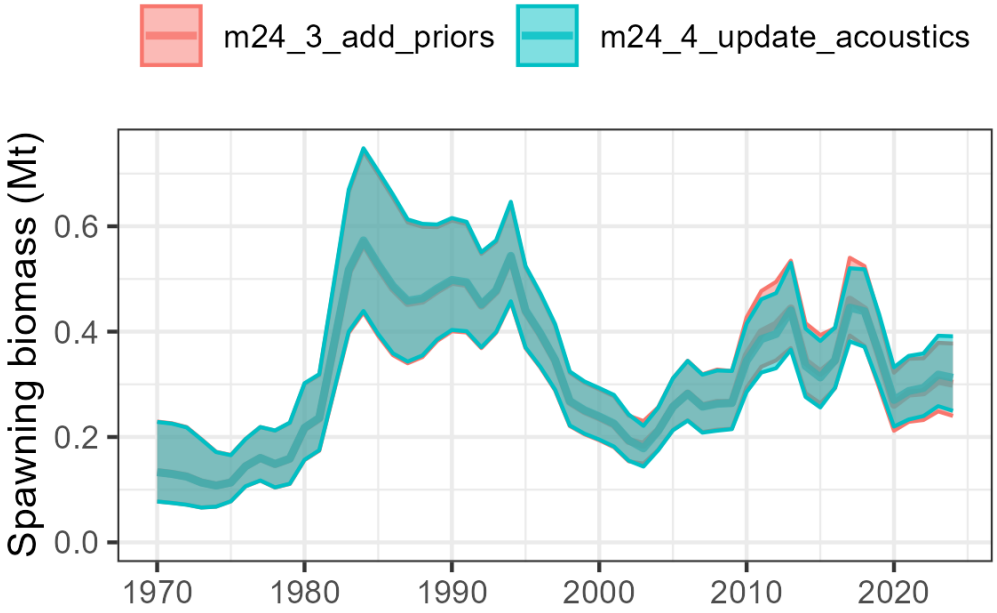
Incorporating additional priors

- Priors were added to stabilize estimation
- Logit(rho)~N(0,1.5) which implies rho~U(-1,1) for Ecov AR(1) process
- Further priors on descending selex for Shelikof
- **Recommend changes**



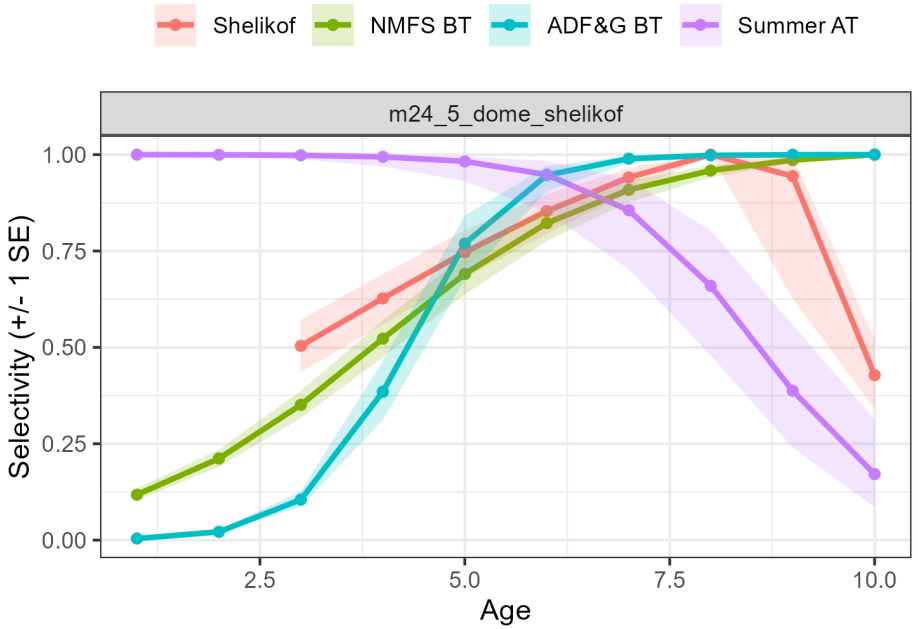
Updating acoustic data + pipeline

- Per D. McGowan's presentation, MACE updated acoustic data:
- Shelikof (2008-2024)
- Summer (2013-2023)
- Arise from changes in equipment and analysis
- **Minimal impact, strongly recommend use of best available data**



