GOA Rex Sole

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November-style SAFE for September 2026

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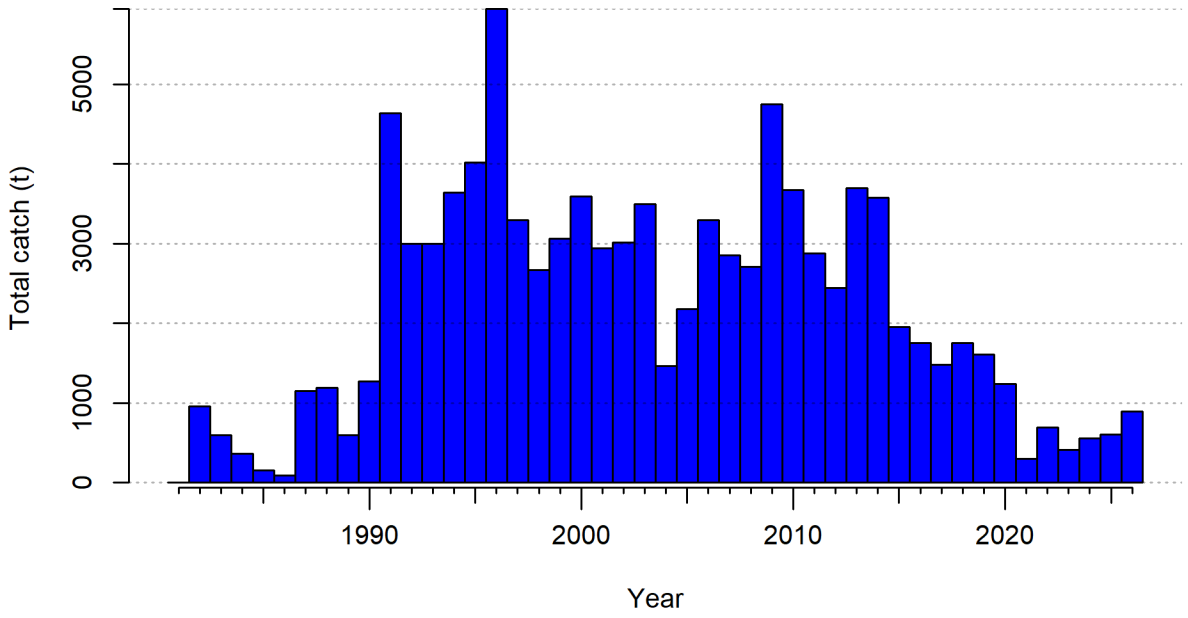
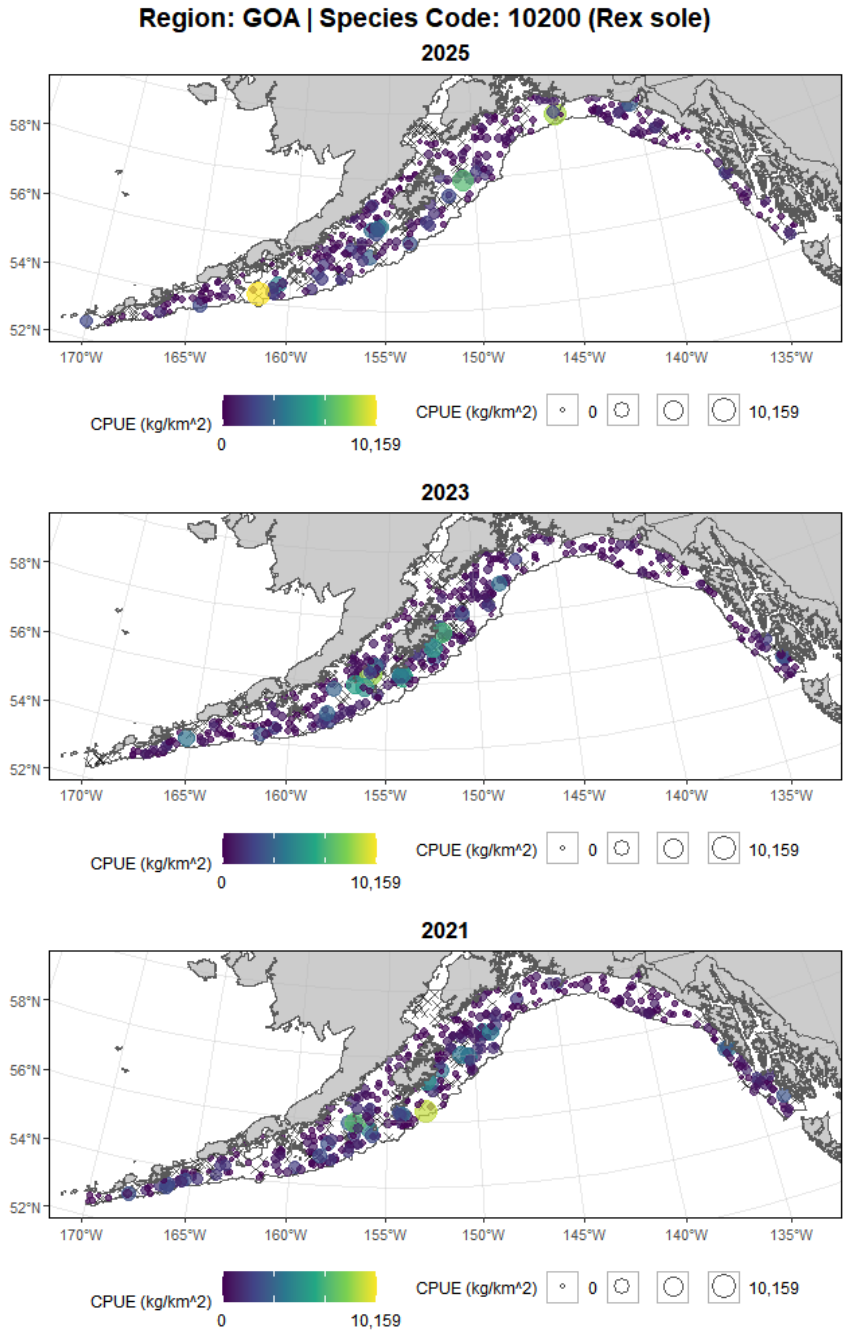
Objectives

