2025 Yellowtail Rockfish North of 40° 10' N. STAR presentation 2: Model, Diagnostics, Results

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May 19, 2025

Outline

1. Bridging from 2017 model
2. Parameter estimates
3. Fits to data
4. Population estimates
5. Diagnostics and sensitivities
6. Uncertainty, risk table

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Base model summary

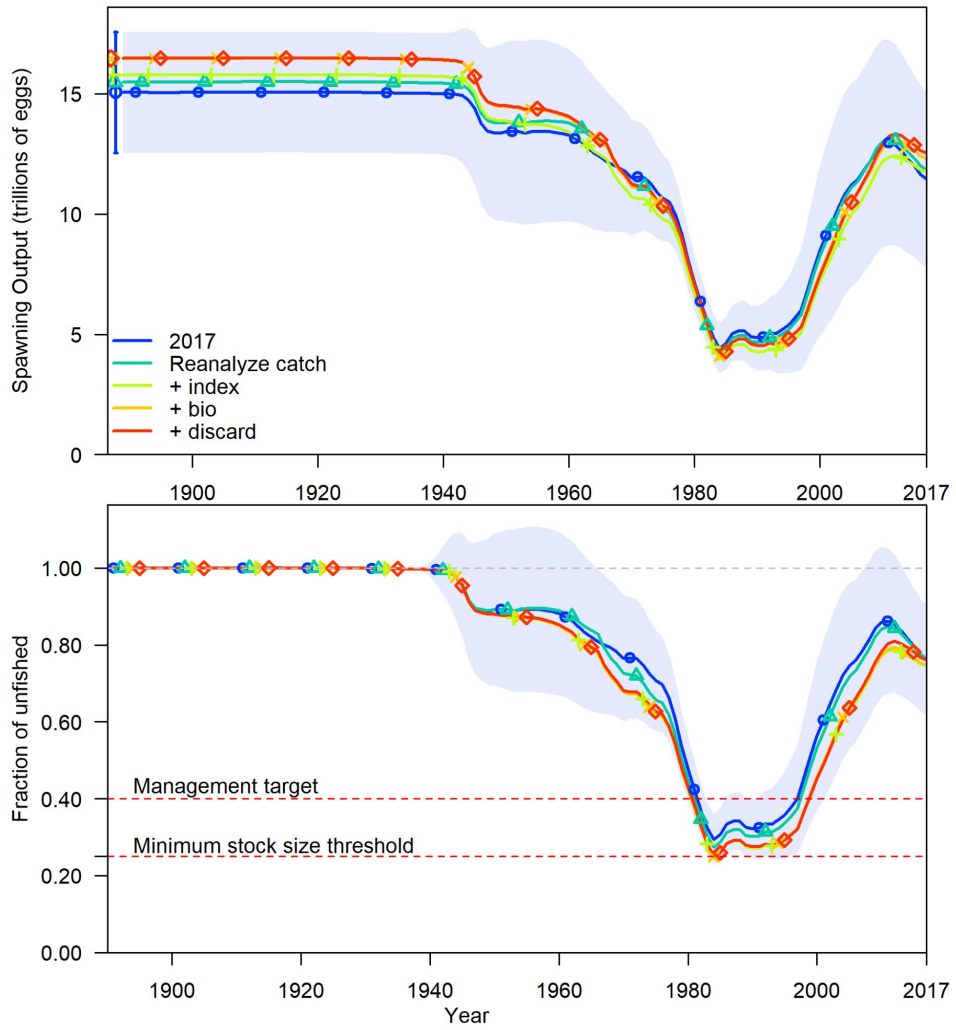
Data

- 3 fishery fleets
  - All with age and length data
- 3 traditional surveys
  - 1 length only, 1 age and length, 1 CAAL and length
- 1 recruitment survey

Model

- Sex-specific mortality and growth estimated
- Trawl gears have asymptotic selectivity
- H&L gears dome-shaped
  - Recreational selectivity is sex-specific

Bridging: data updates



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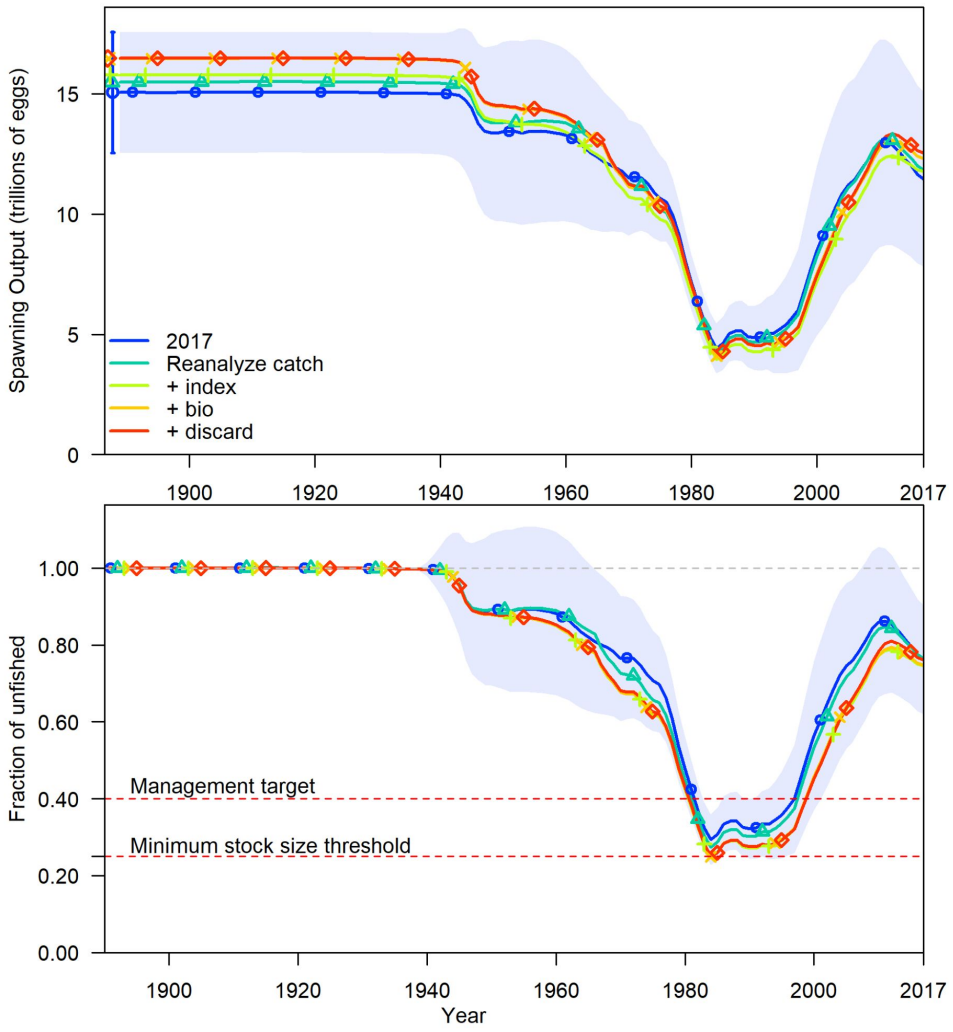
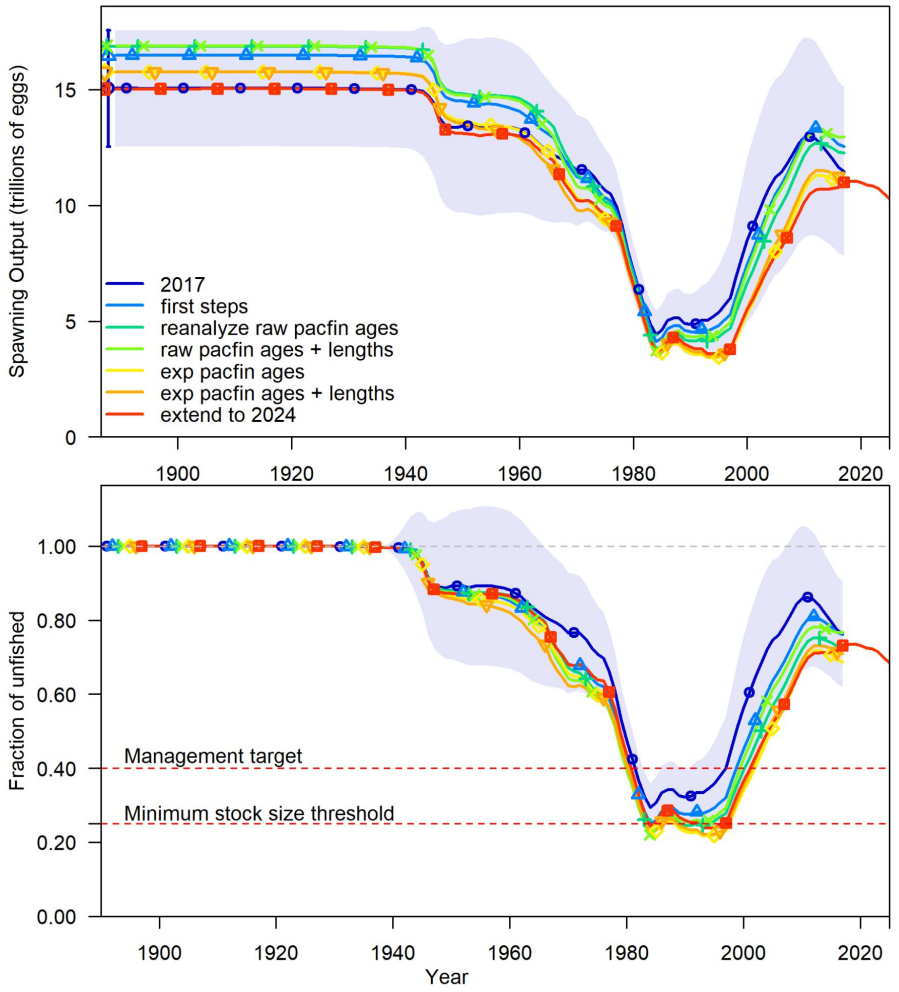
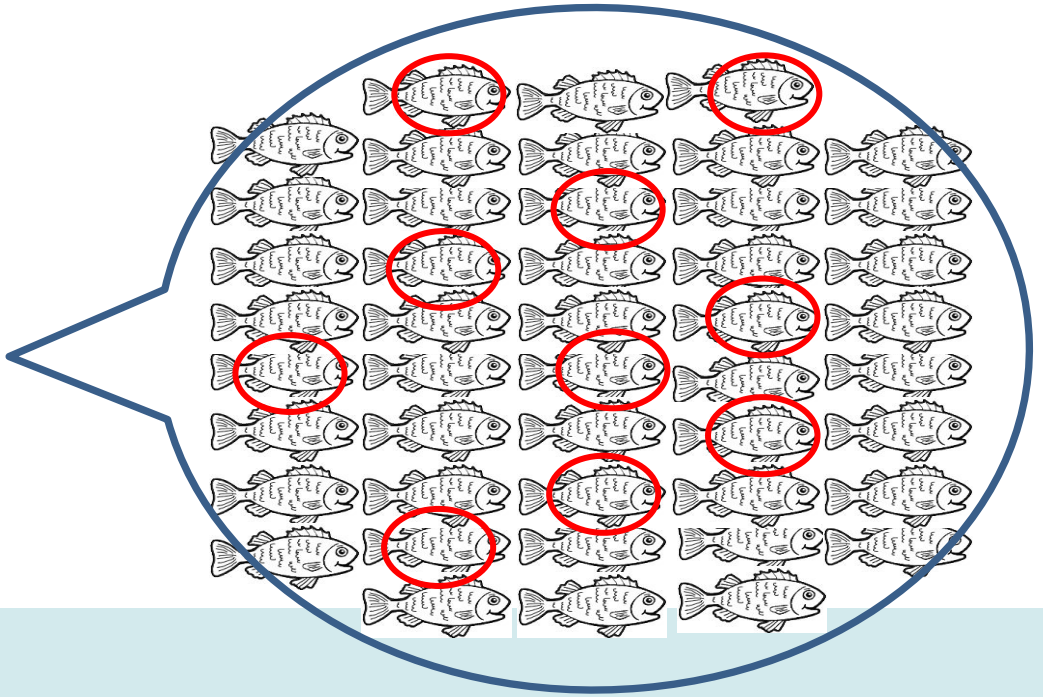
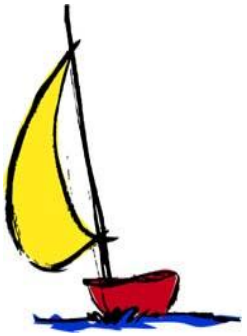


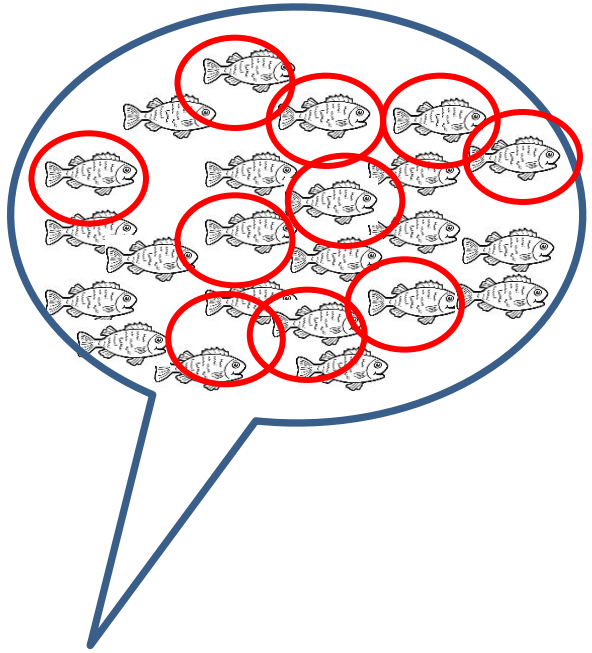


What are expanded PacFIN data?

Problem: Fish sizes are usually not homogeneously distributed. The same number of fish can be representative of a small or large amount of catch







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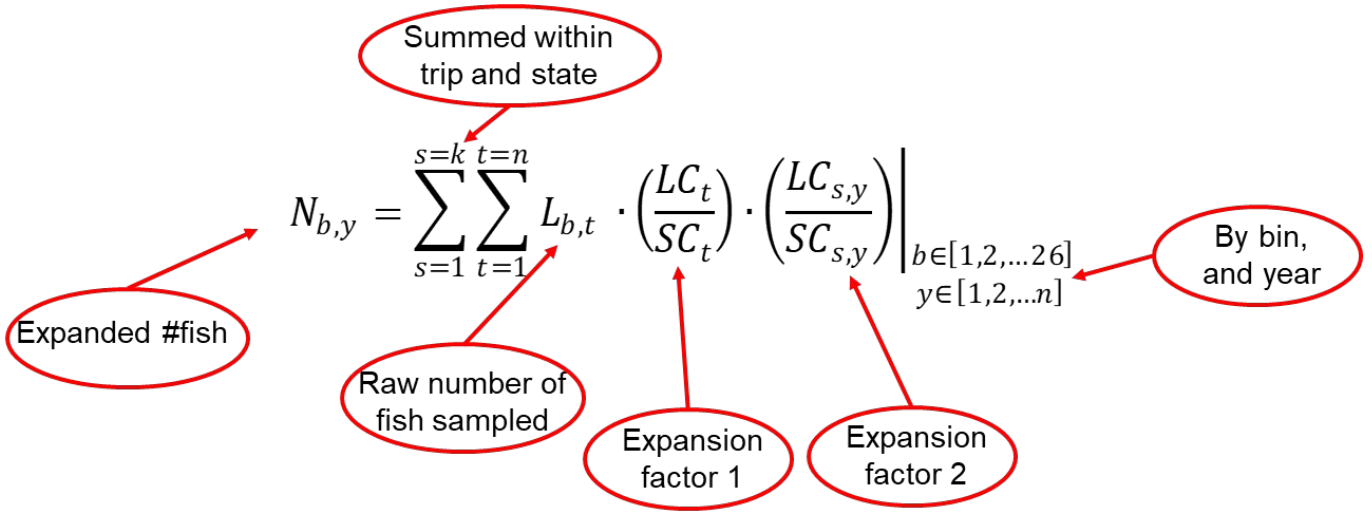
What are expanded PacFIN data?