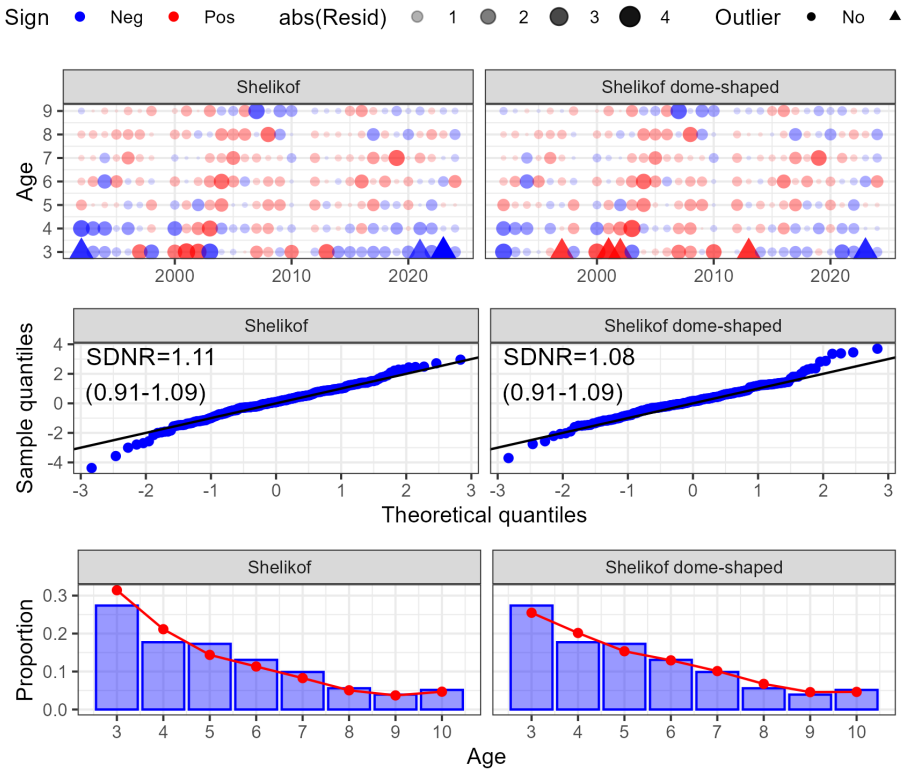
Dome-shaped selex for Shelikof

- A run where Shelikof selex was allowed to have estimated ascending limb (was descending logistic before)
- Estimates are surprisingly low at early ages



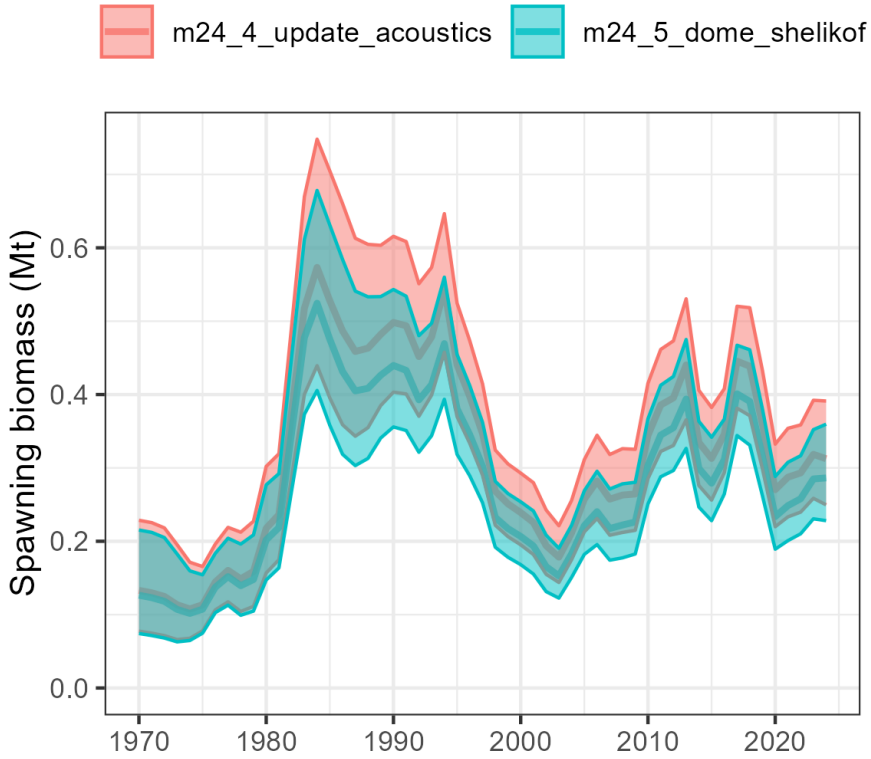
Dome-shaped selex for Shelikof

- Residuals are better in some ways, worse in others



Dome-shaped selex for Shelikof

- And surprising change to SSB
- The red is 23e
- **If adopted, new model would be 23f**
- Thoughts?