- Show/discuss assessment results from ss3 and 2026 recommended ABCs
- Show a bridge to SPoRC from ss3
- Discuss proposal to allow the next GOA rex sole assessment in 4 years to move forward in SPoRC only

Catch Time series

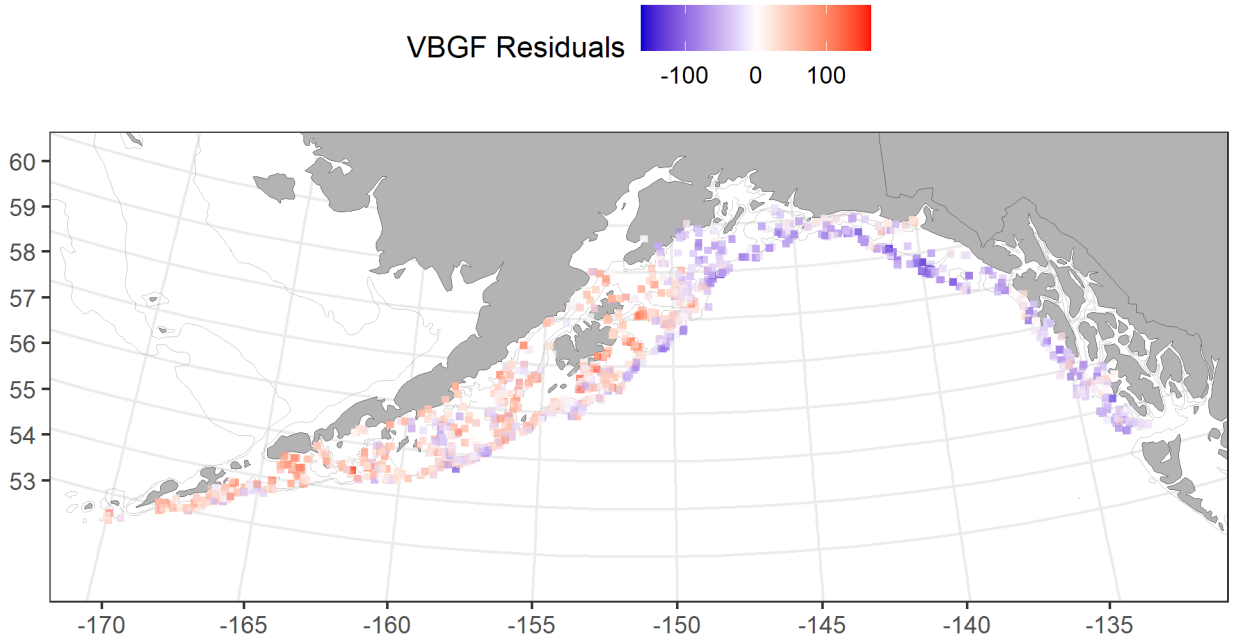


Survey CPUE



Credit: Matt Callahan
https://github.com/MattCallahan-NOAA/gapproductssynopsis

Growth data map:
Residuals from the von-Bertalannfy growth curve



Credit: Beth Matta

General model setup

Two areas: Western-Central, Eastern GOA

Parameters estimated within the model:

- Growth parameters and CV in length-at-age by sex and area
- Fishery age-based selectivity by sex, time-invariant (Western-Central GOA only)
- Survey age-based logistic survey selectivity by area (not sex-specific)
- Survey catchability (with prior), time-invariant, one estimate applies to all areas
- Log mean recruitment (lnR0)
- Early and main recruitment deviations
- Fishing mortality (hybrid method)

Parameters estimated outside of the model

- sigmaR = 0.6
- Natural mortality = 0.17
- Maturity-at-age
- Weight-length relationship

Life history

- Plus group at age 20
- Protracted batch spawning October – May
- Offshore during the spawning season
- Broad distribution of larvae, cross-shelf transport
- Two distinct growth patterns on otoliths (pers. comm. Anderl, Matta)
- Similar maturity-at-age and fishery selectivity-at-age historically

Fishery

- Caught by bottom trawl
- Low utilization, especially in recent years (2-5% of the TAC since 2021)
- High retention (typically ~95%)