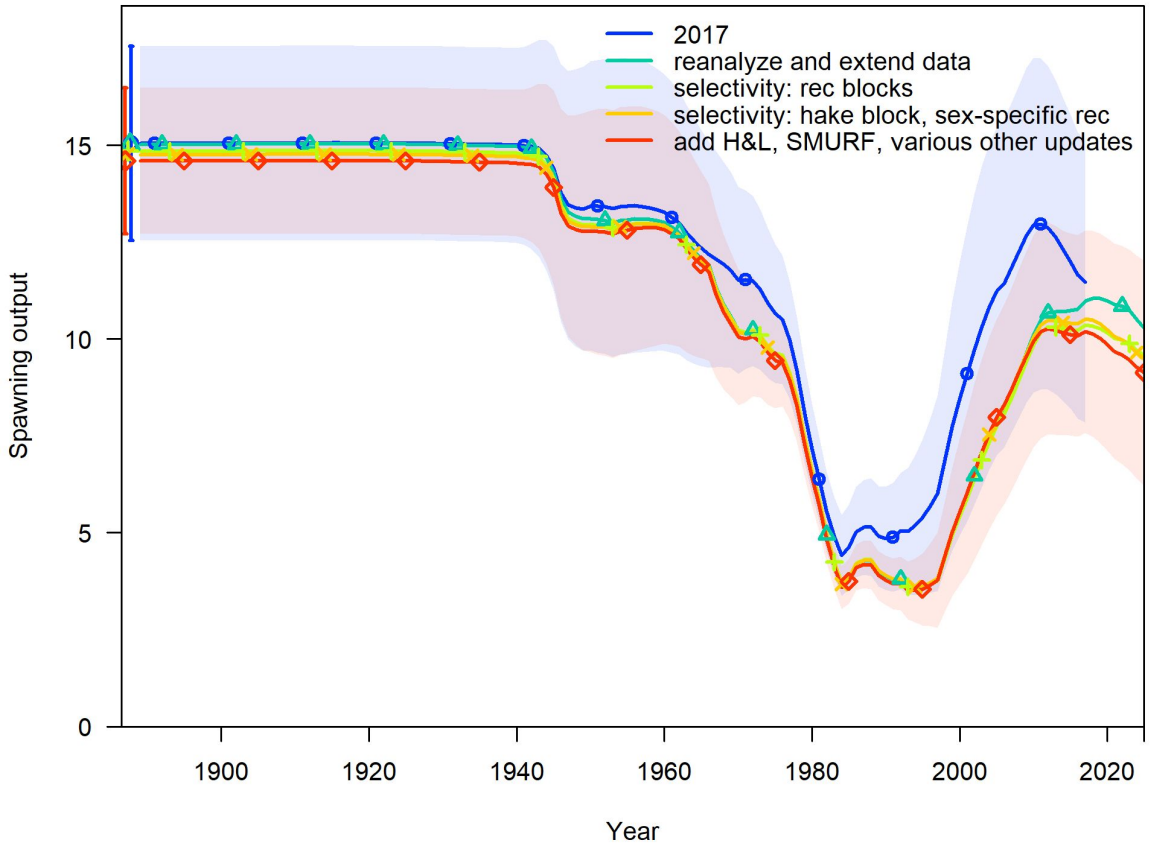
Raw sample sizes, #fish sampled within bin, within trip

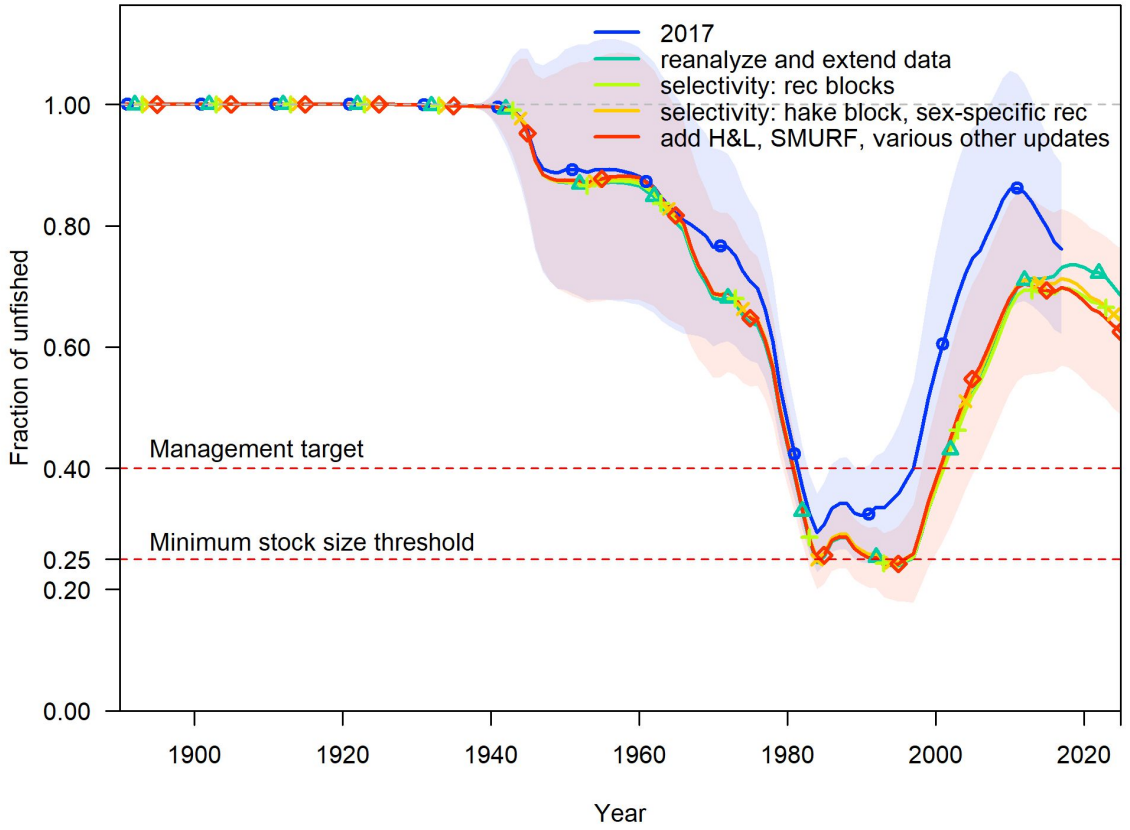
Stage 1 expansion, to account for differences in catch among trips

Stage 2 expansion, to account for differences in catch among states



Bridging: model updates





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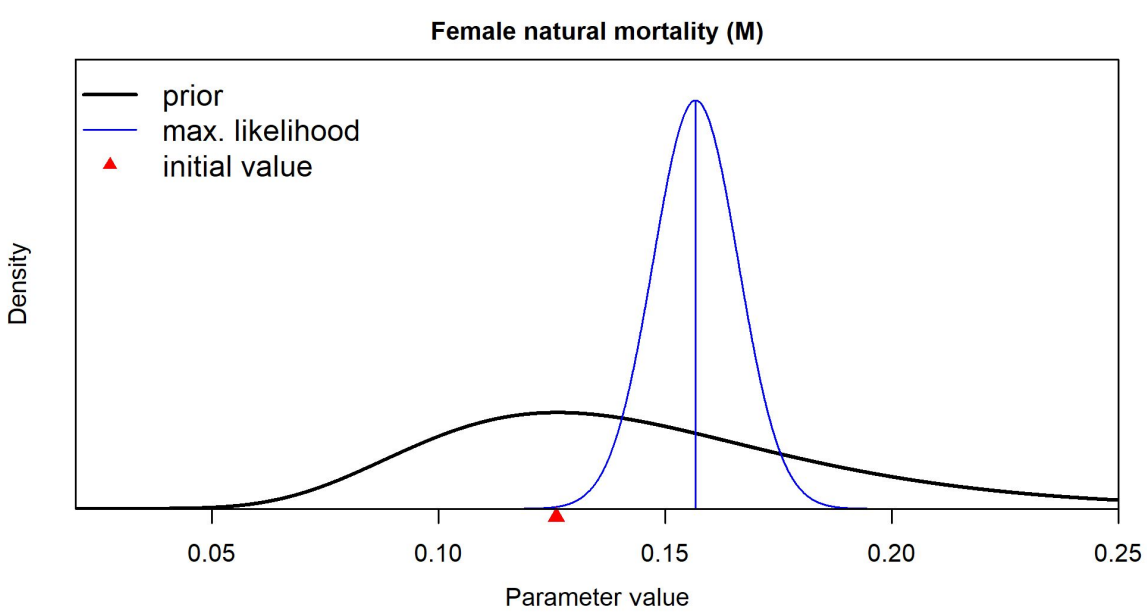
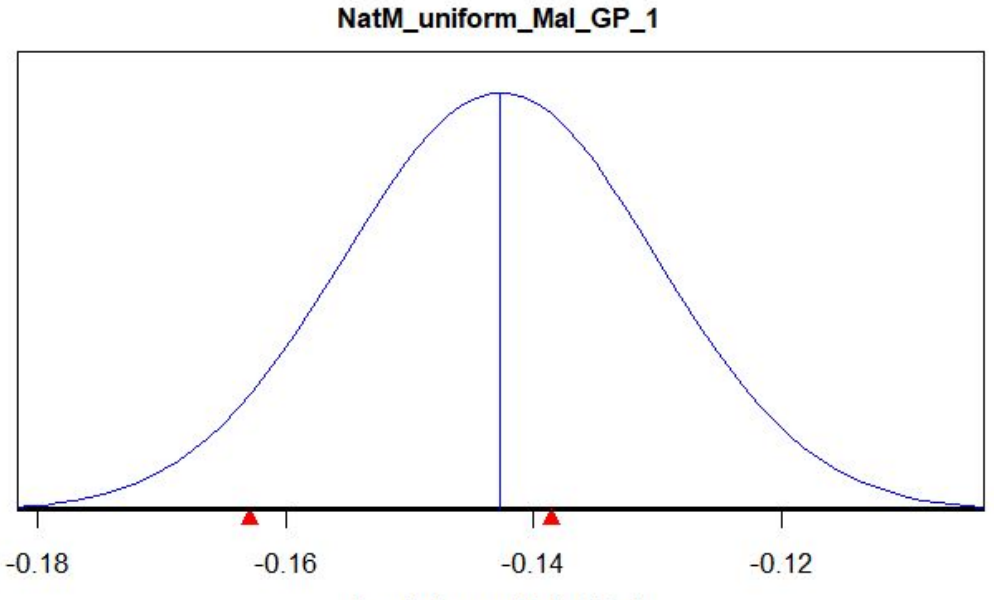
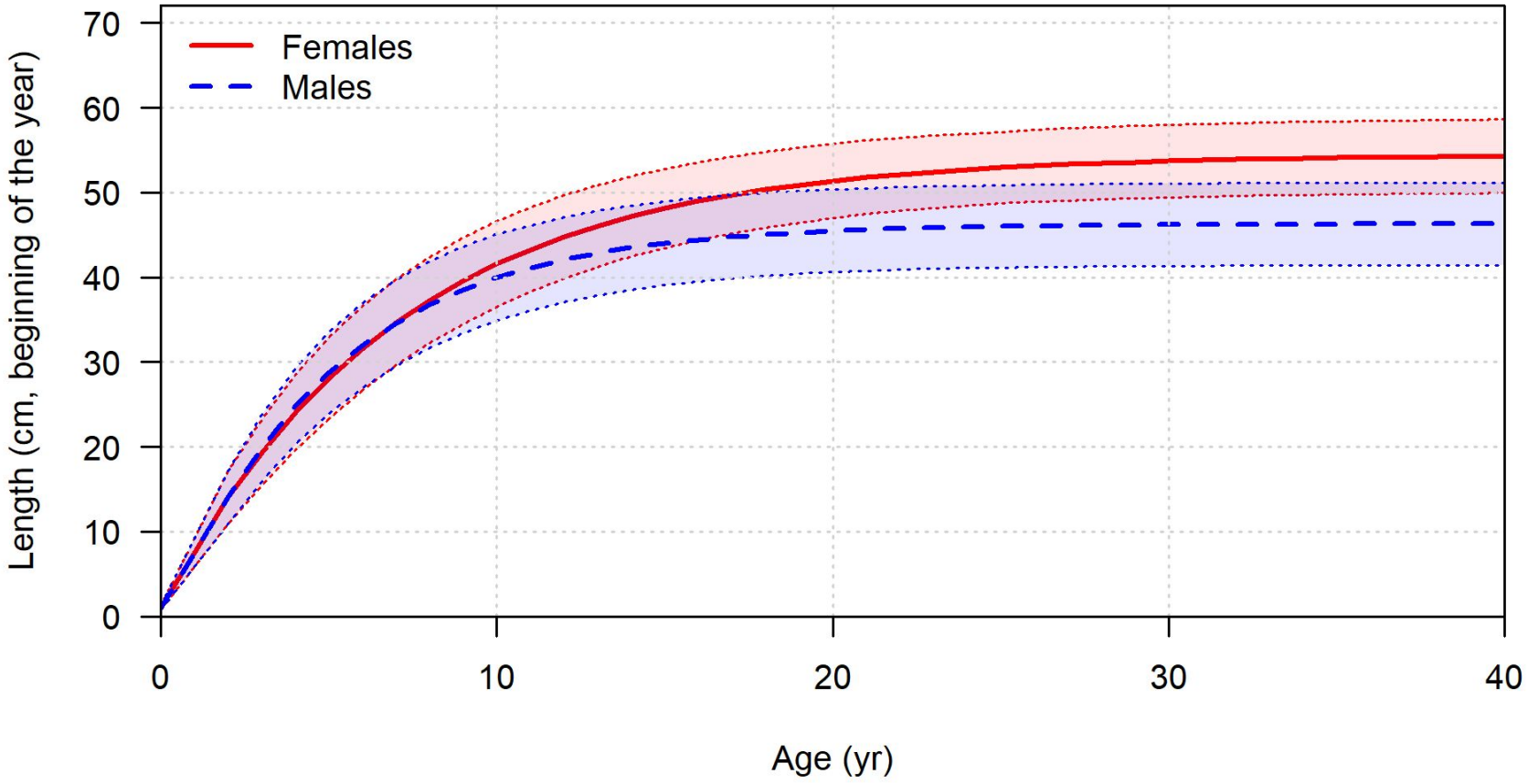
Natural mortality



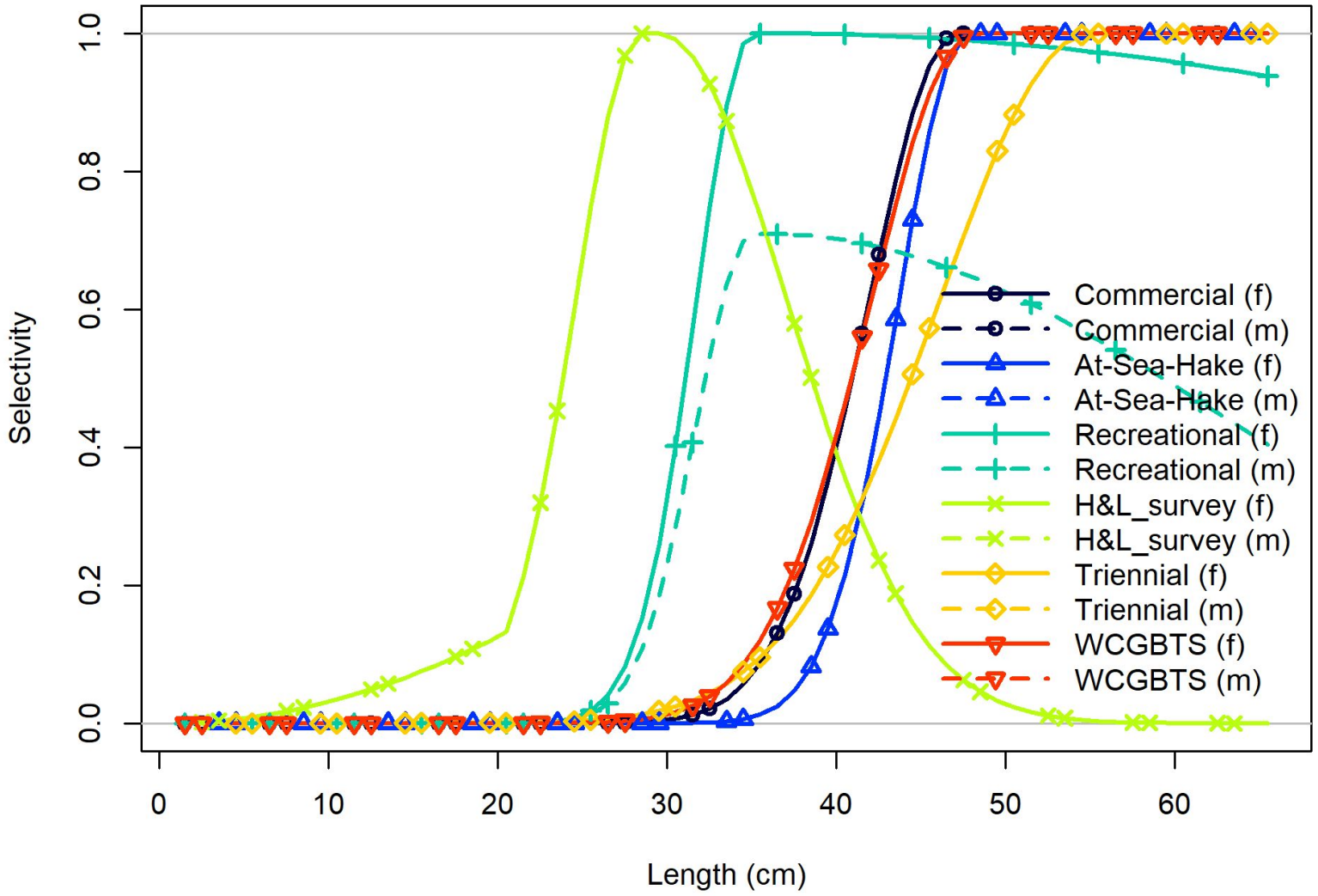


Growth


Females
Males
Length (cm, beginning of the year)
0
10
20
30
40
50
60
70
0
10
20
30
40
Age (yr)

Selectivity at size (estimated)

- Commercial fleet and WCGBTS nearly identical
- Hook and line gears catch smaller fish