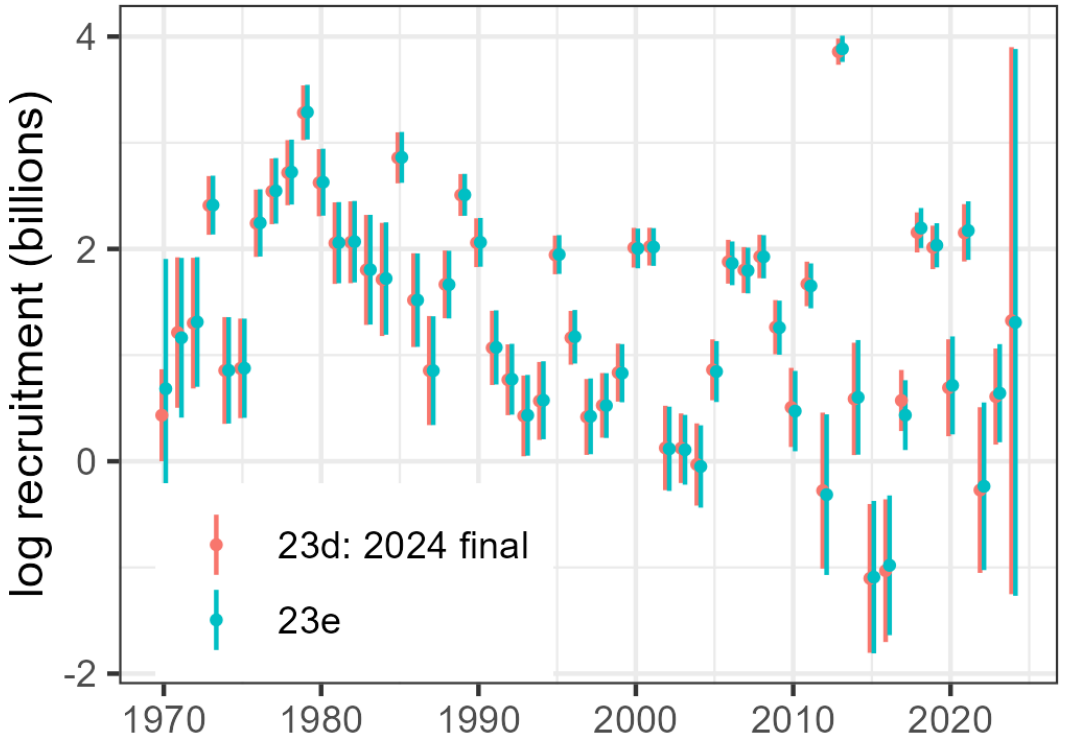
Proposed alternative model 23e

- For the 2025 assessment I propose model 23e
  - Model 23e = model 23d
    + updated initial NAA
    + additional priors
    + updated acoustic data

Model	SSB (2024)	B0	B40	B35	FOFL	FABC	OFL (2025)	ABC (2025)
23d: 2024 final	243,078	535,000	214,000	187,000	0.321	0.271	210,111	181,022
23e	252,704	539,000	216,000	189,000	0.319	0.269	216,027	186,208

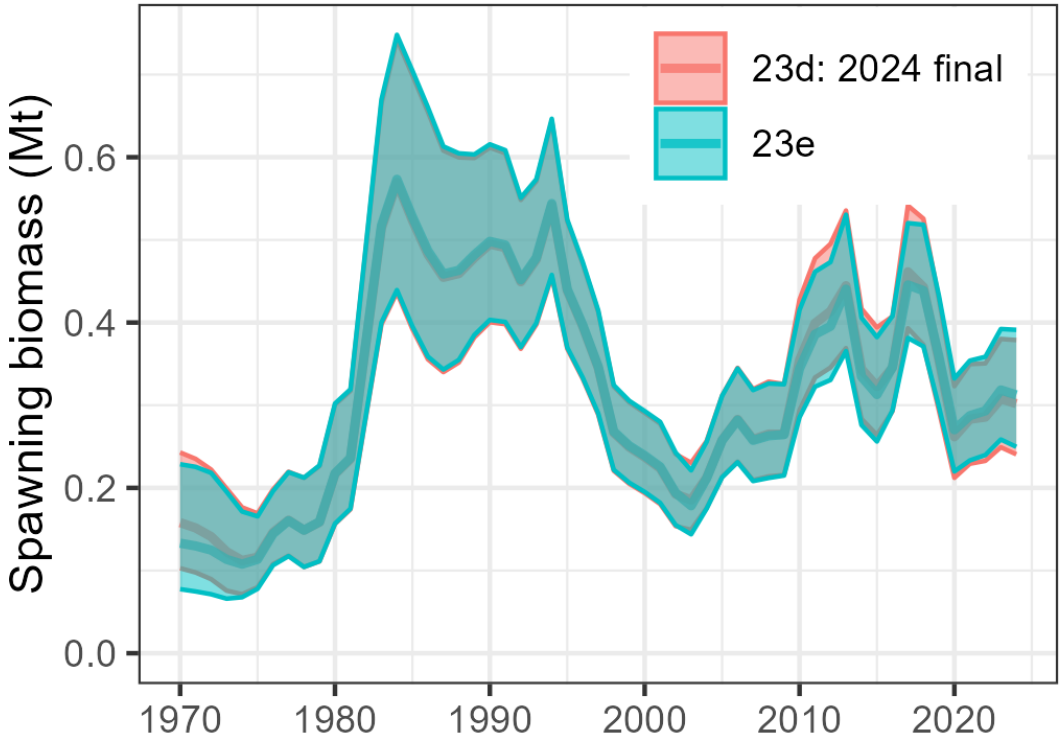
Model results

- Recruitment same except for first year (1970)
- Due to initial NAA change
- More realistic