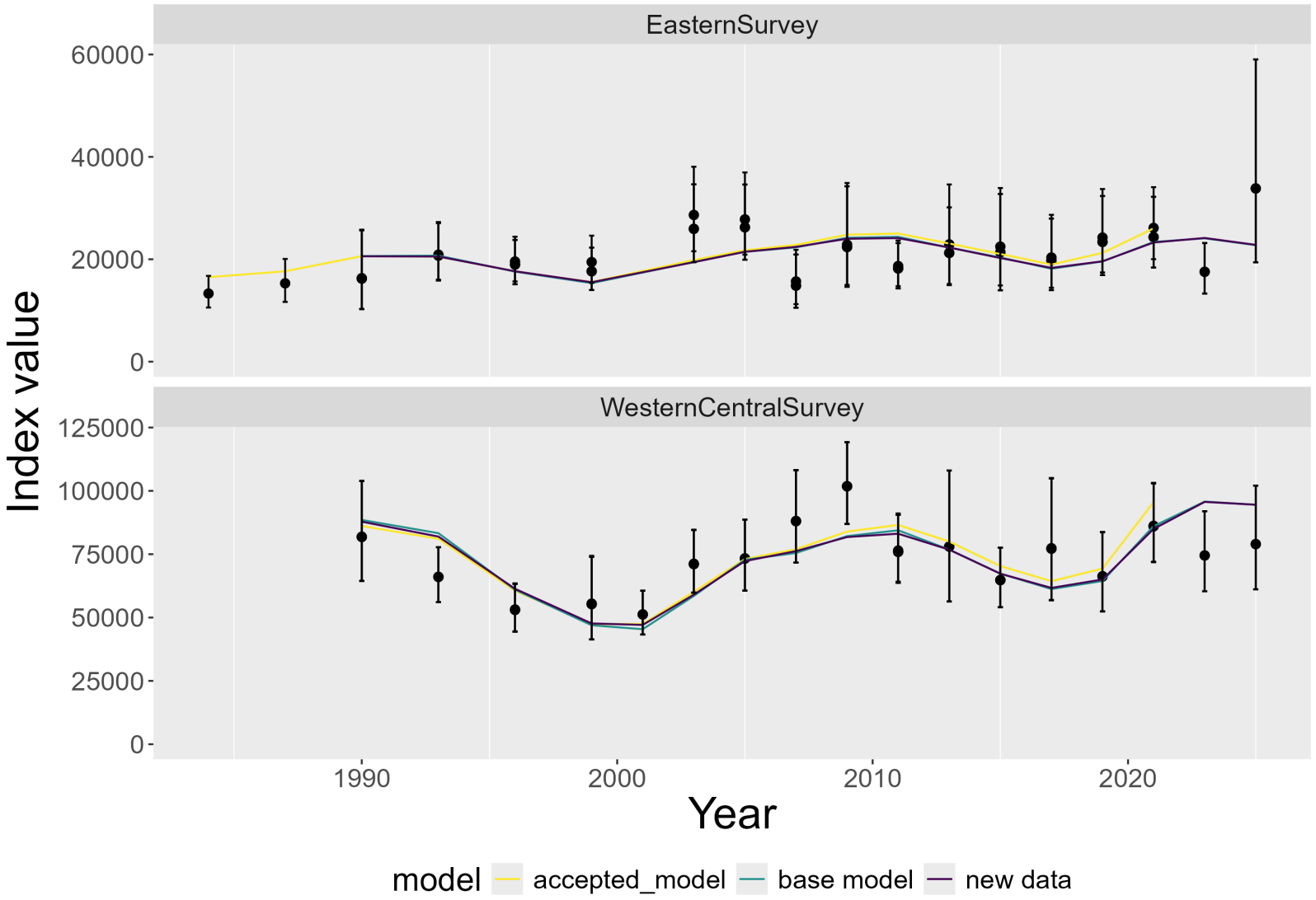
Data inputs

Source	Data	Years
NMFS Groundfish Survey	Survey Biomass	1984-1999 (triennial); 2001-2025 (biennial)
	Ages Conditioned on Length	1984, 1987, 1993, 1999; 2001-2025 (biennial)
	Age Composition*	1984, 1987, 1993, 1999; 2001-2025 (biennial)
	Length Composition	1984-1999 (triennial); 2001-2025 (biennial)
U.S. Trawl Fisheries	Catch	1982-Aug 29, 2026
	Length Composition+	1982-1984, 1990-2026
	Age Composition	1992,1995,1999,2003,2005,2007,2009,2010,2012 2014-2024