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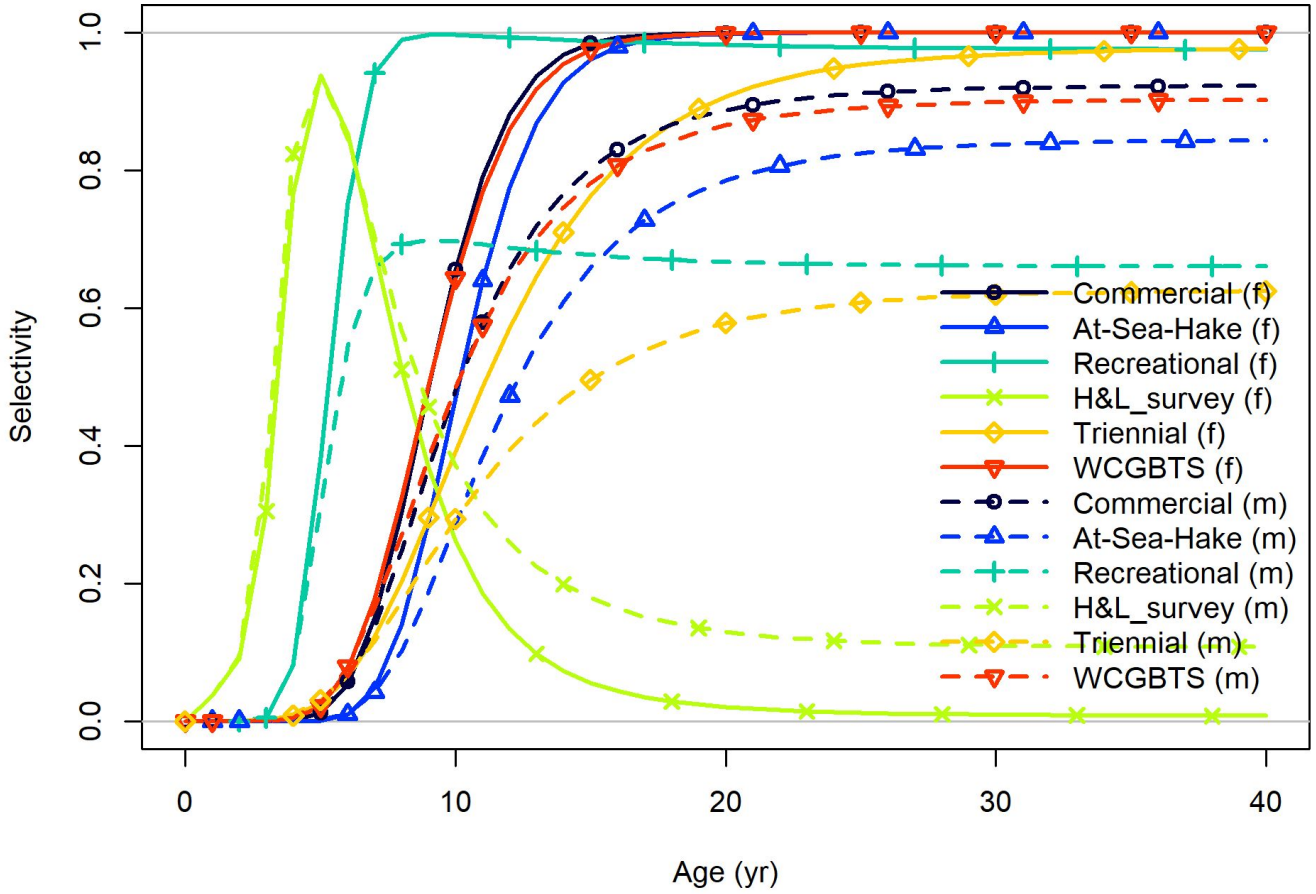
Selectivity at age (derived) indicates females are often more selected than males



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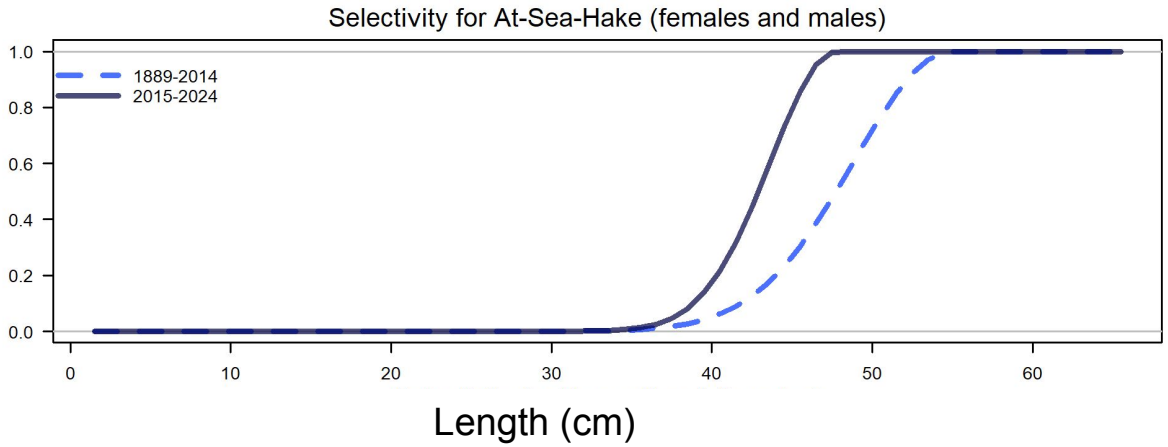
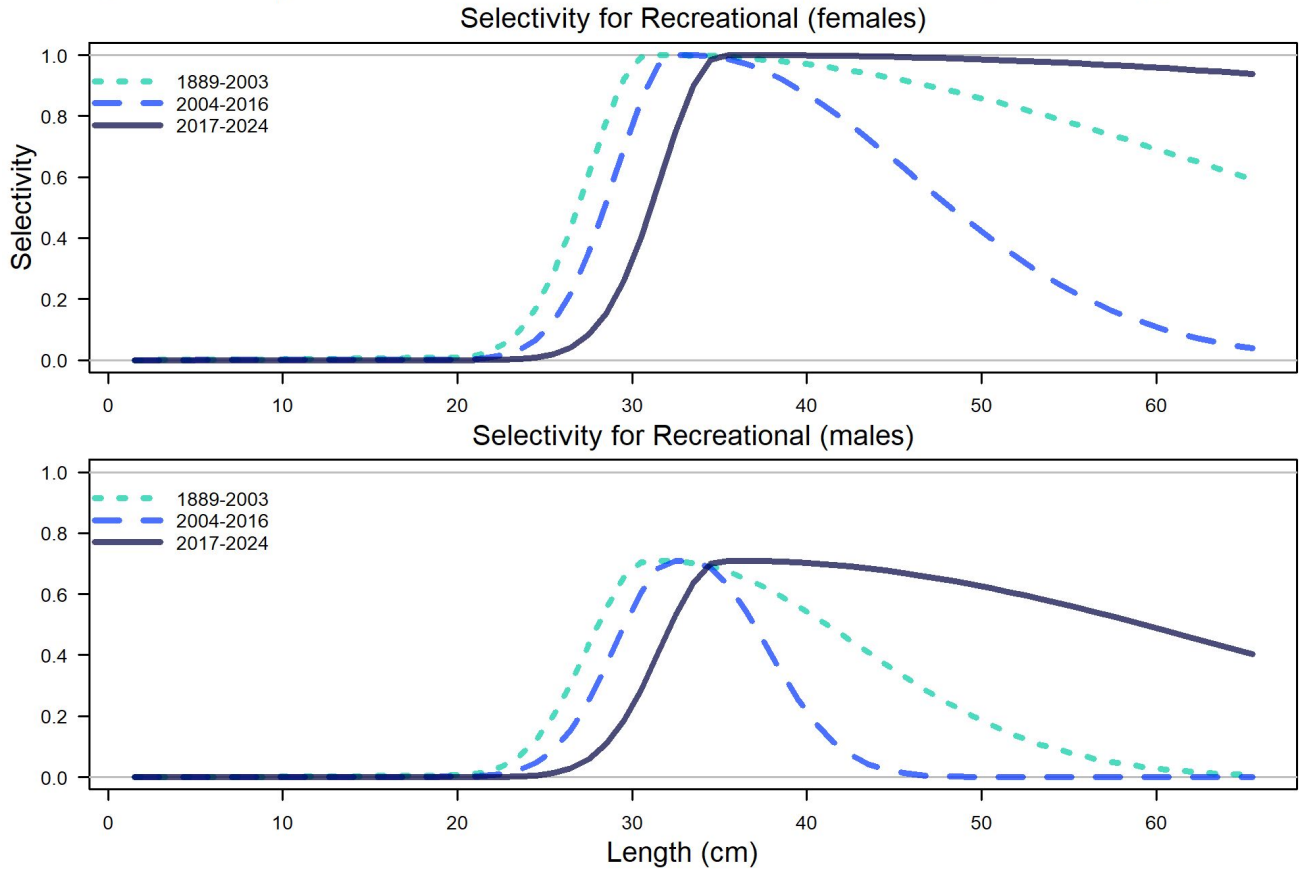
Time-varying selectivity





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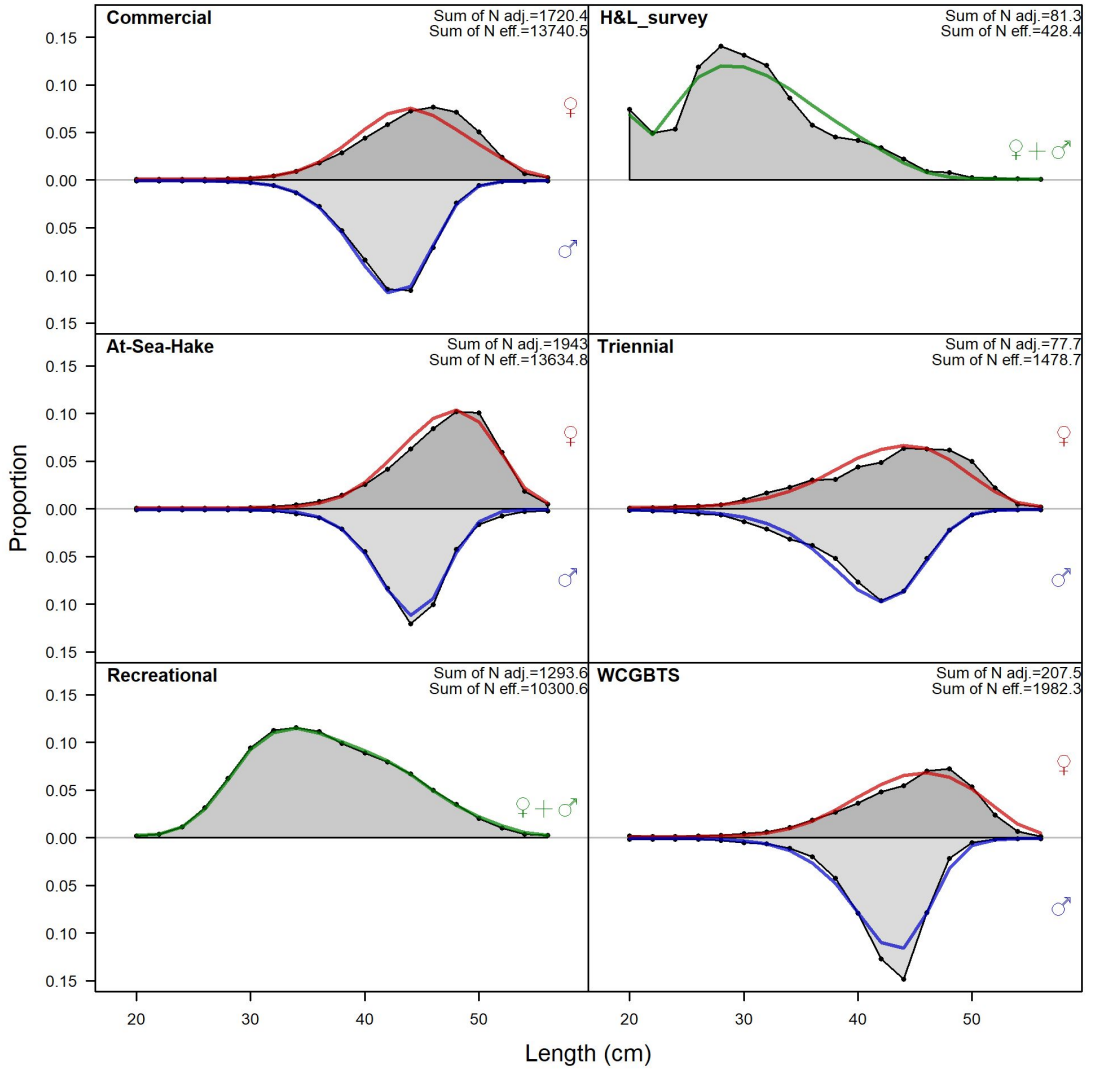
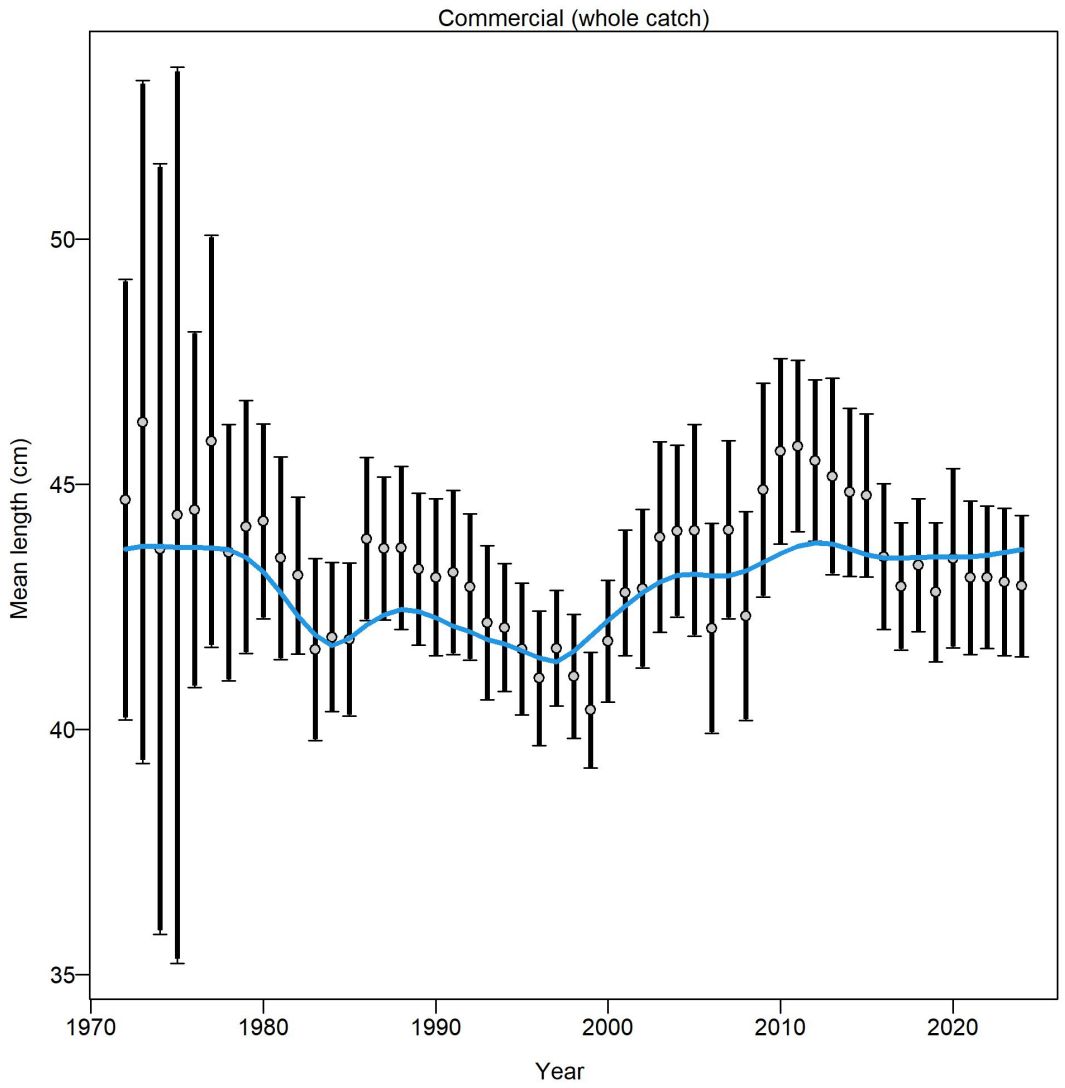
Aggregate fits to length compositions

- Some skew with fitting female trawl samples, especially commercial
- H&L fits would likely improve with sex-specific parameters, but data not available



Fits to commercial mean lengths (most informative fleet)