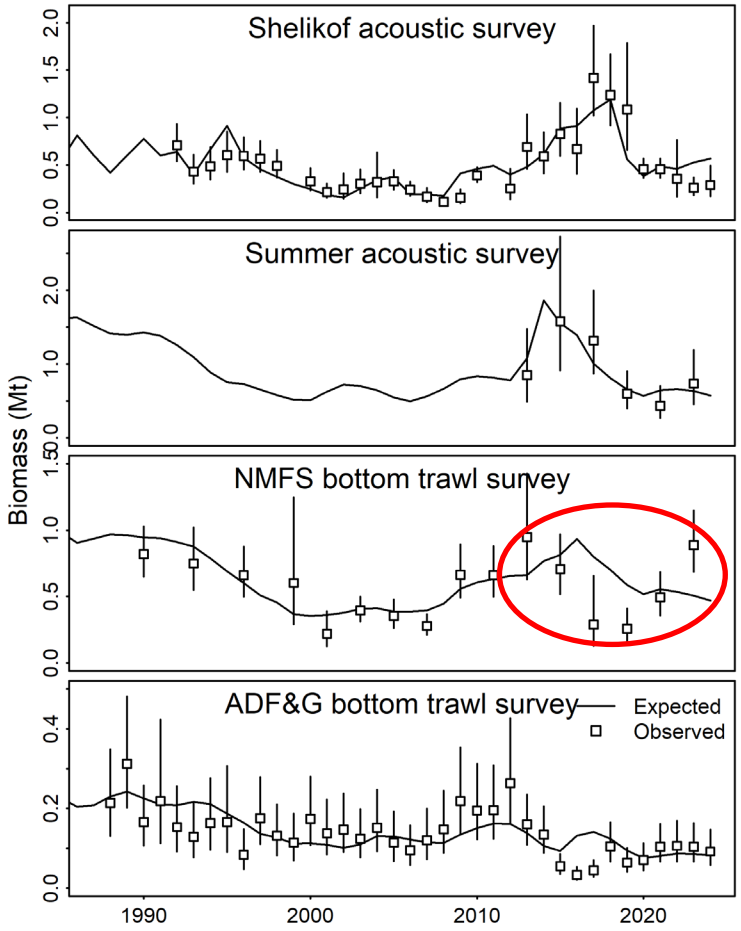
Model results

- Negligible impacts on SSB
- Except early period (<1978)



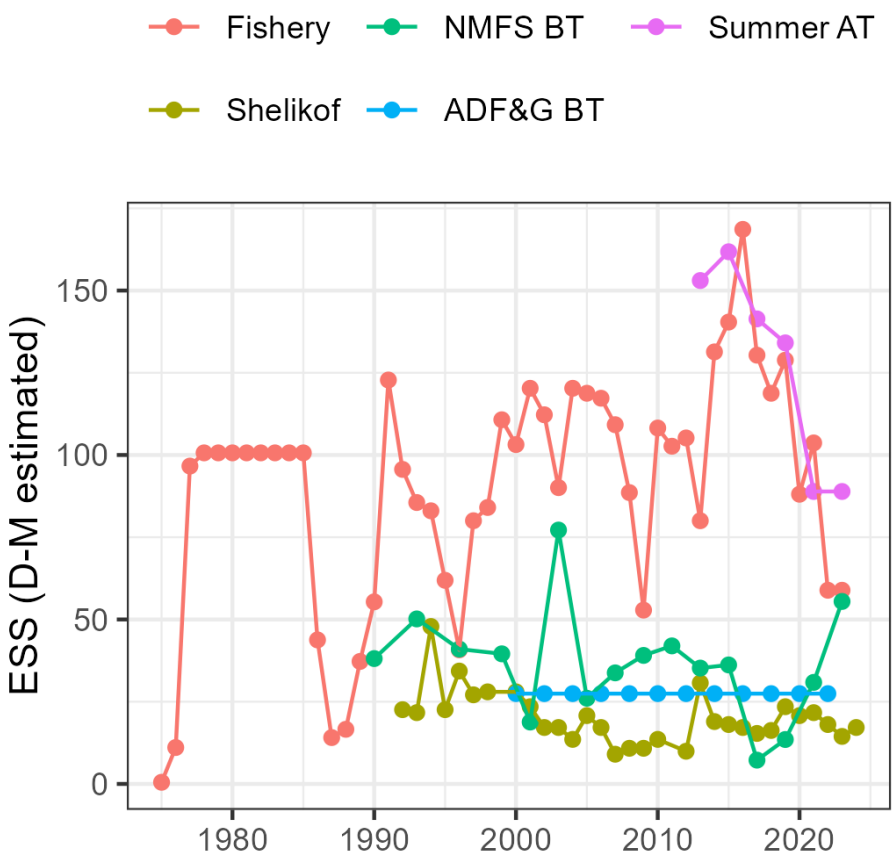
Model validation

- Continued misfit to recent NMFS BT index
- Improved Shelikof fits due to *q*-link