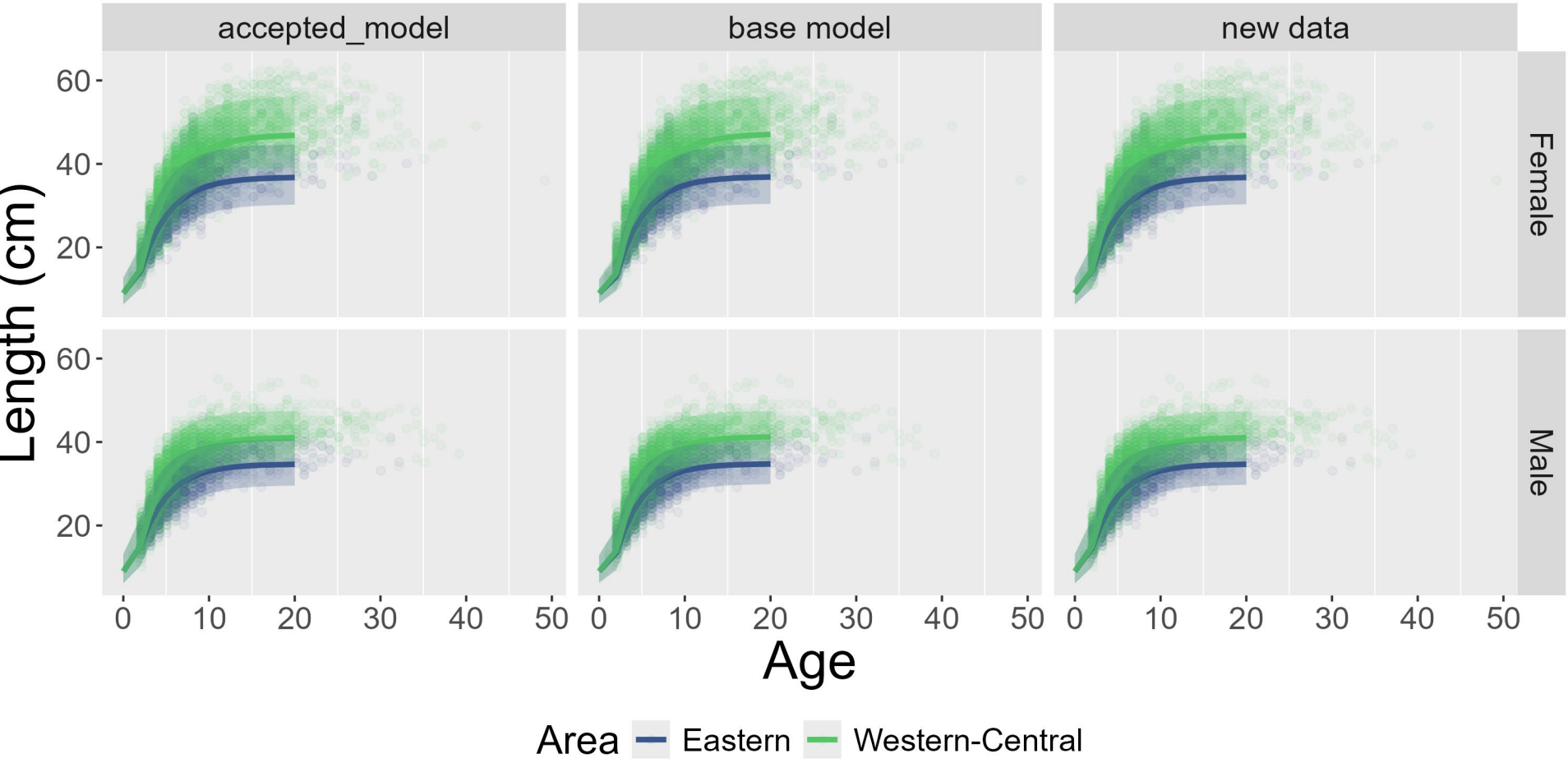
2026 Models

- Accepted 2021 Model
- **Model 25.0**: Housekeeping from the 2021 accepted model
  - presented at CIE review and Sept 2025 PT,
  - specified as the base-model and starting point for final SAFE
- **Model 25.1**: As for Model 25.0 with the addition of an ageing error matrix developed from GOA rex sole-specific analysis