Mean length slightly underestimated ~2009-2015



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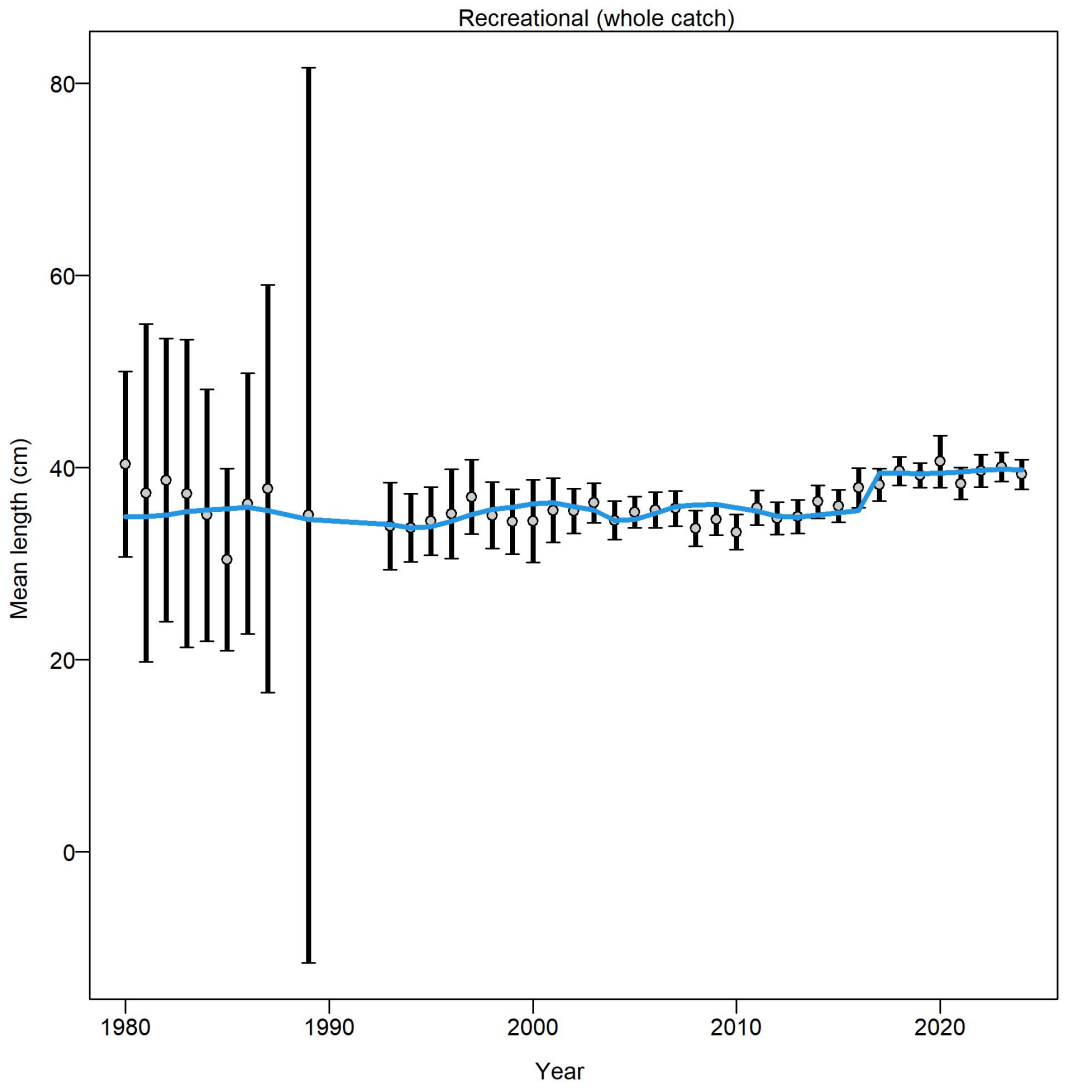
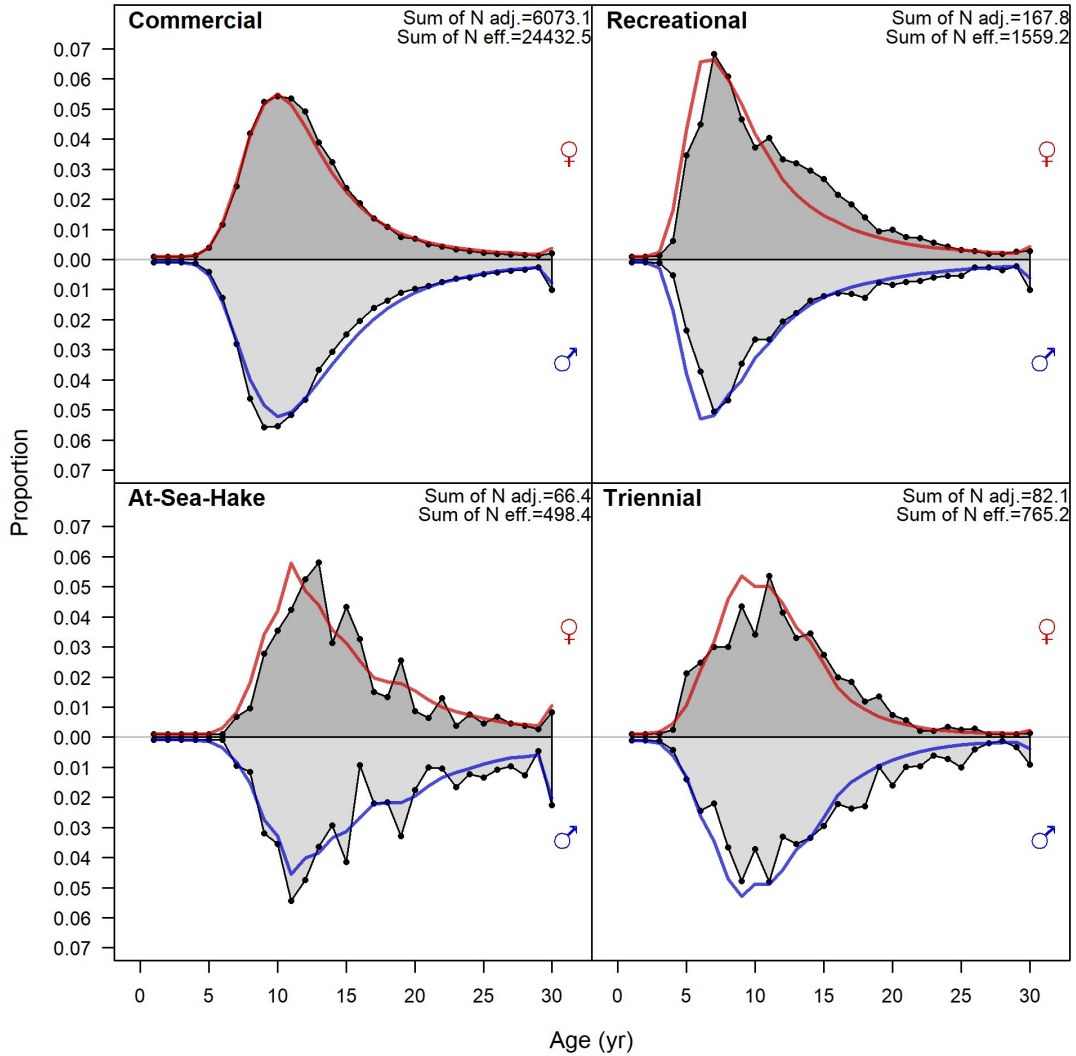
Fits to recreational mean lengths

- Block in 2017 needed to capture increase in mean length
- Associated with management changes



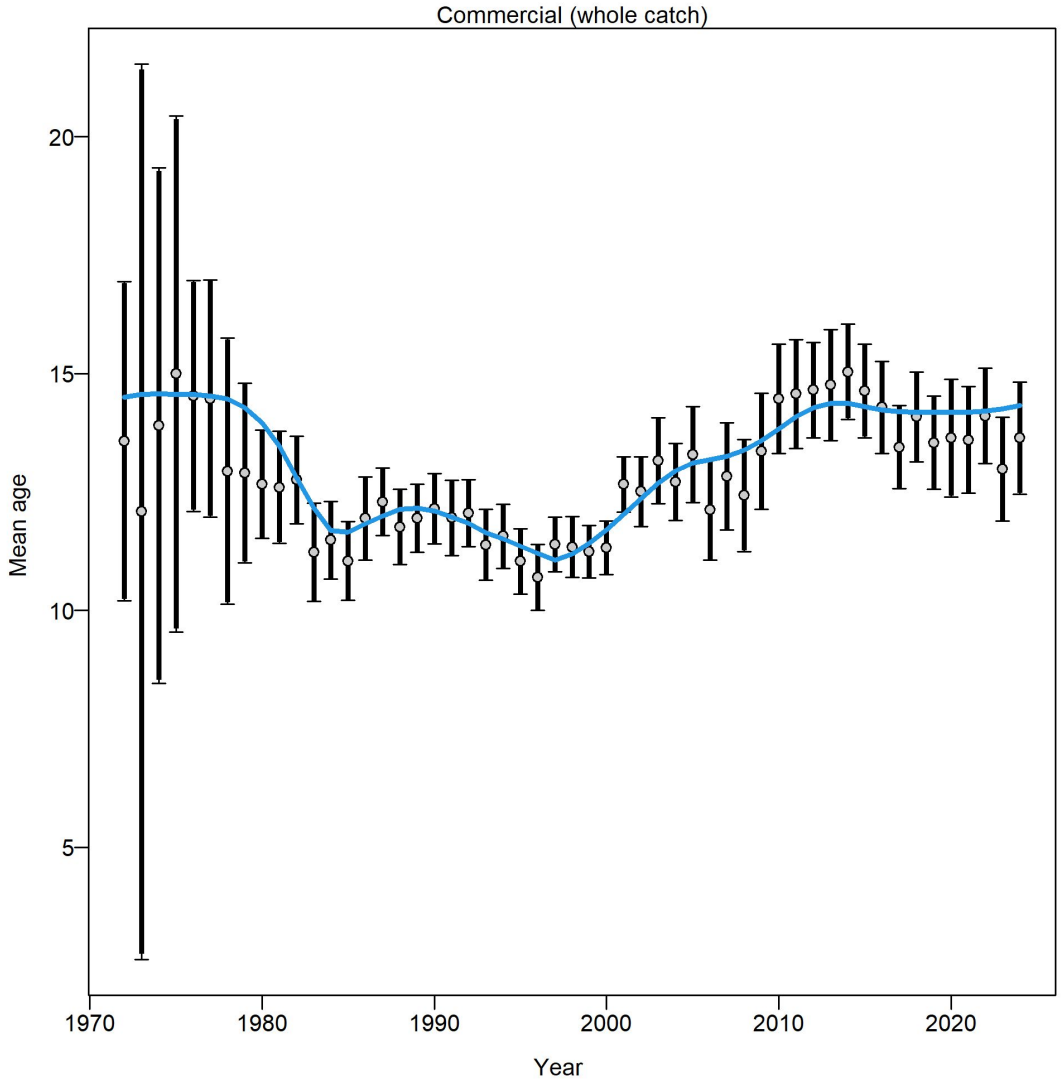
Aggregate fits to age compositions

Generally good



Fits to commercial mean age

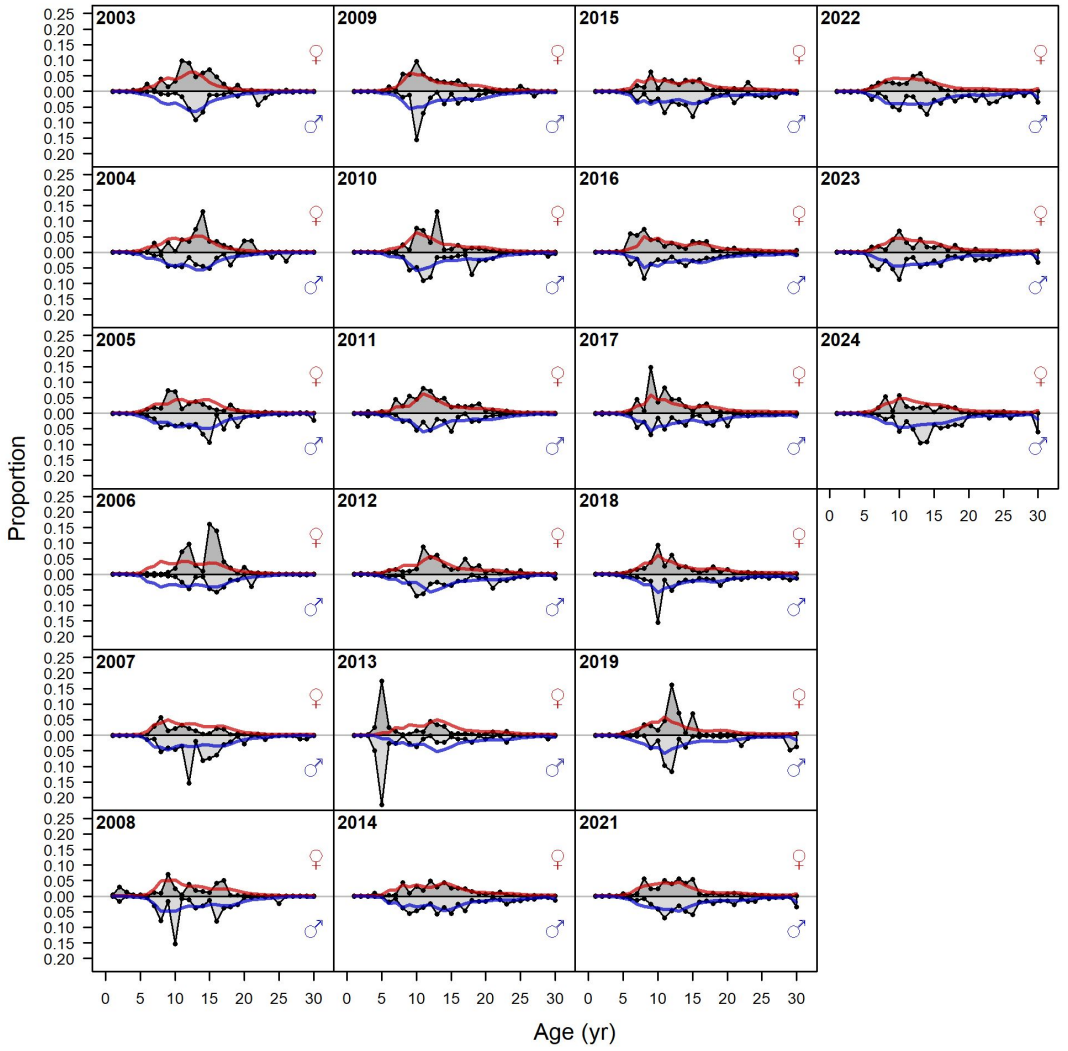
Fits for 2009-2015 are better for age data