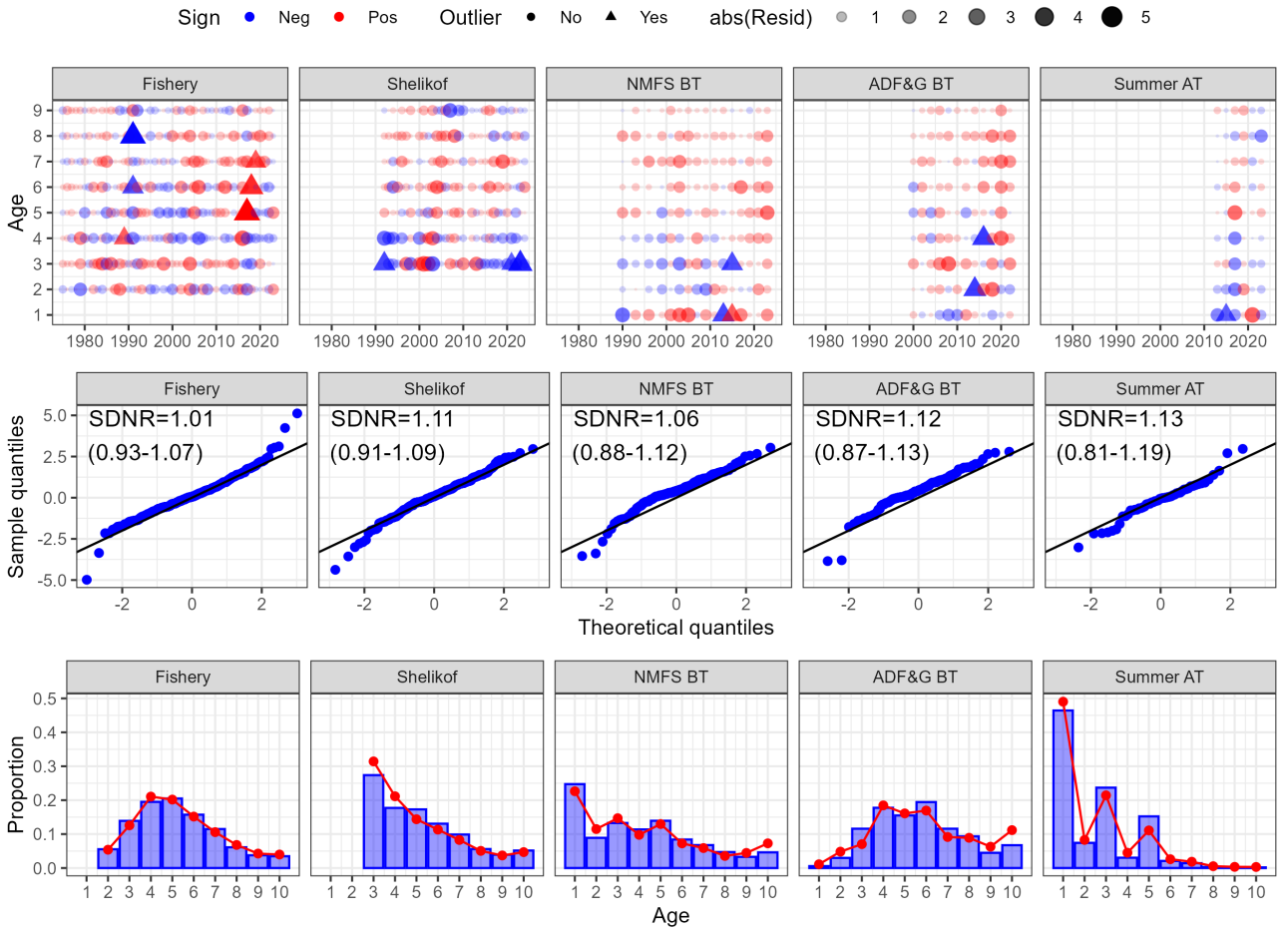
Model validation

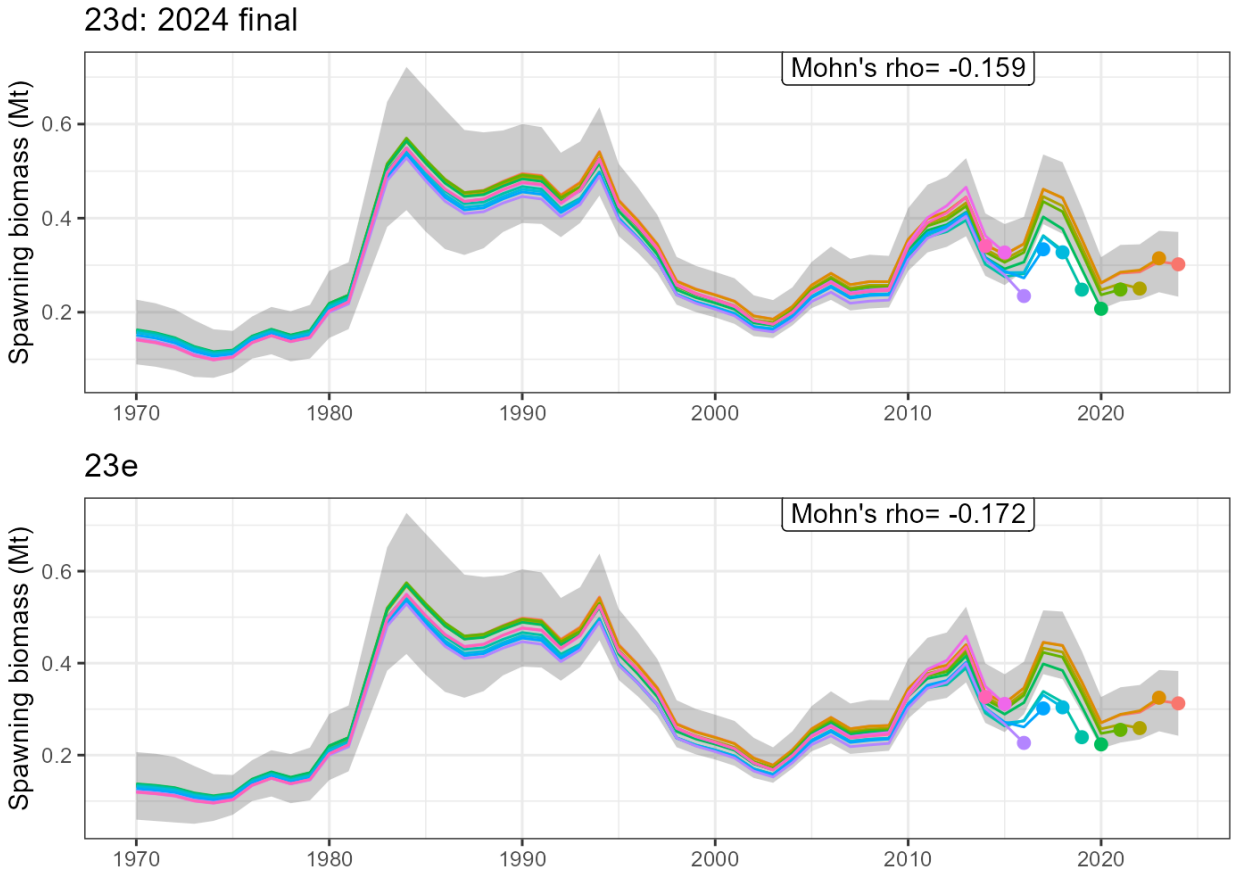
The ISS is based off # hauls per year, then scaled by the Dirichlet-multinomial estimate (D-M)