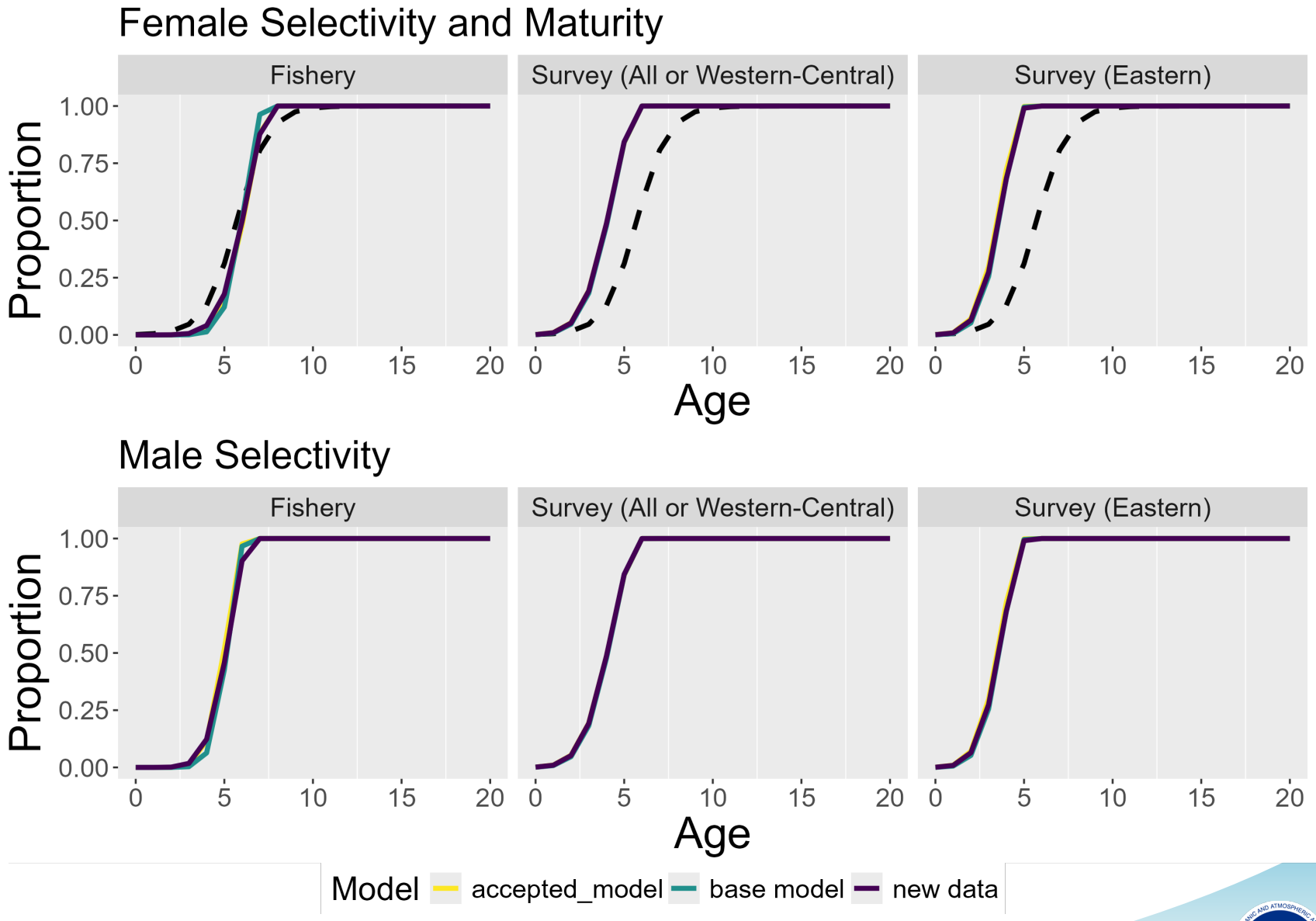
Fits to survey biomass



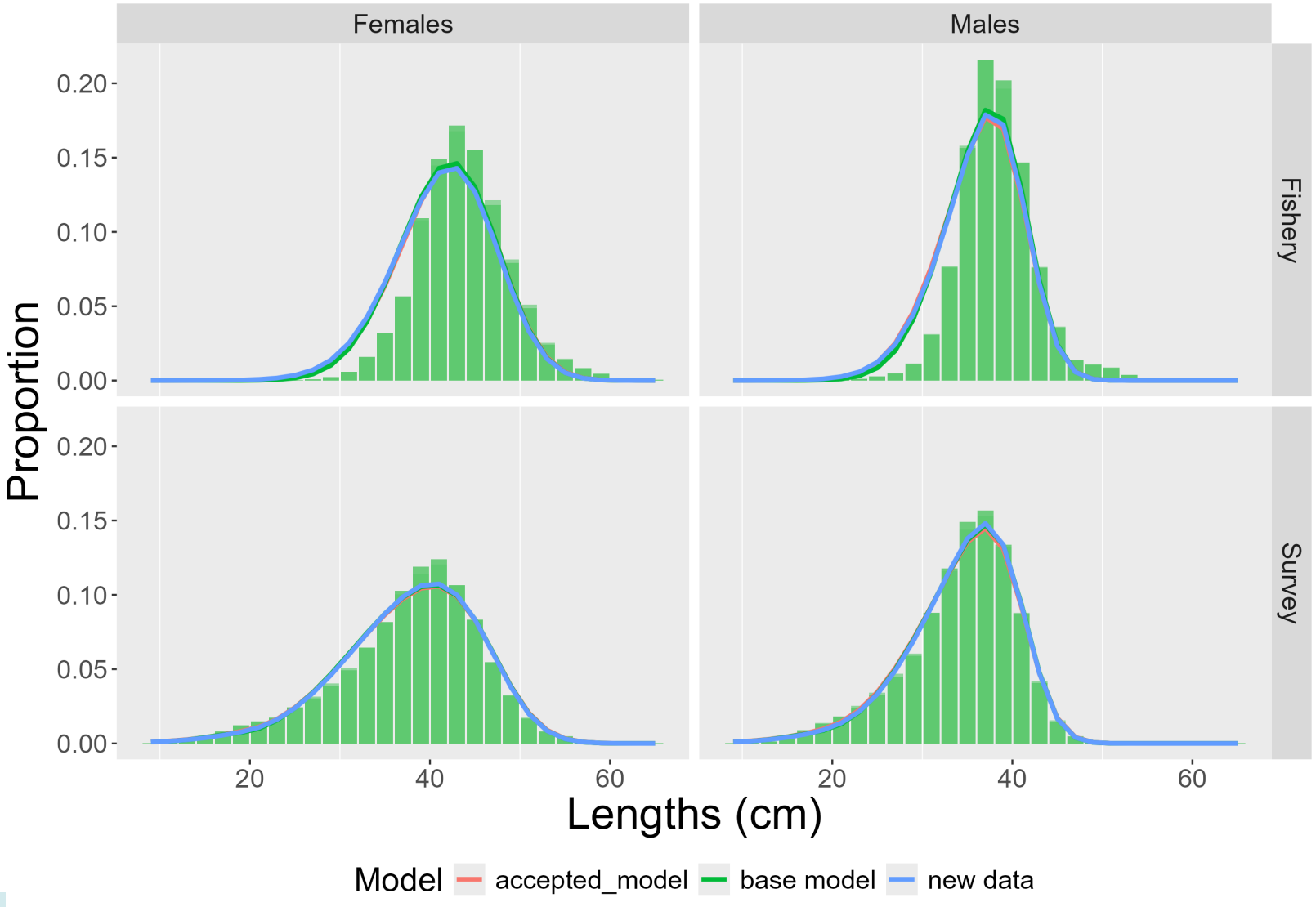
Fits to age-length data (conditional age-at-length approach)