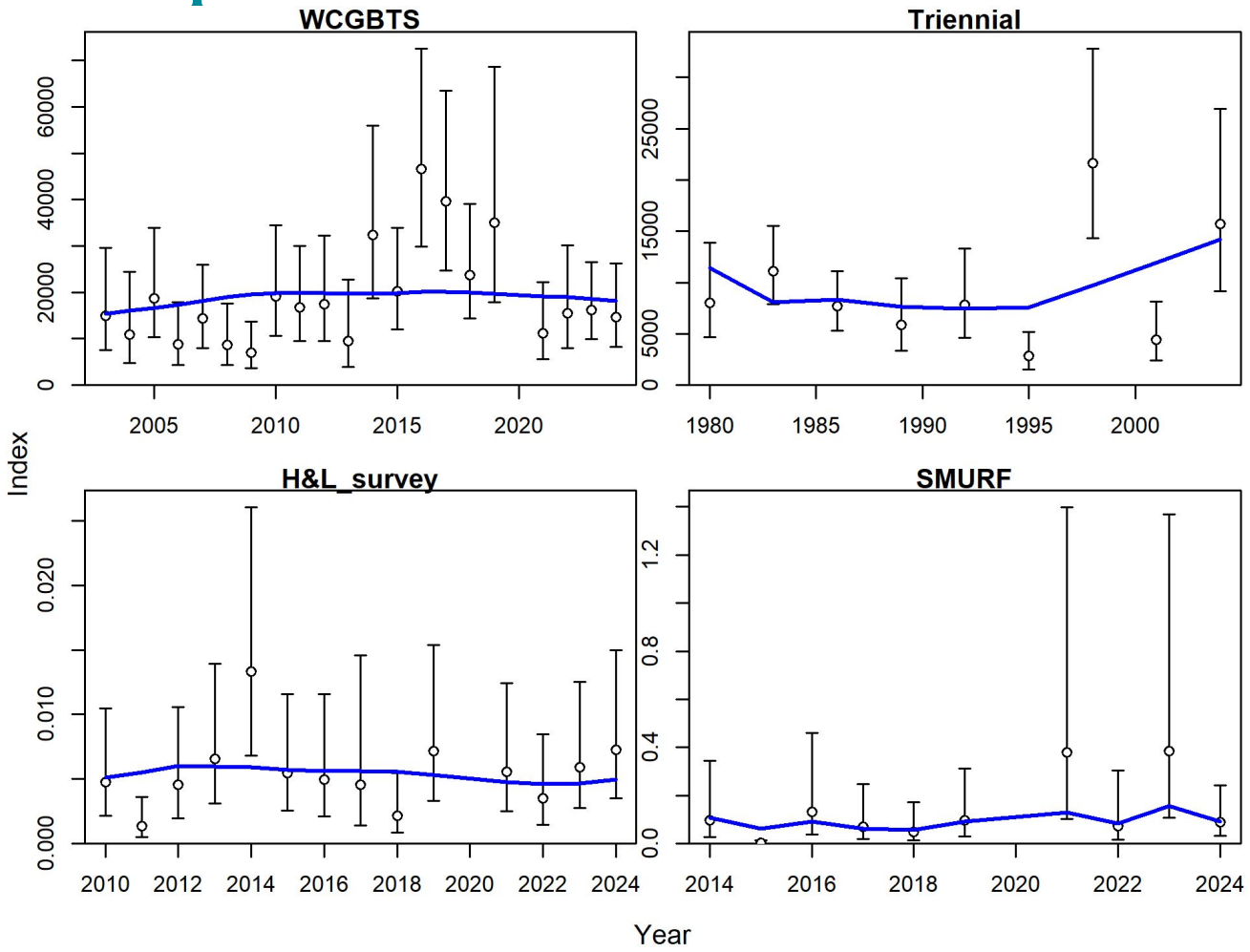
WCGBTS marginal age fits

Provided as marginal ages for visualization

Input in likelihood as conditional age-at-length



Fits to 2 longest indices have below expected coverage of input 95% CI



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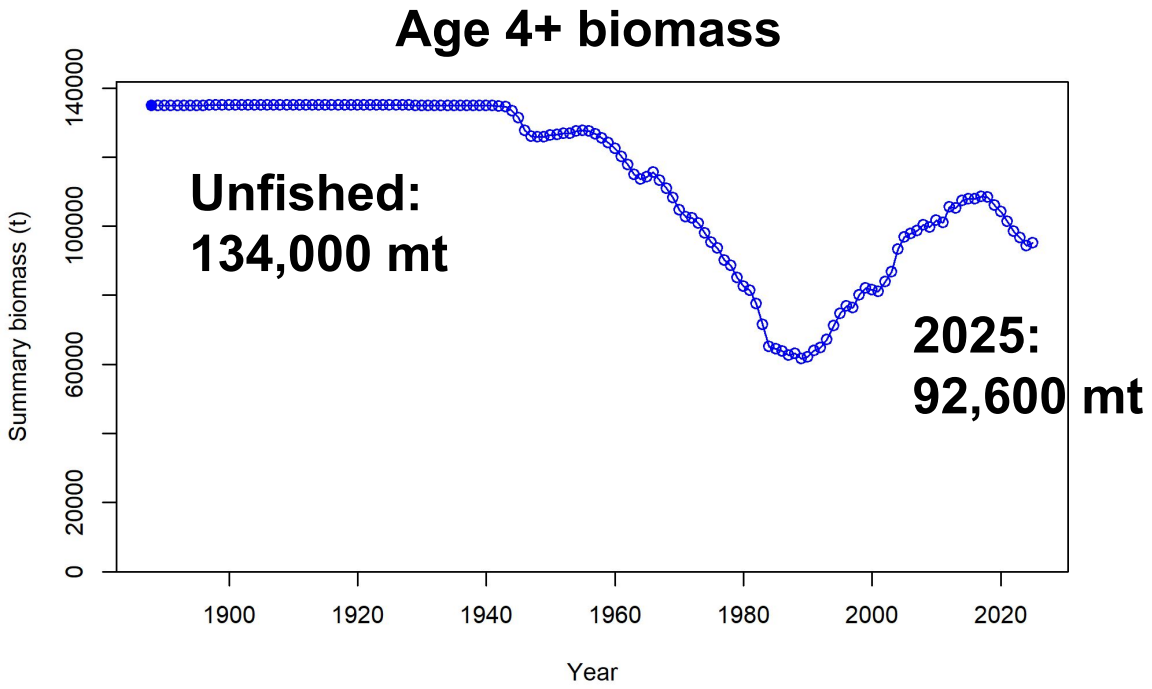
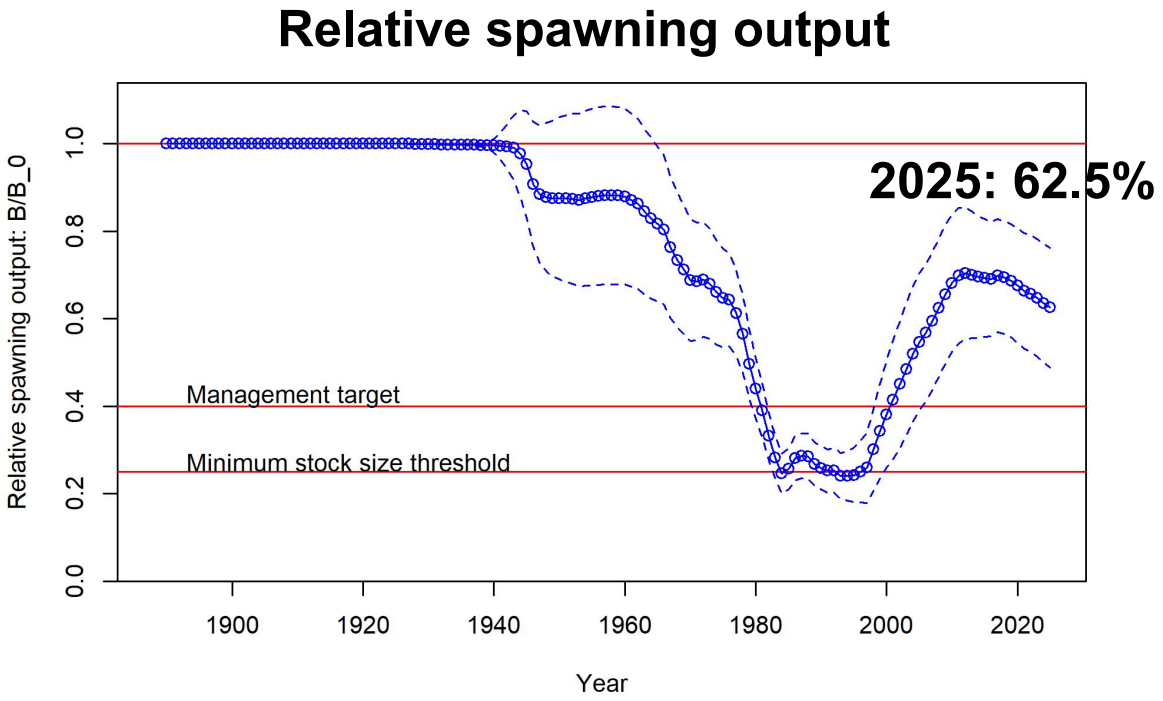
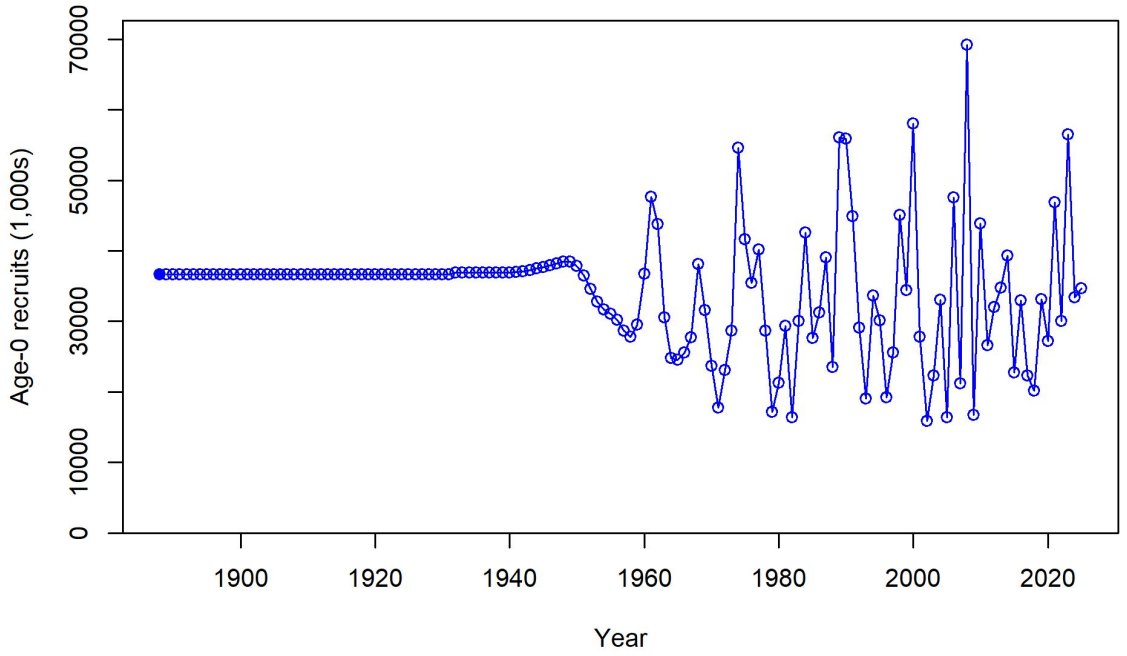
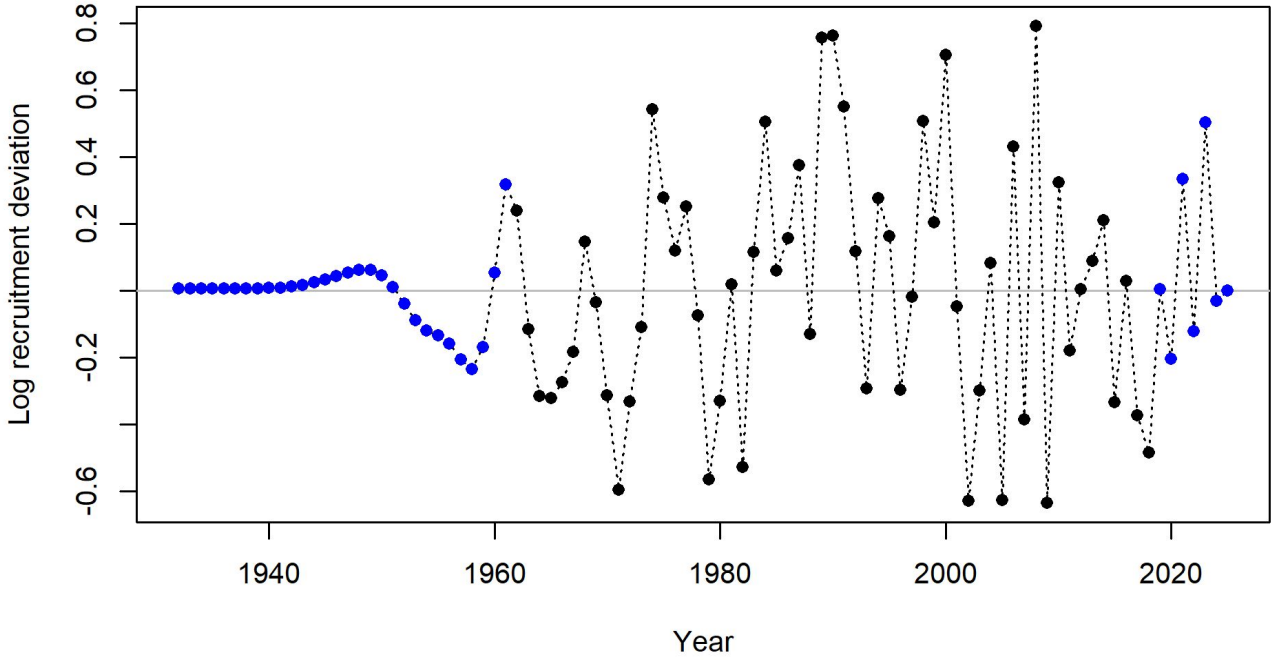
Summary biomass and relative spawning output



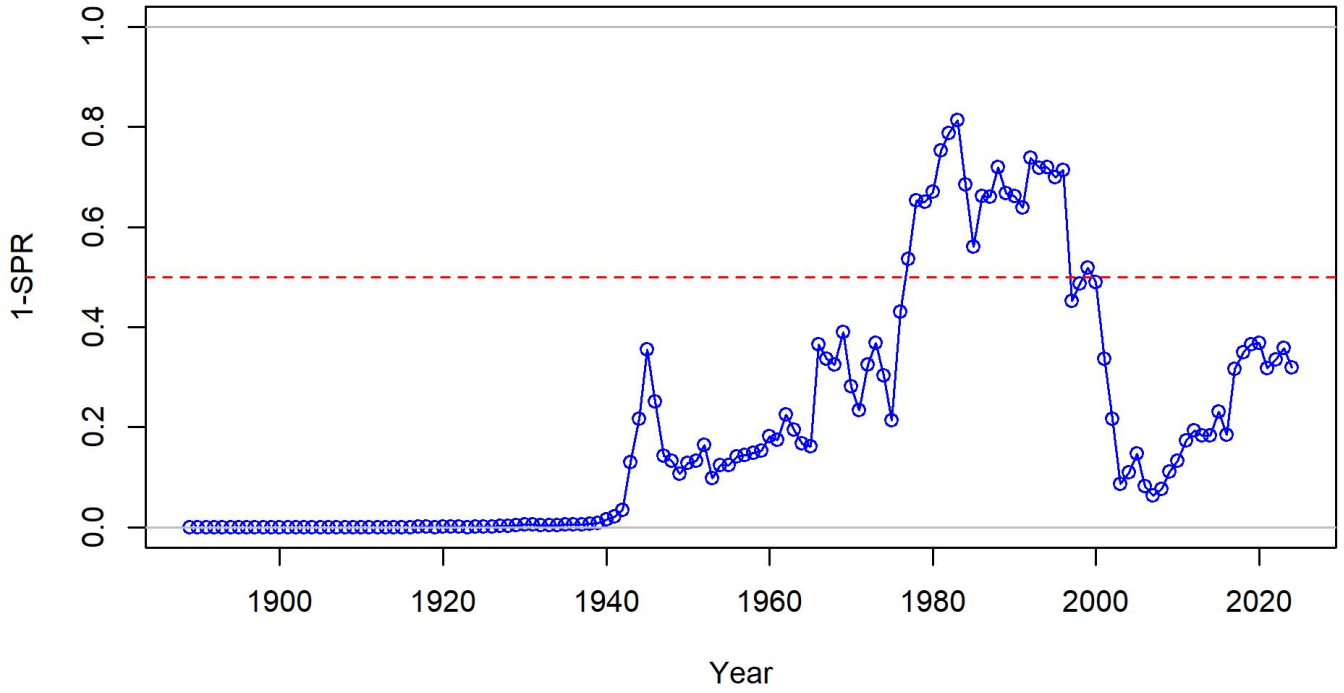


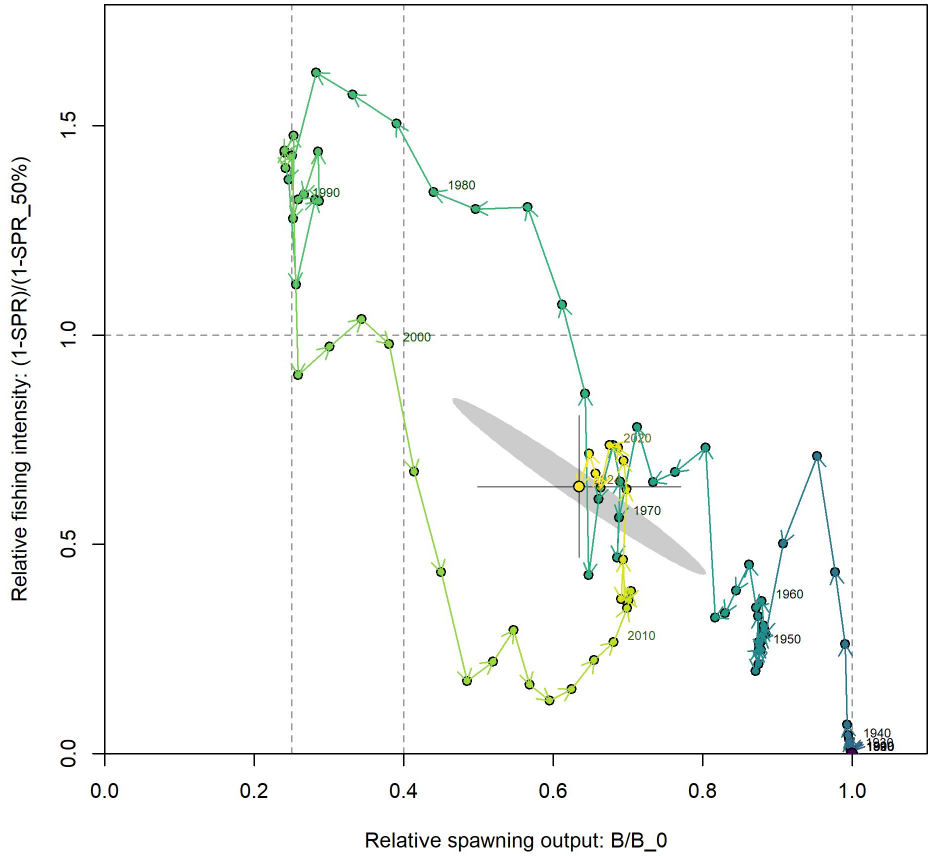
Recruitment and recruitment deviations





Fishing intensity and Kobe plot





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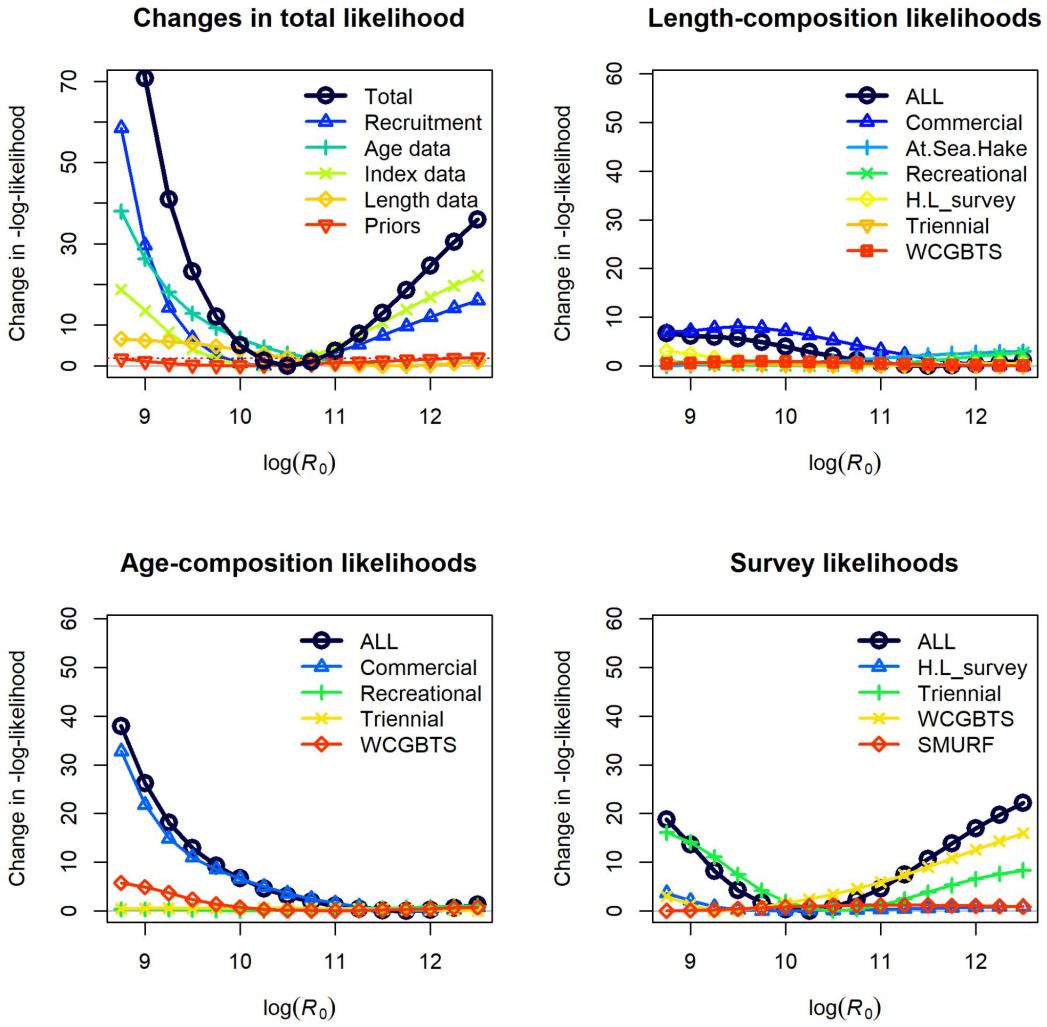
Profiles: Log(R0) likelihoods

- Rec dev prior, indices, age data are most influential
- Age data consistent with larger scale
- WCGBTS and Triennial conflict