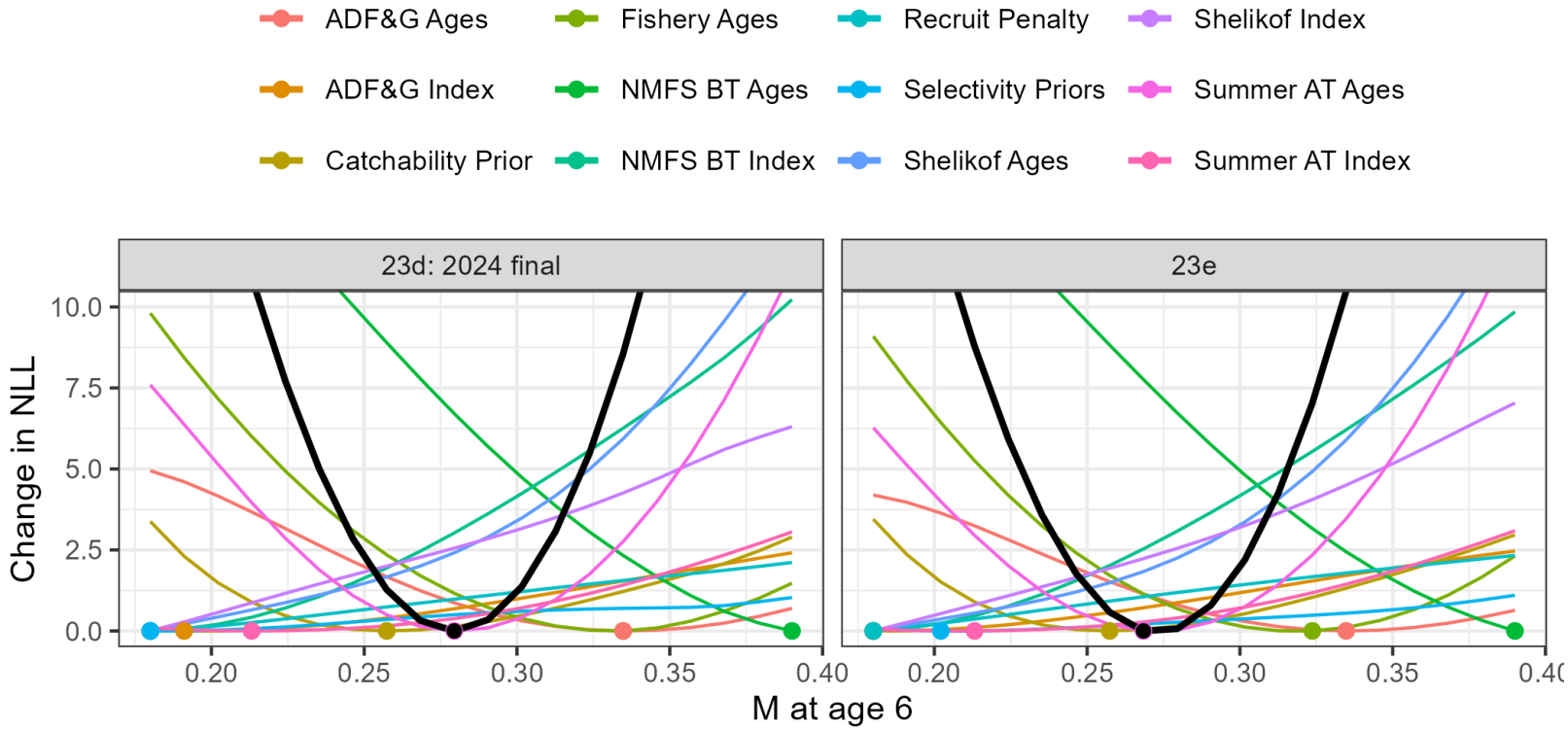
Model validation

- Same fits as last year
- Some large fishery residuals
- Misfit to:
  - Age 10 for BT surveys
  - Age 3+4 for Shelikof