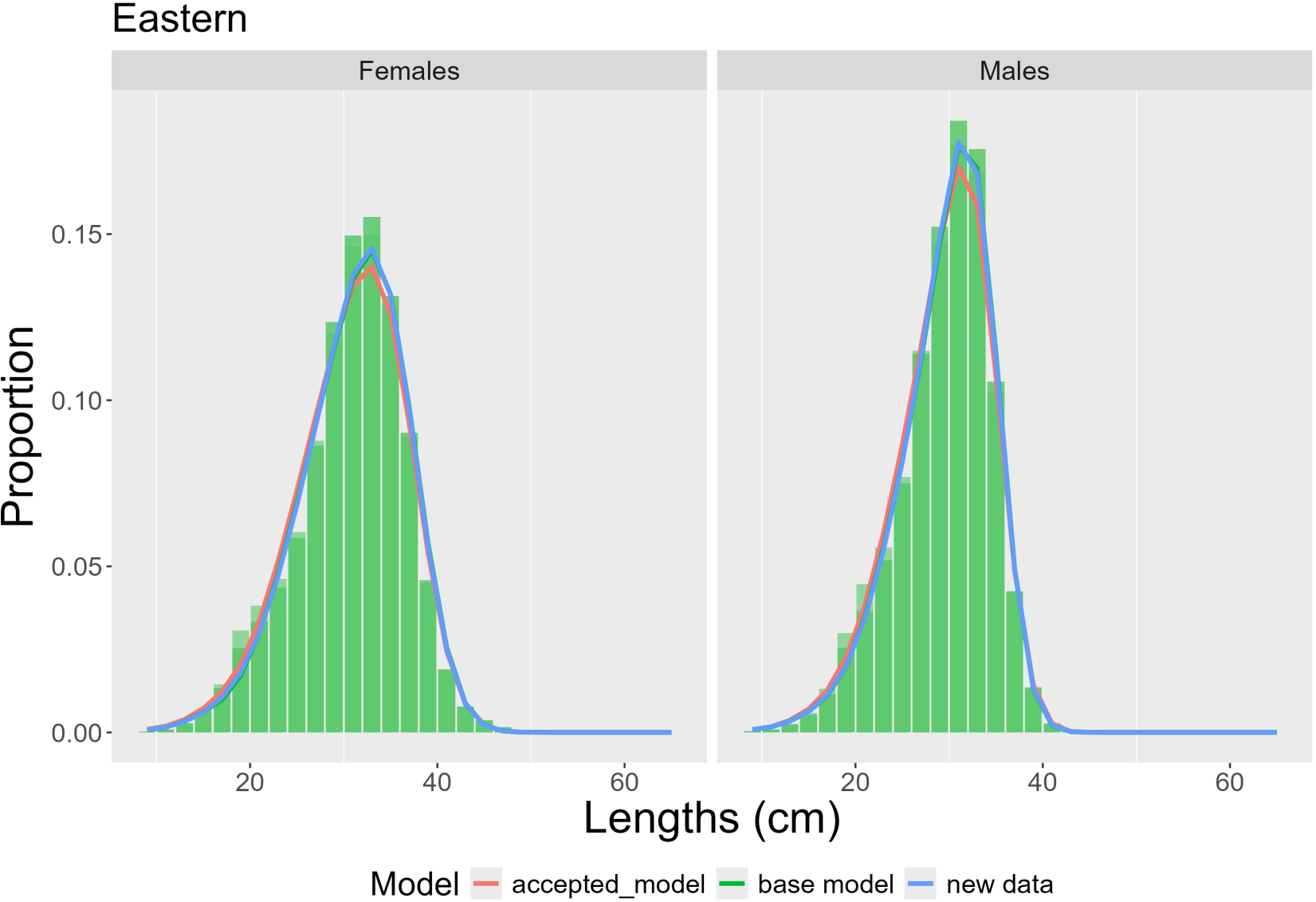
Selectivity and maturity-at-age



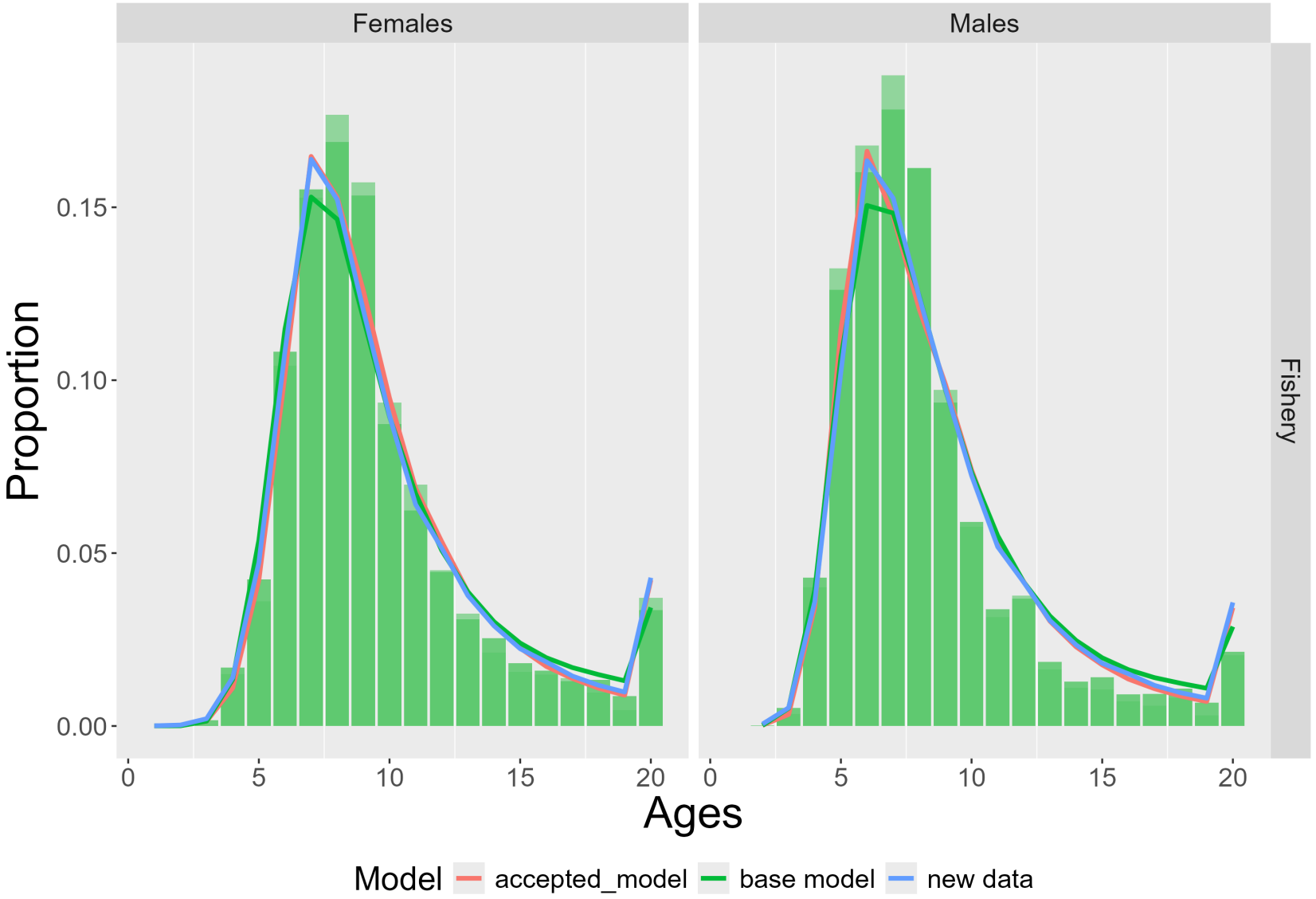
Fits to Western-Central survey and fishery length composition data