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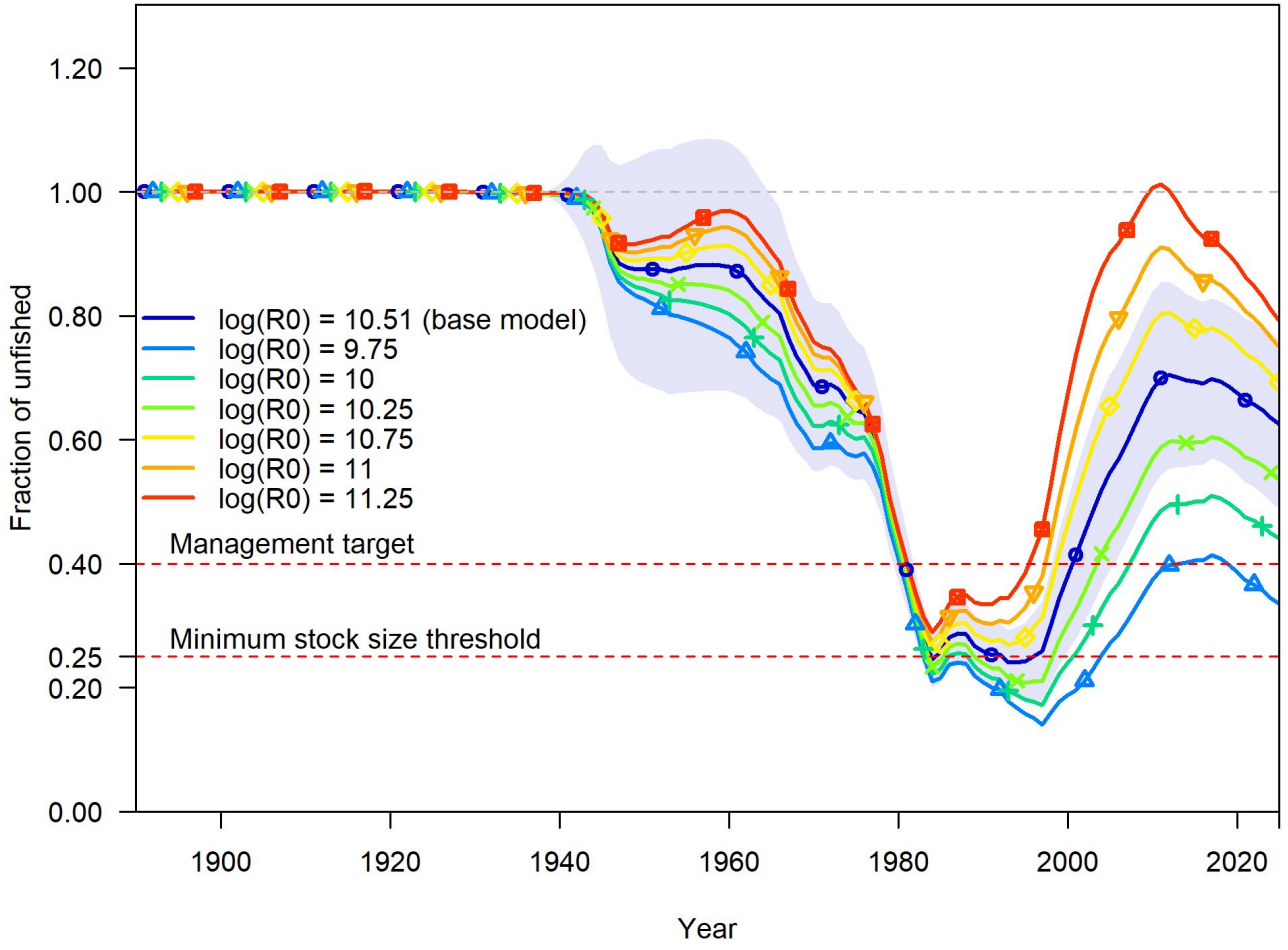

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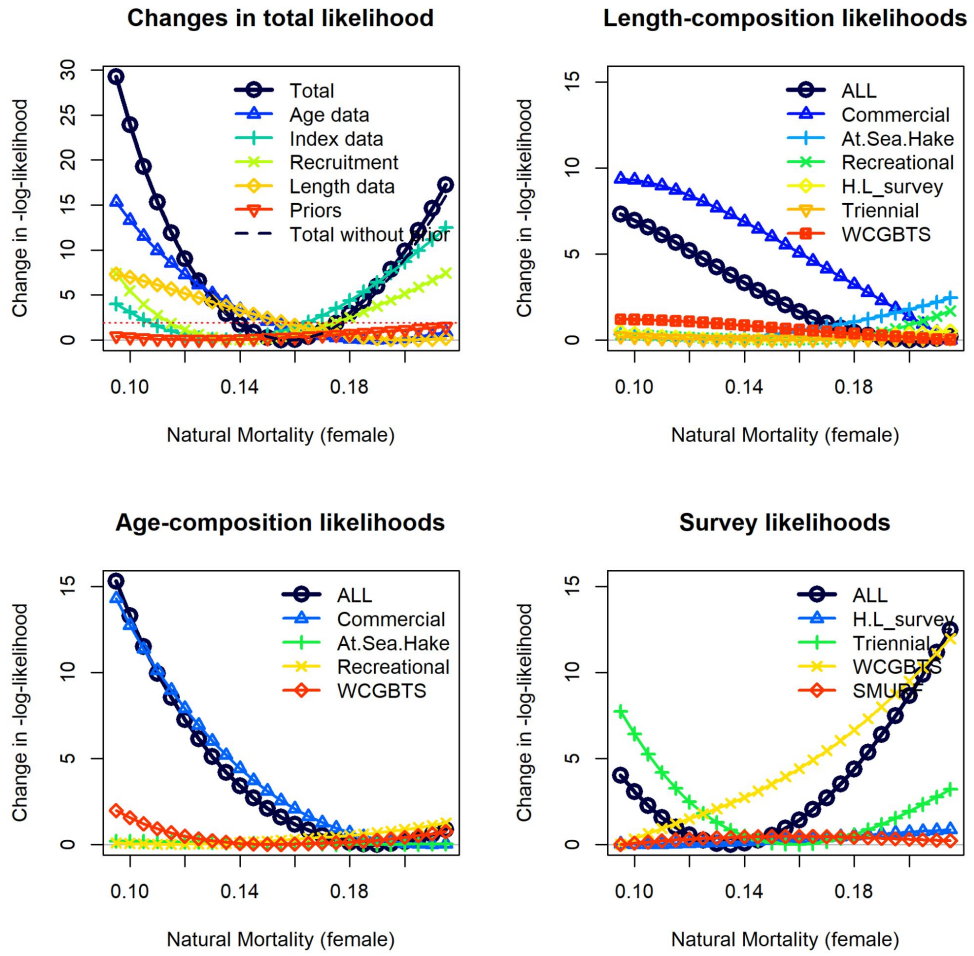
Profiles: Female M likelihoods

- WCGBTS consistent with low M (despite being very dynamic)
- All other data consistent with higher M



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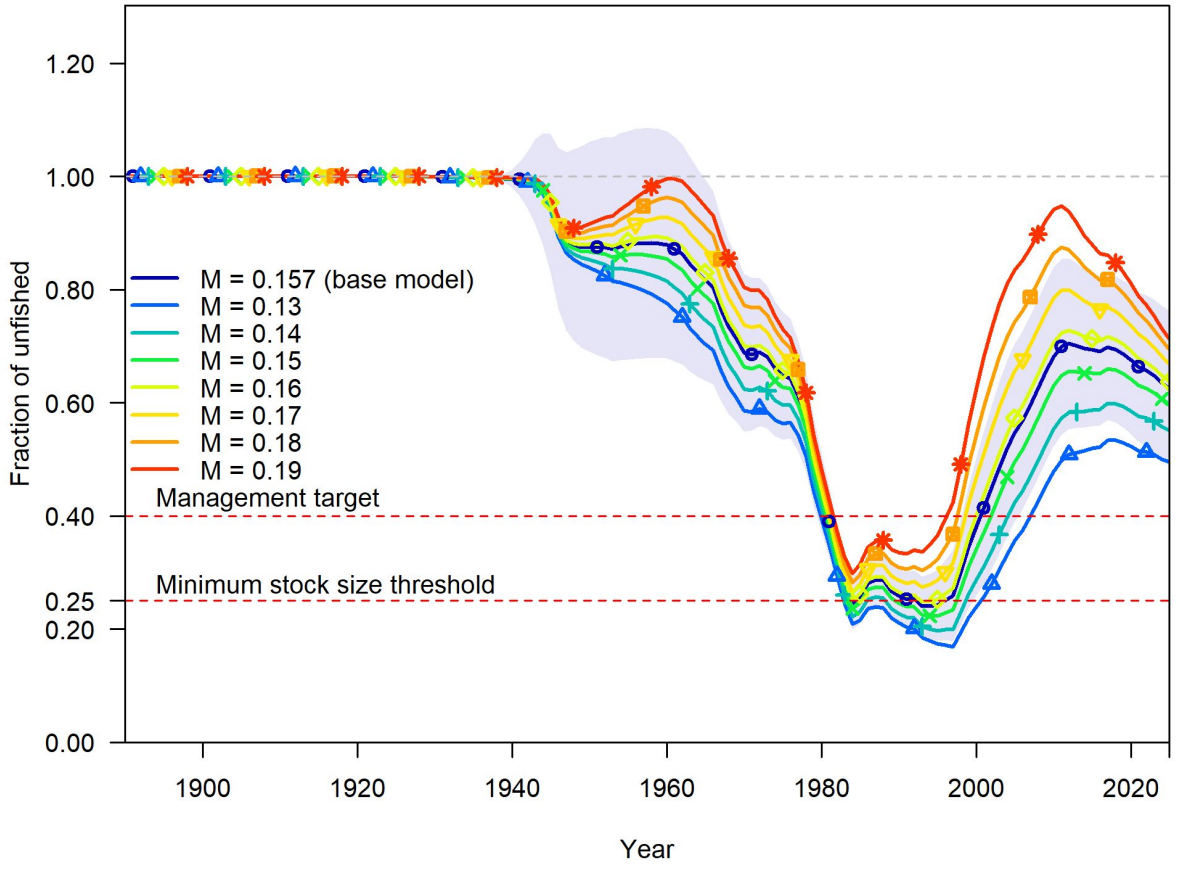

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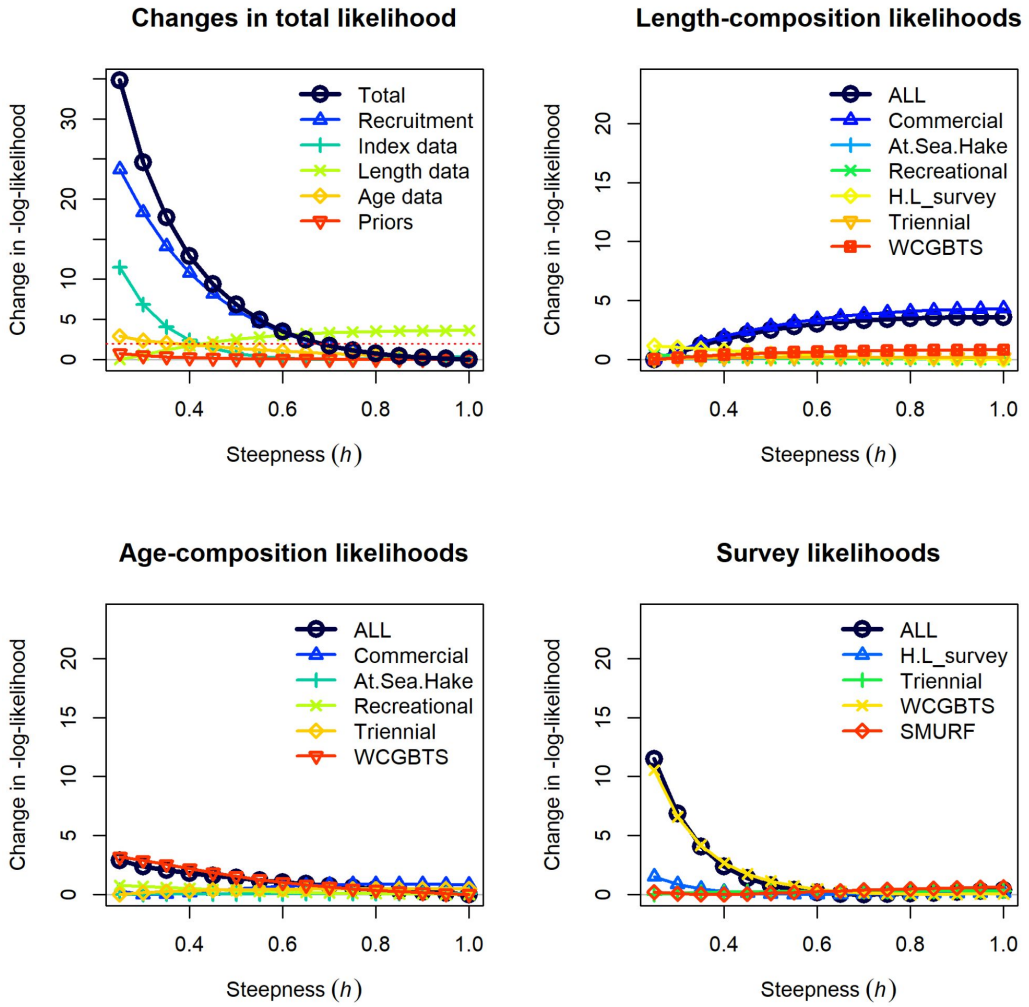
Profiles: steepness likelihoods

- Little information in data to inform estimation
- Tends towards maximum value (1), unrealistic
- Length data supports minimum value (0.2)