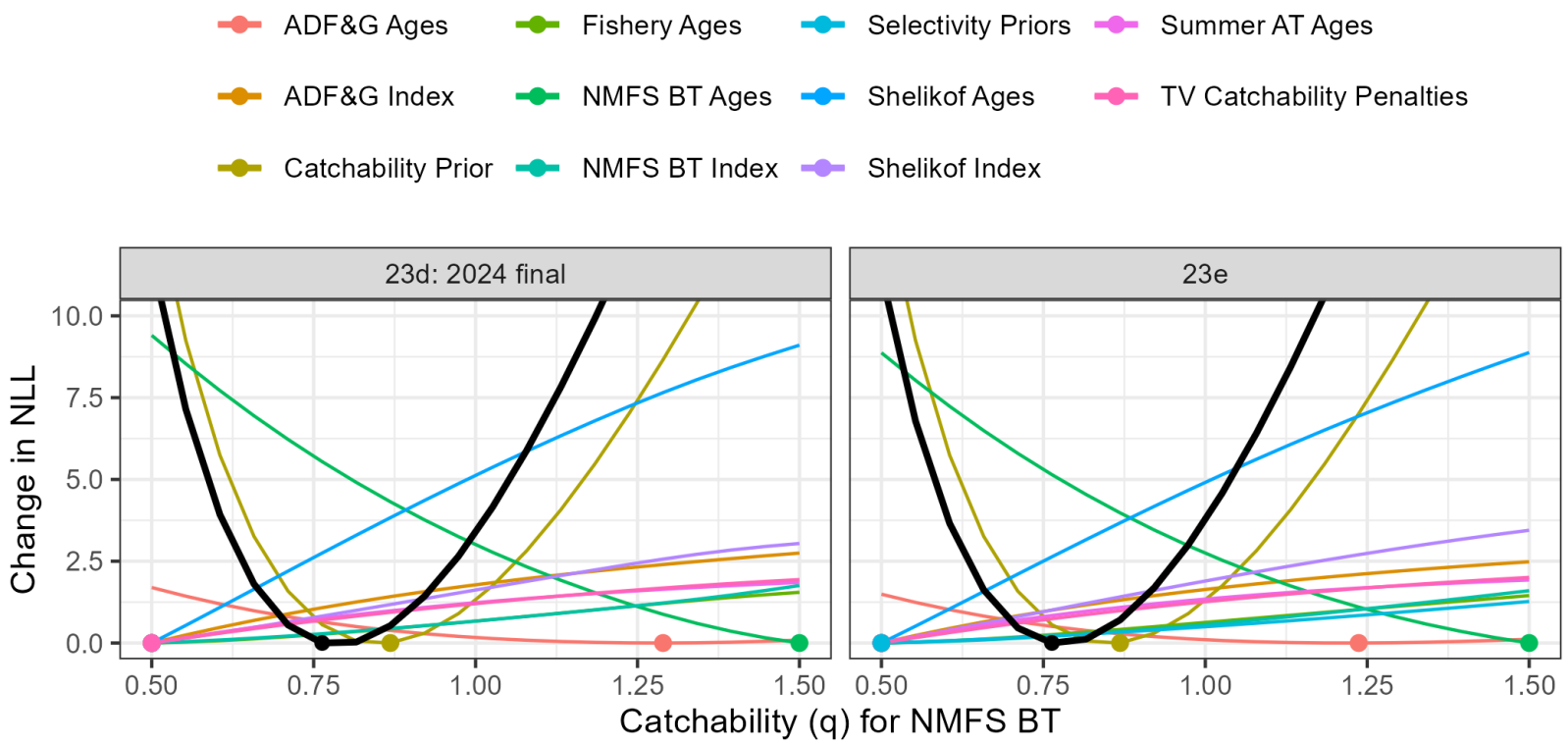



23d: 2024 final
Mohn's rho= -0.159
Spawning biomass (Mt)
0.6
0.4
0.2
1970
1980
1990
2000
2010
2020
23e
Mohn's rho= -0.172
Spawning biomass (Mt)
0.6
0.4
0.2
1970
1980
1990
2000
2010
2020