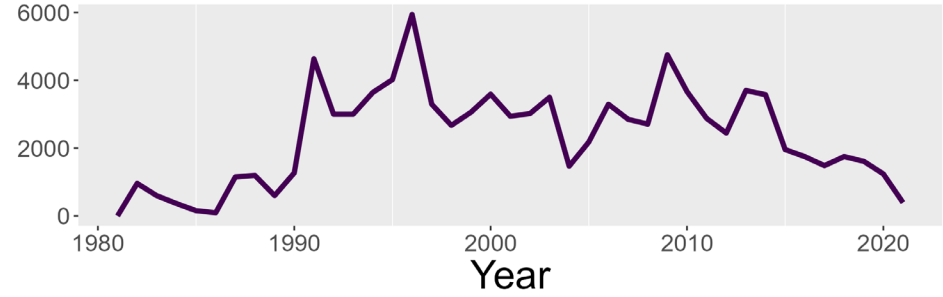
Fits to Eastern survey length composition data



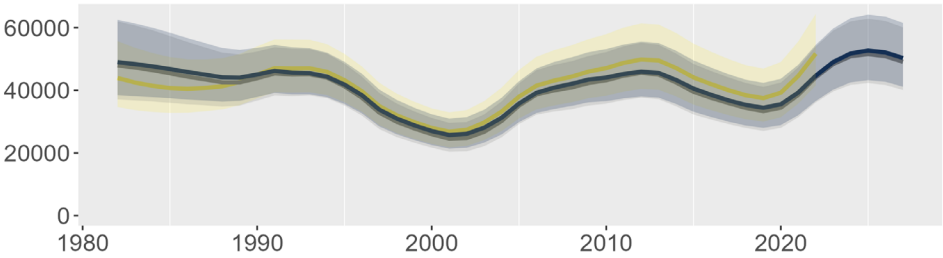
Fits to fishery age composition data



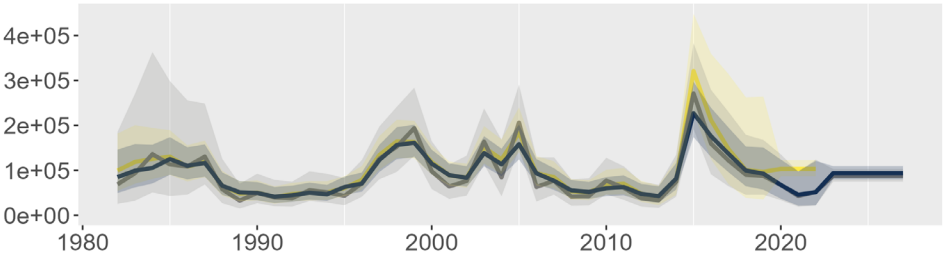
Catches



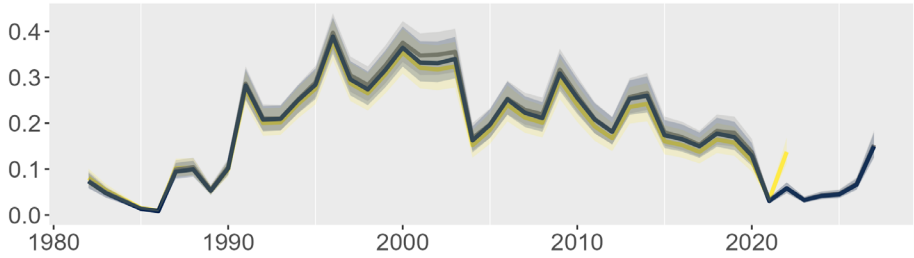
SSB (t)



Age-0 (thousands)