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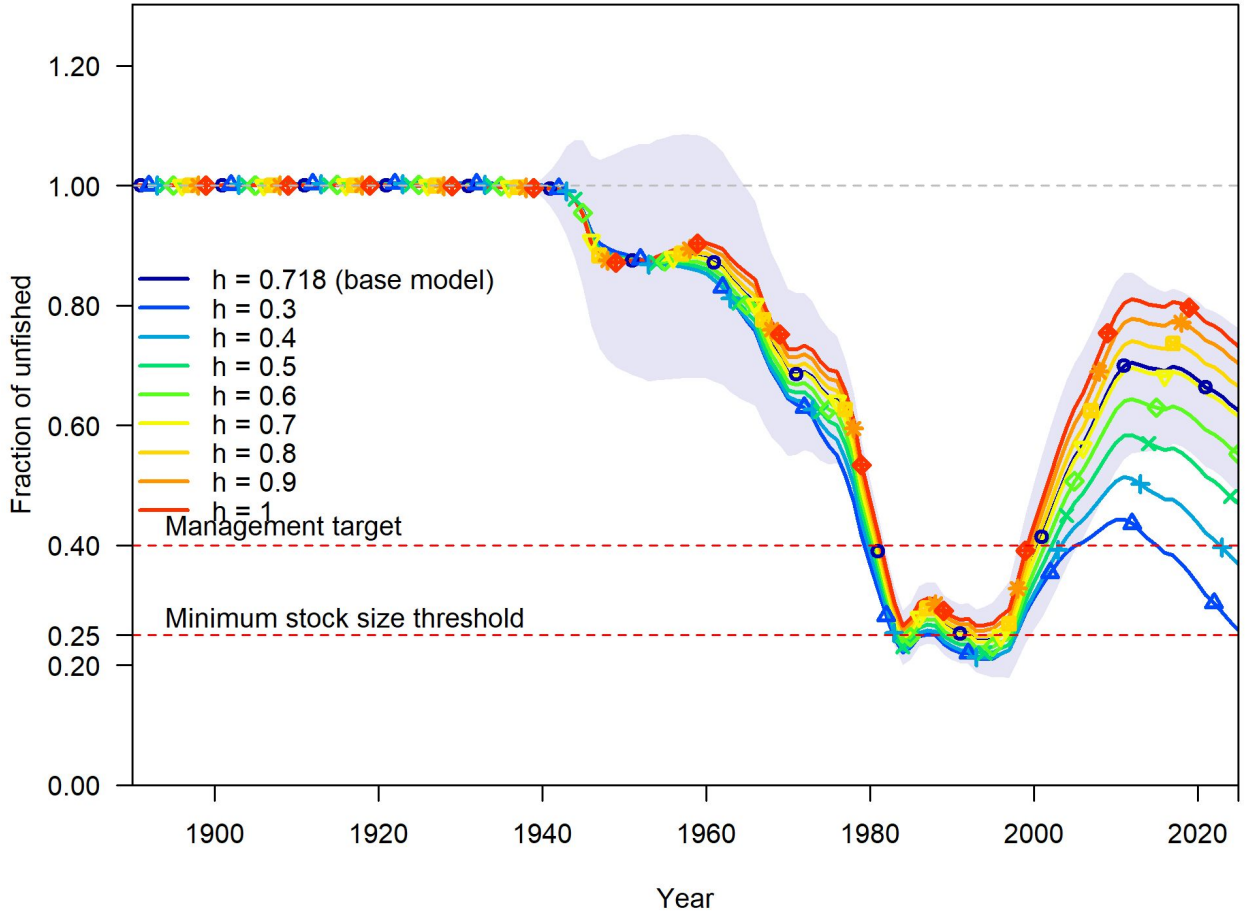
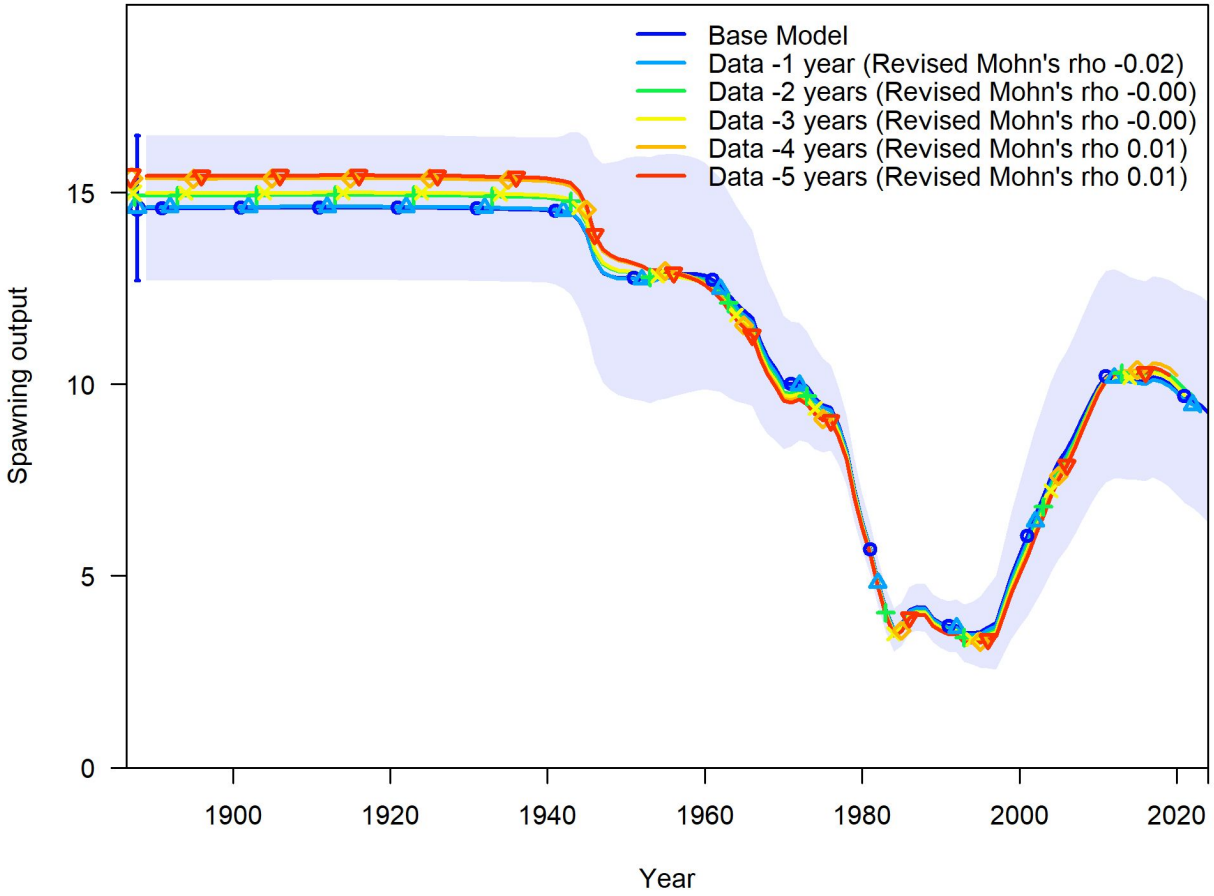
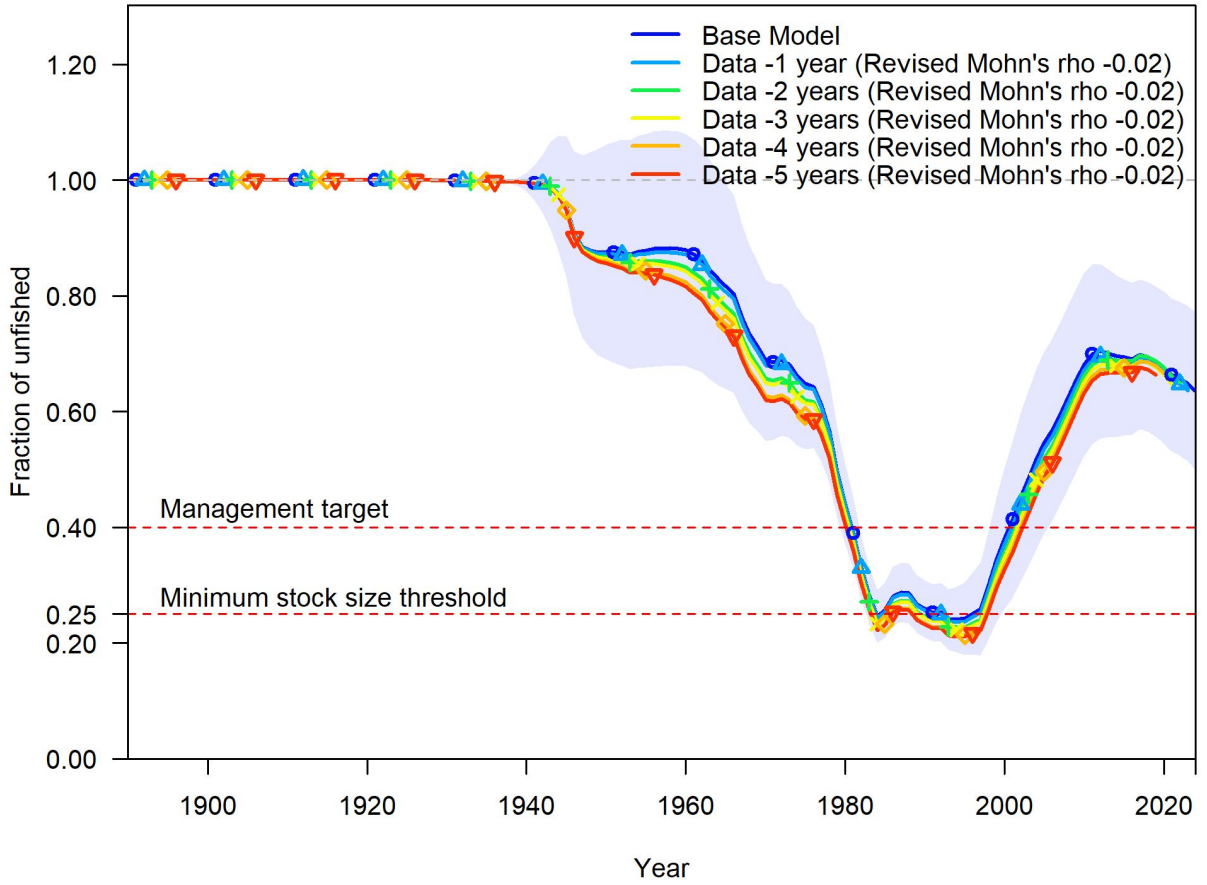


Retrospective runs

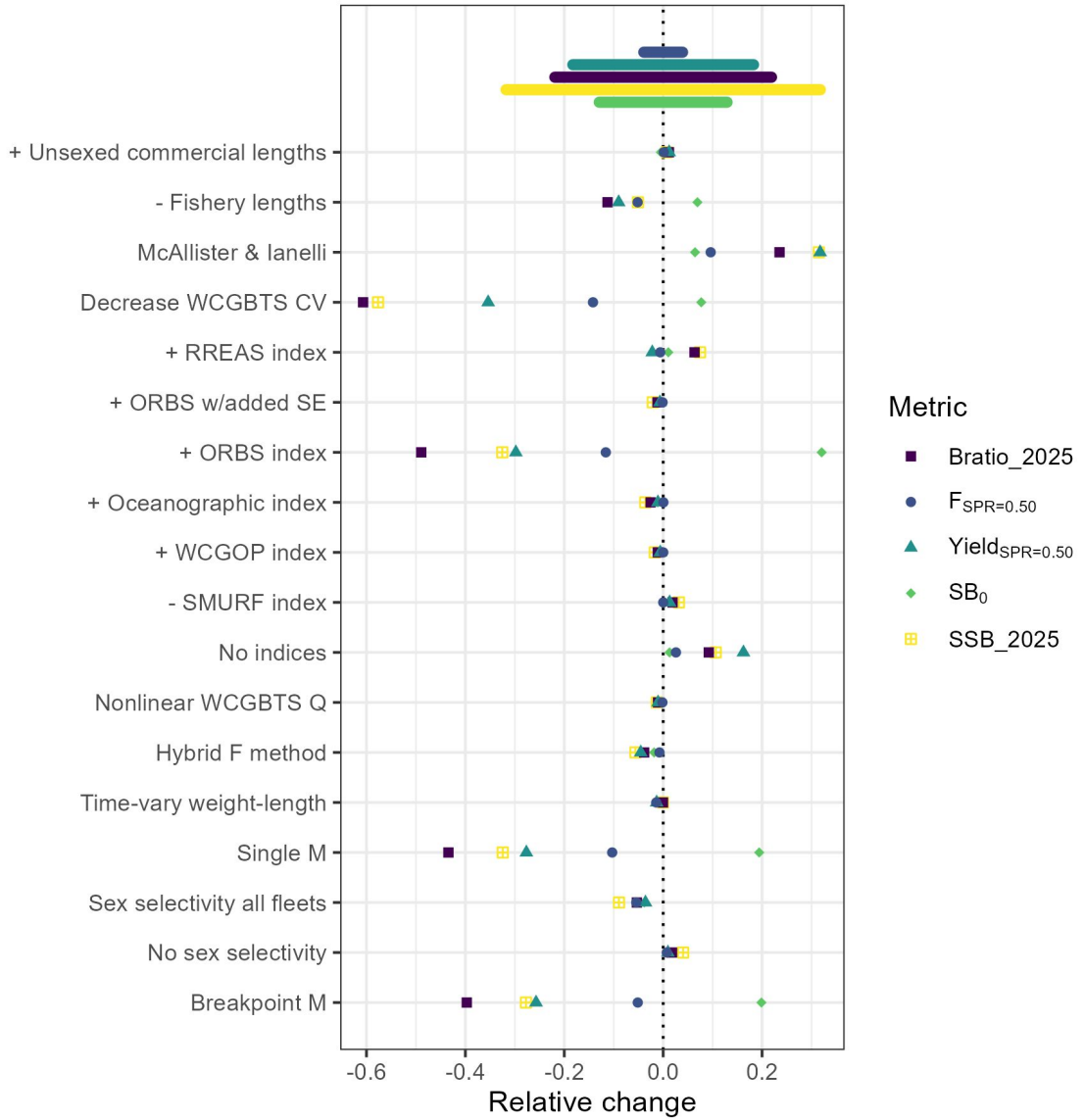




Sensitivities

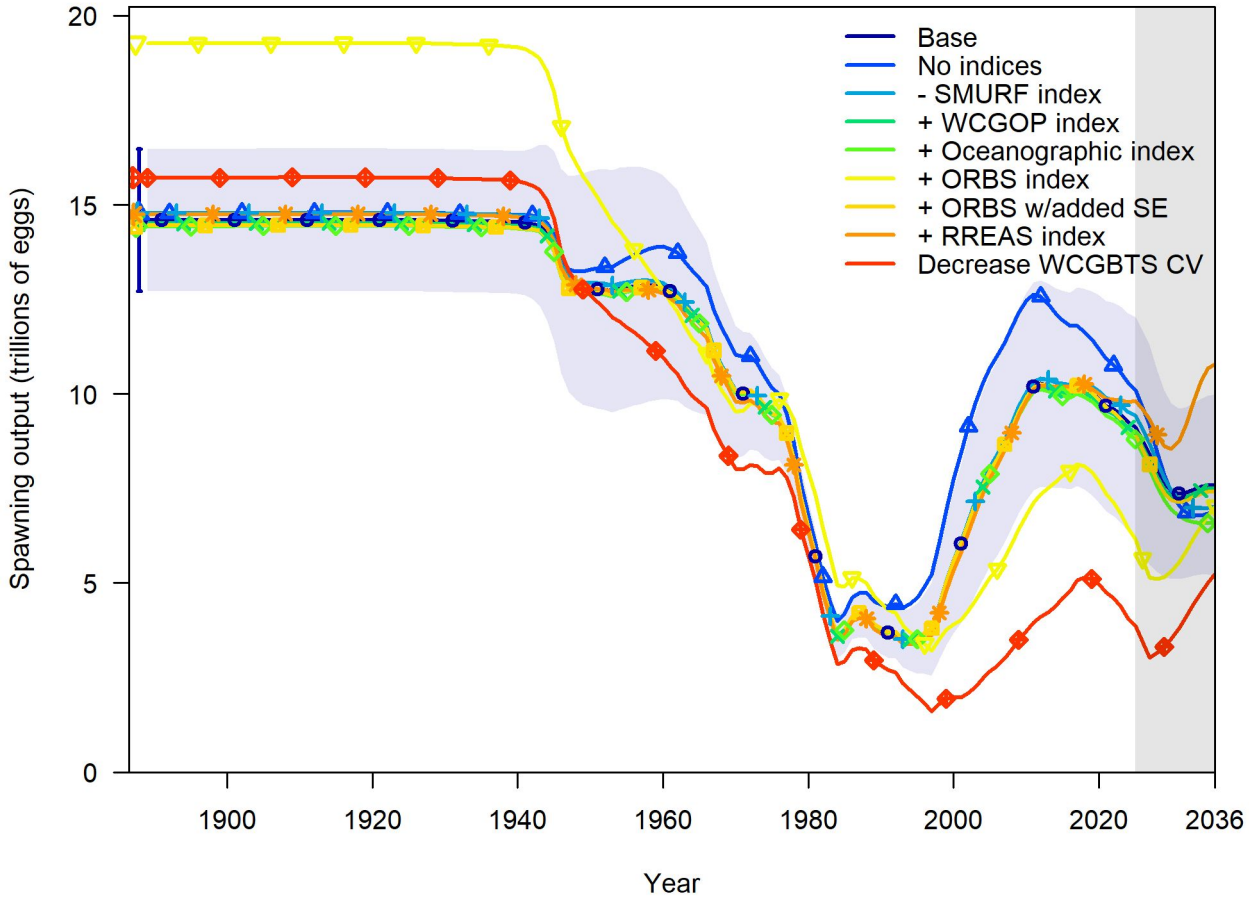
Most sensitive to:

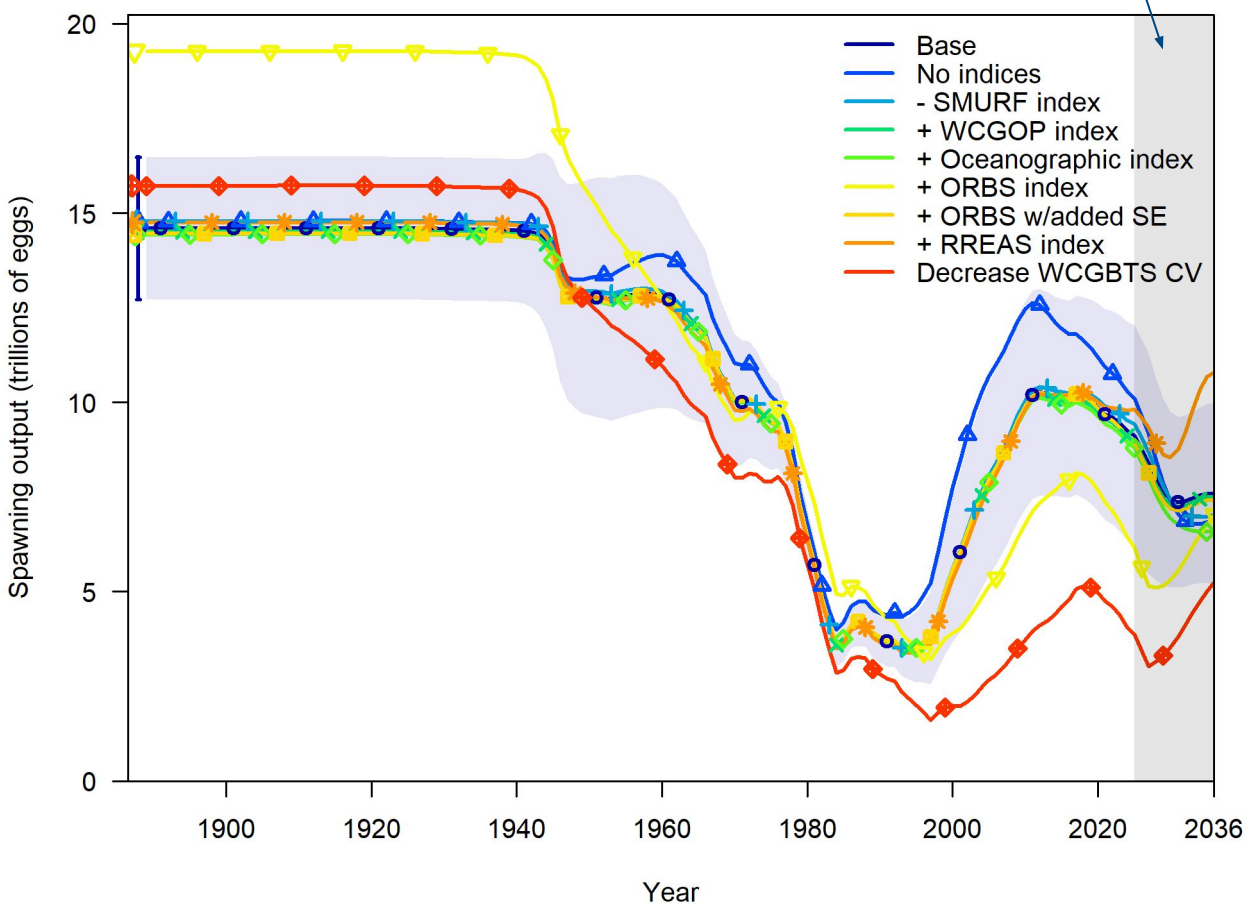
- Composition data weighting
- WCGBTS weight
- Natural mortality treatment