Model validation: likelihood profile on M

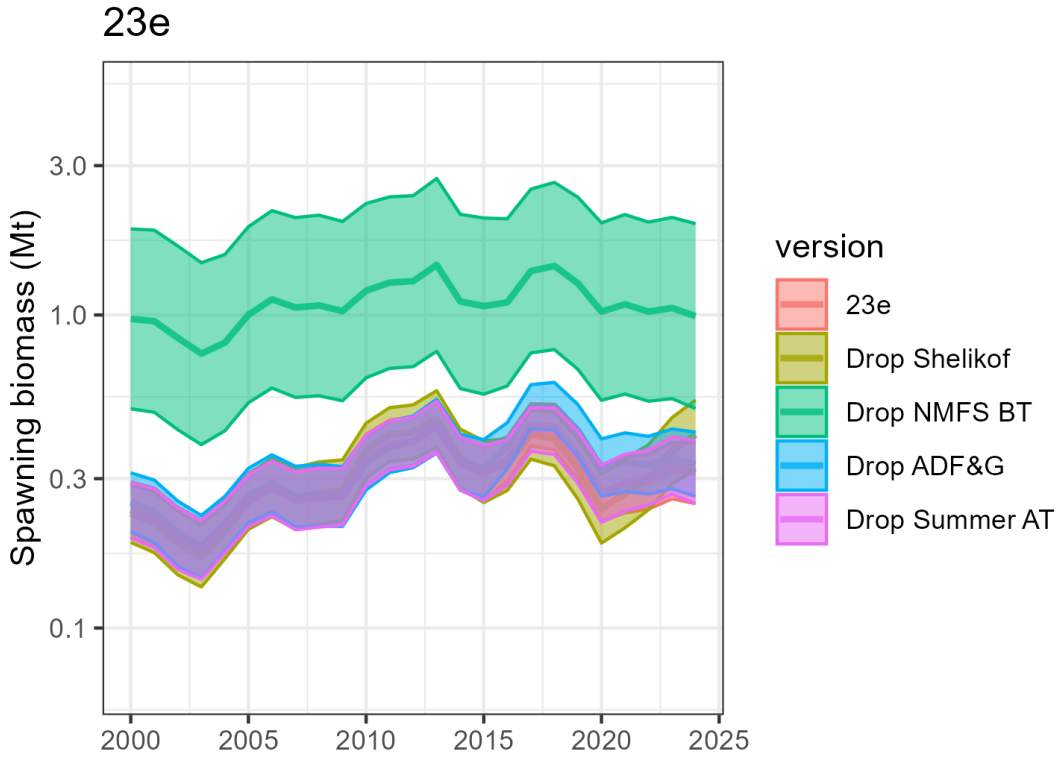


Model validation: likelihood profile on NMFS BT q



Model validation: effects of dropping surveys

- Big change in scale when dropping the NMFS BT survey
- Longstanding issue with scale being informed strongly by prior on catchability for NMFS BT
- Otherwise fairly stable trend
- *See Sep 2024 doc for further analysis and thoughts about estimates of catchability*



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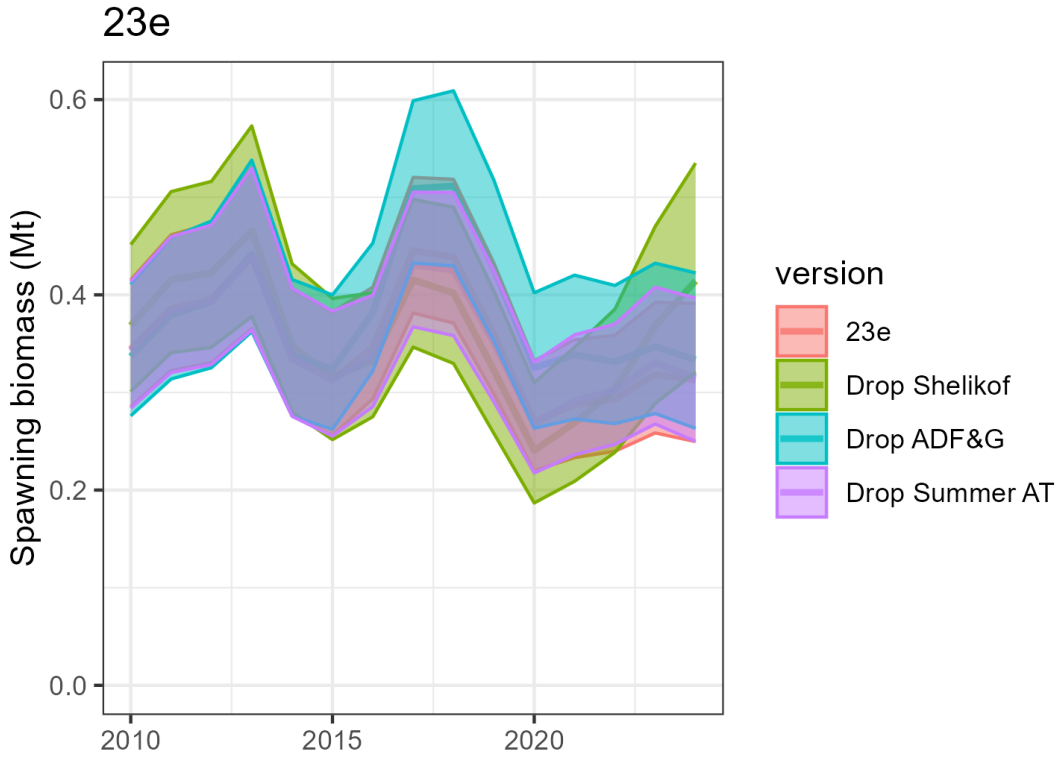

Concerns + discussion + research updates

- Continued issues with scale without the NMFS BT
- Continued misfit in recent indices, in particular NMFS BT
  - Need to better understand vertical availability to gear types
  - Ongoing collaboration w/ MACE staff, plan something for next year
- Data conflict (profile likelihoods)
- Plus group too low? – **will present analysis next year**

Concerns + discussion + research updates

- Some issues in composition fits
  - Should I use time-varying age-based survey selectivity?
  - Growth variation + constant gear => variation in age-based selex
- **PT request**: *try to include additional surveyed areas not currently included in the winter survey index estimates*
  - Ongoing research. An analytical plan is in place, expect results next year.
- **PT request**: *drop 3 year old from the Shelikof survey & reevaluate 1 & 2s*.
  - Explored this year and not recommended. Bigger effort is ongoing research.

Concerns + discussion + research updates

- **SSC request**: *further explorations of DSEM module*
  - Structural-causal version of assessment (Champagnat et al.) is in revision at Fish and Fisheries. Replicated in RCEATTLE. Ongoing research.
- **SSC request**: feasibility of an AVO approach in the Gulf?
  - Preliminary MACE analyses imply it is unlikely to work due to challenges of assigning backscatter w/o reliable mid-water trawls
- **PT request**: include WAA + uncertainty from 'sampler' into model
  - Ongoing research. Still unresolved differences in the Fortran and ADMB sampler when disaggregating by area + season

2025 recommendations

- I recommend model 23e for use in 2025

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