Index sensitivities

Forecast





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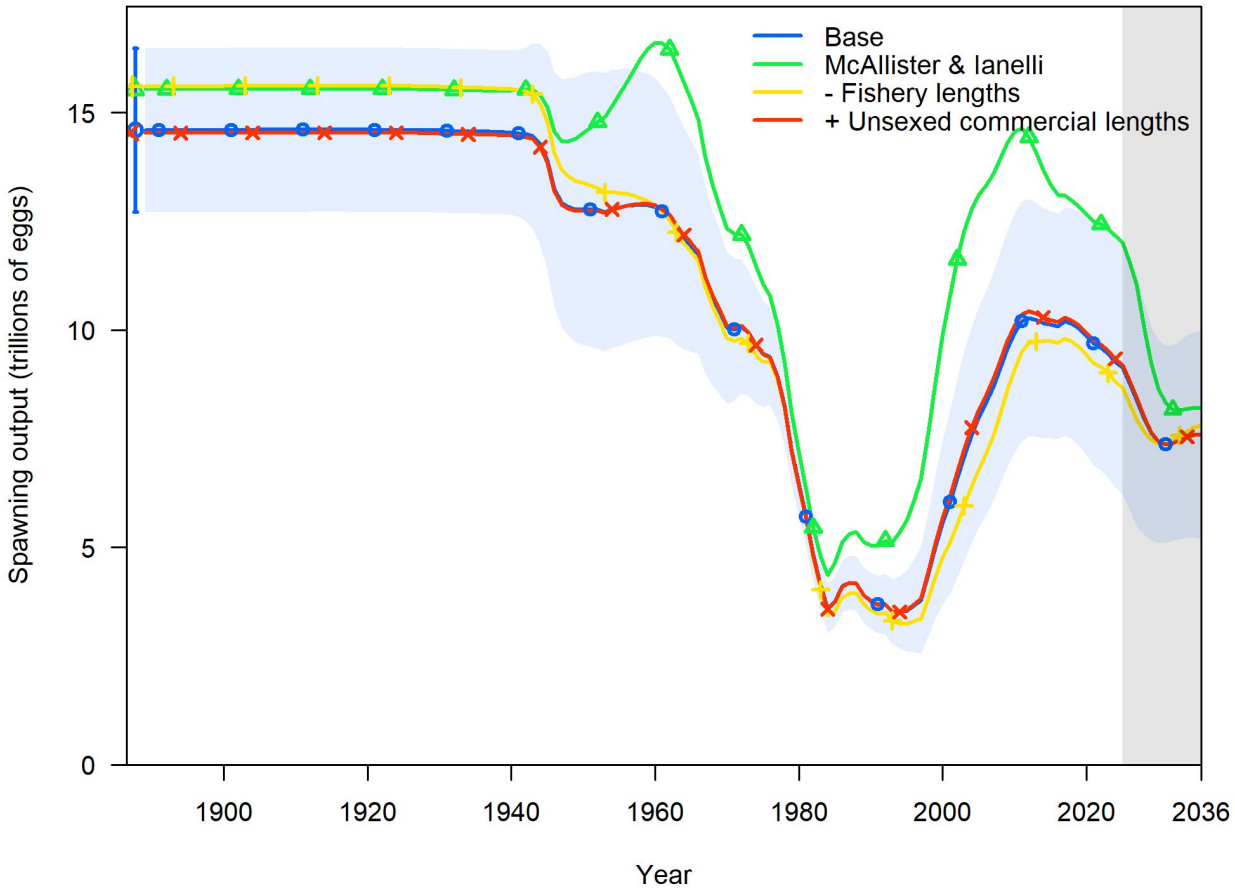
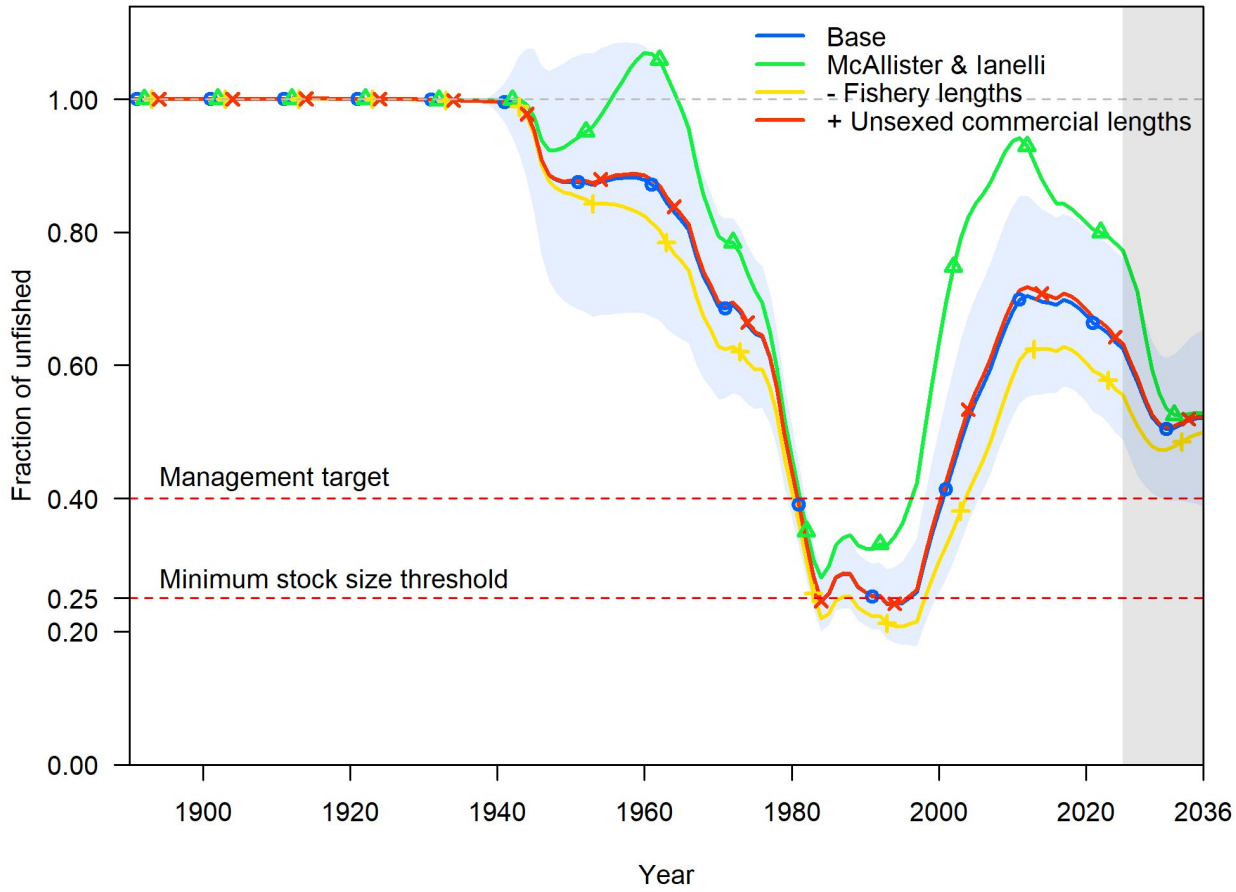
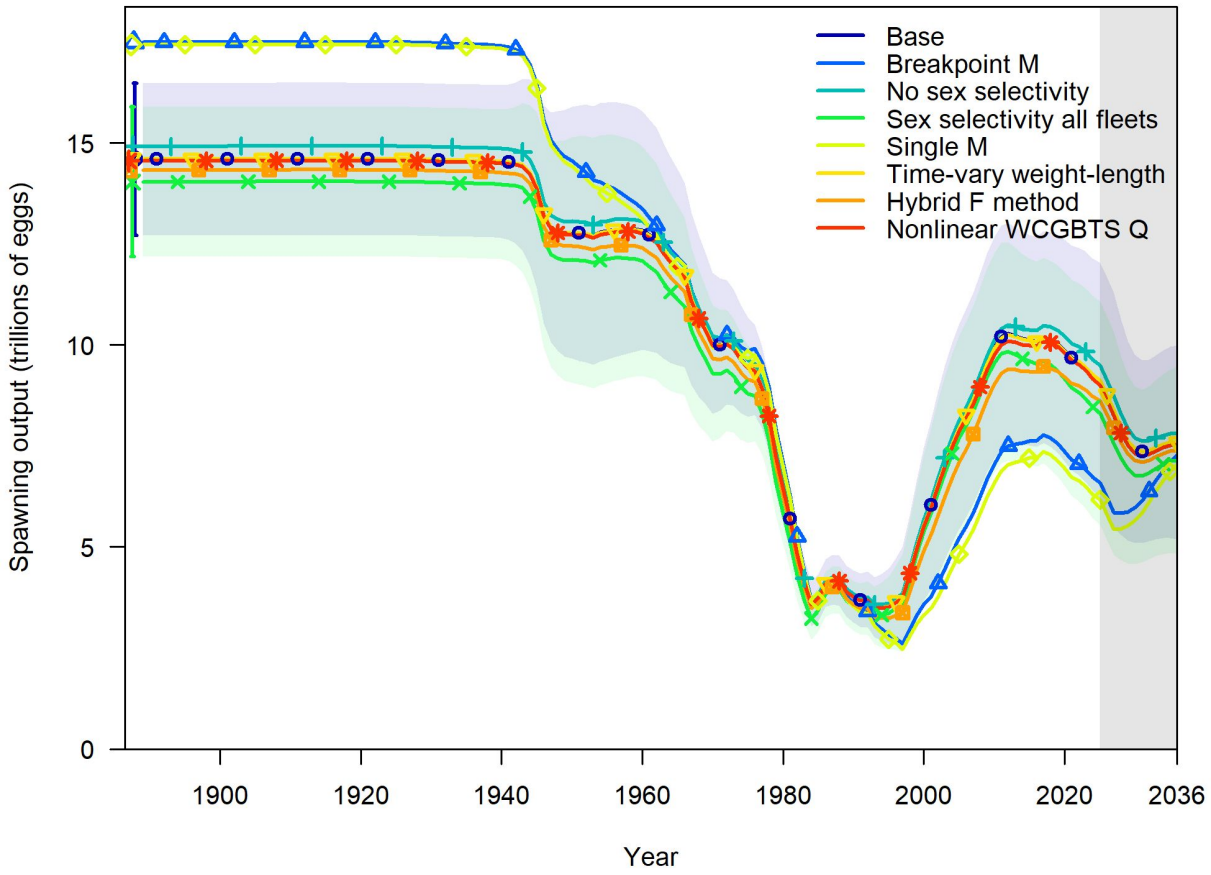
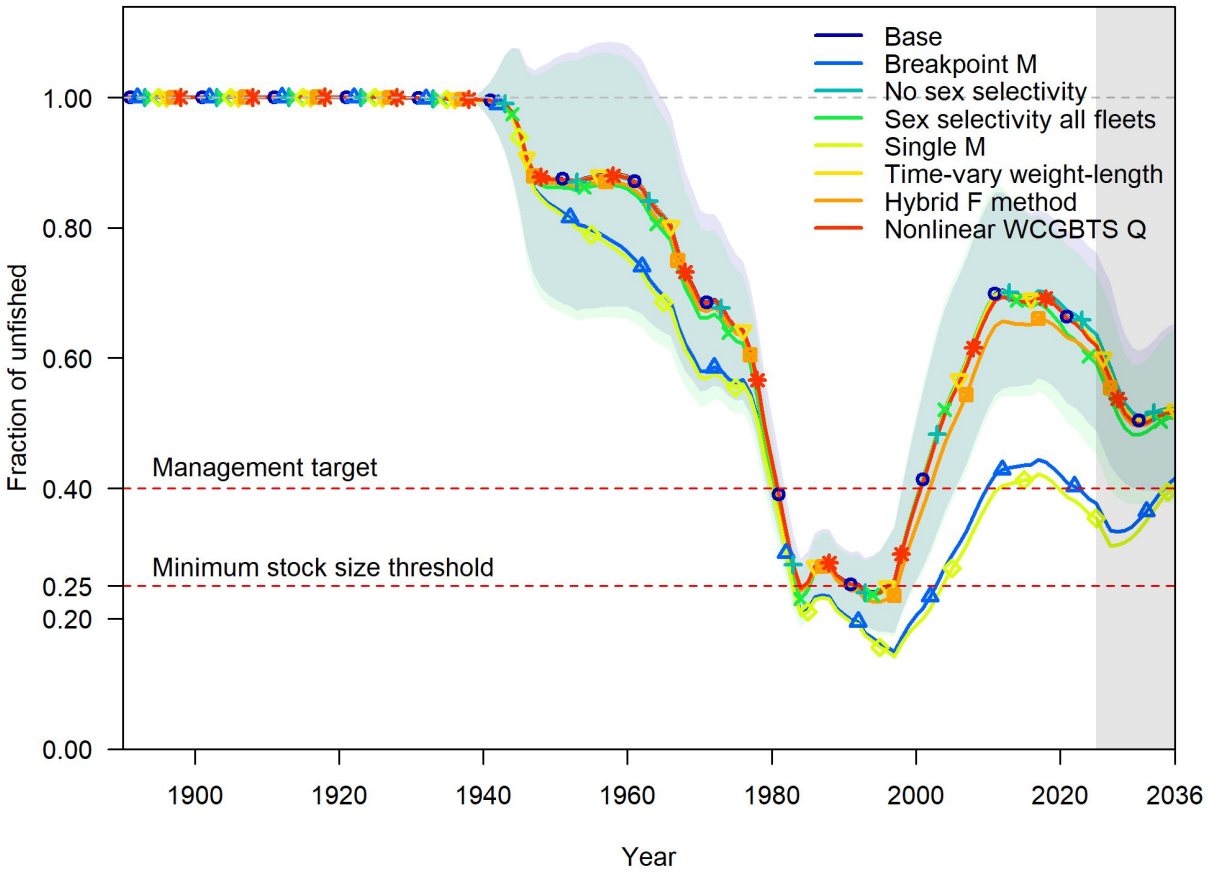
Composition data sensitivities





Modeling sensitivities





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Risk table

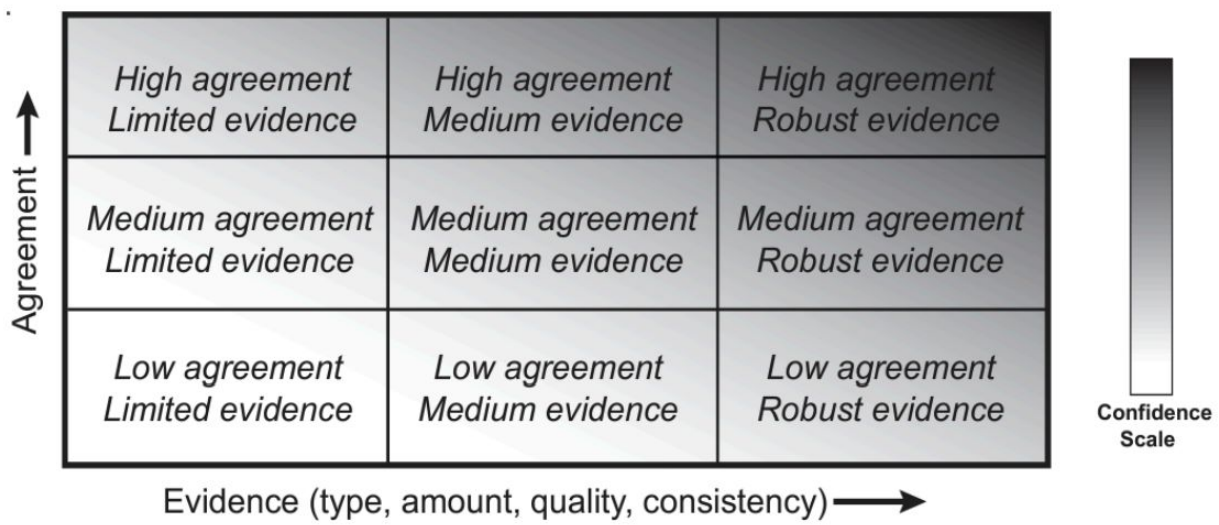
- Environmental and ecosystem condition
  - Recruitment
  - Habitat/Distribution
  - Prey
  - Predators & Competitors
- Assessment data inputs
  - Catch reconstructions
  - Age data
  - Age data fits
  - Maturity data
  - Indices
  - Bycatch
- Assessment model fits and structural uncertainty
  - Evaluated with final model/after STAR panel

	Environmental and ecosystem conditions	Assessment data inputs	Assessment model fits and structural uncertainty
Level 1: Favorable			
Level 2: Neutral			
Level 3: Unfavorable			

Risk table: Environmental and ecosystem conditions

- Specifically consider trends over the last 5 - 7 years
- Only consider information not represented in the base model

IPCC framework used to assign overall levels across information



Risk table: Environmental and ecosystem conditions

- Recruitment:
  - Oceanographic data, YOY indices,
- Habitat & Distribution:
  - Kelp watch CA/OR/WA
  - Distributions
- Prey:
  - ESR and CCIEA data
  - krill, herring, juvenile hake, copepods
- Predators/Competitors
  - Ecopath
  - California sea lions, fur seals, harbor seals, lingcod, sablefish

Level 2: medium to high confidence based on agreement between majority of indicators, robust evidence, and no apparent concerns

Ecosystem and environmental conditions
• Recruitment: unfavorable to neutral conditions for recruitment
• Habitat: Neutral
• Prey: Most available evidence suggests adequate forage for yellowtail in 2024 and recent years. Caveat: low krill in 2023 acoustic surveys. • Predators: no trend in abundance for 6 of 7 predators in the last 5 yrs • Competitors: Some potential for hake competition for krill, but highly uncertain.
Level 2: neutral

Risk table: Assessment data inputs

- Catch reconstruction is reliable for a rockfish species, with some uncertainty in historical years when rockfish were not always sorted to species
- More age data than almost any other groundfish species. Covers shoreside, at-sea, and recreational sectors. Shoreside age data dating back to the 1970s.
- Age data are generally fit well with simple selectivity assumptions. Some mild issues with commercial (shoreside) length data.
- Species-specific maturity and fecundity; maturity data collected over the last ~10 years
- Bottom trawl survey may not be reliable way to generate index for midwater rockfish
- New exploration of early life history and hook and line surveys
- Generally a target species with most catch landed, only limited bycatch

Level 1: favorable / above average

Risk table: Assessment model fits and structural uncertainty

To fill out this week! Things to consider:

- Model flexibility to estimate parameters
- Evidence for non-stationarity
- Range of sensitivity models
- Diagnostics- Profiles, retrospectives, geometry of likelihood surface

Thank you!

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