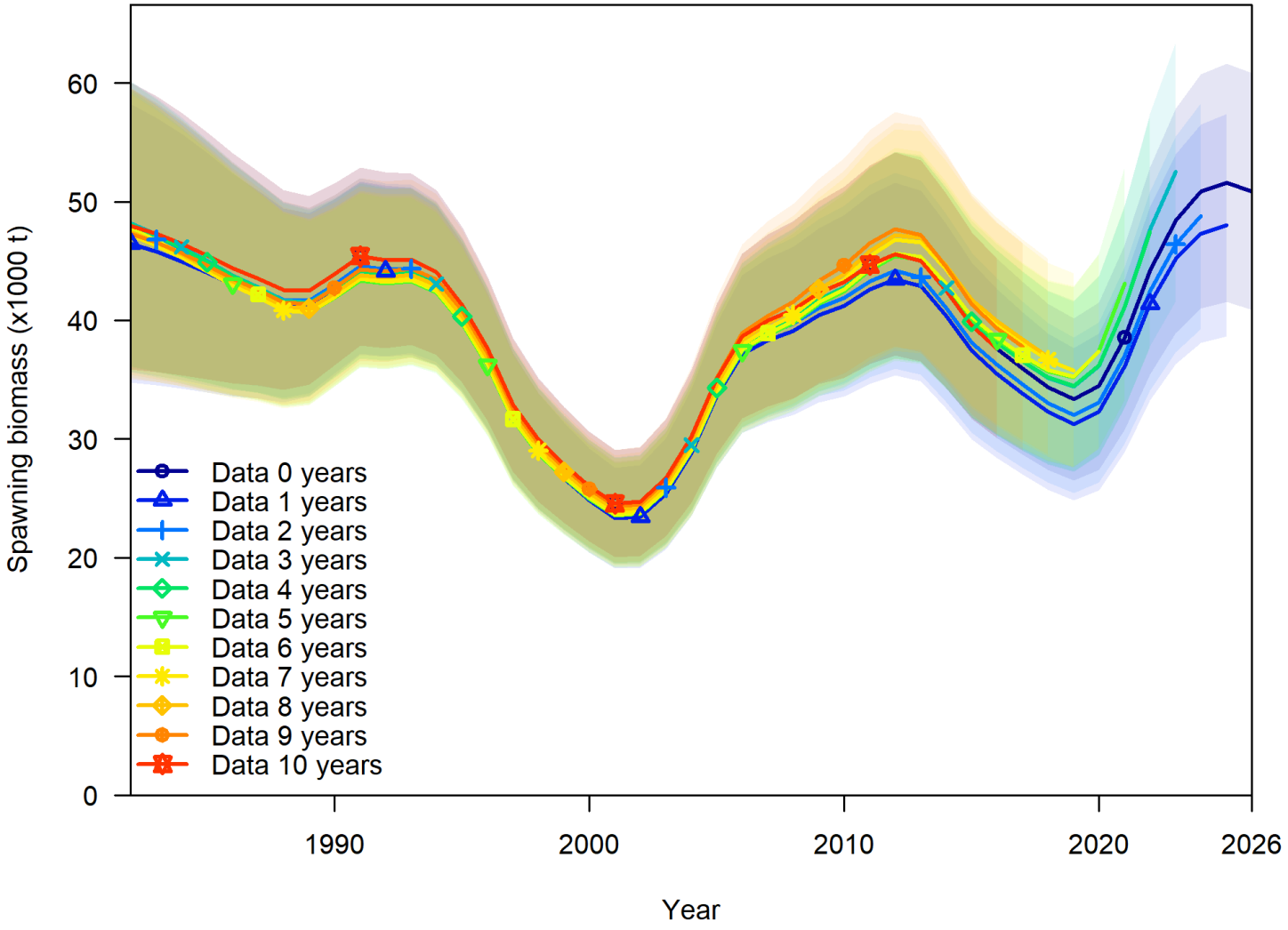


1-SPR

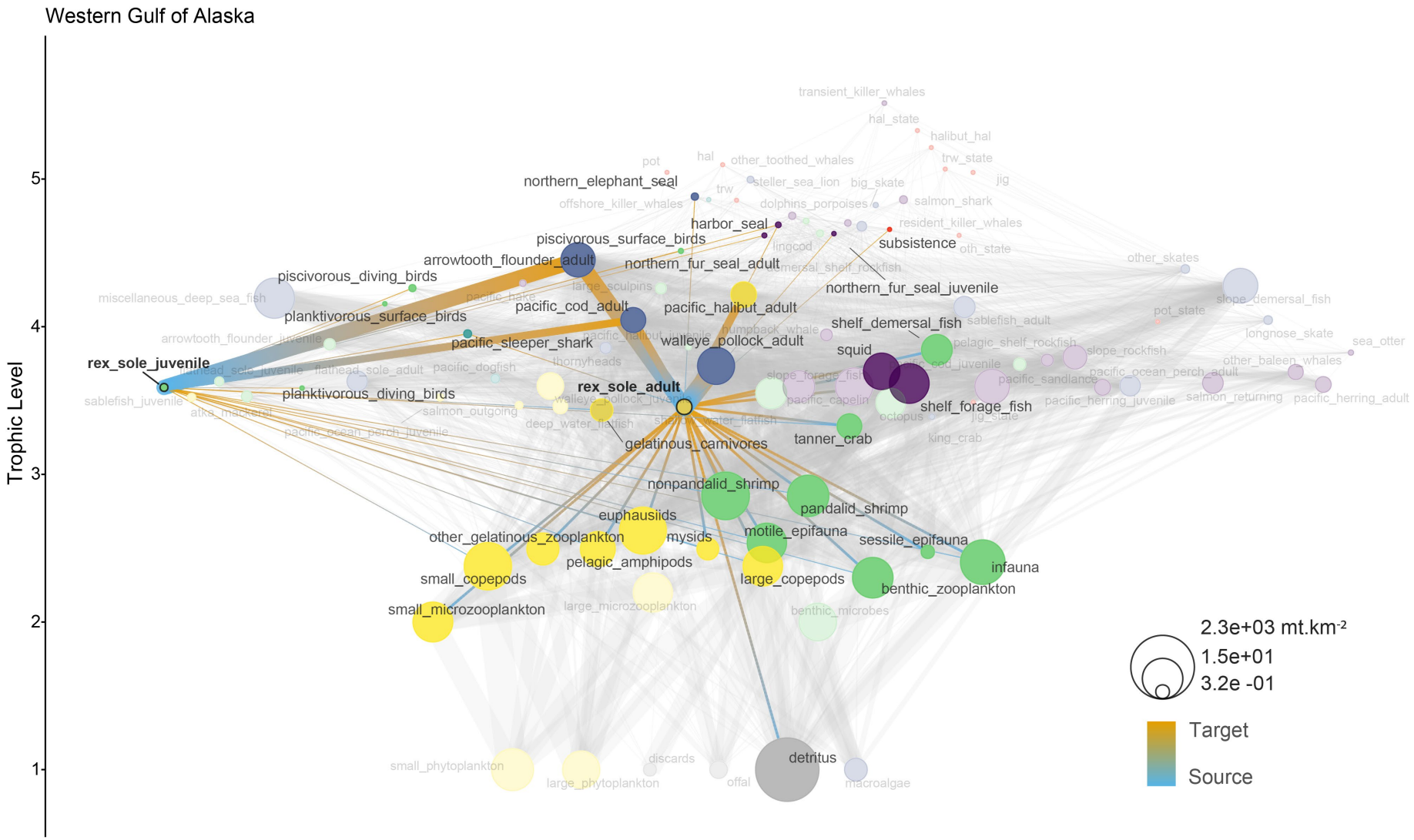


Model accepted_model base model new data

Retrospective pattern

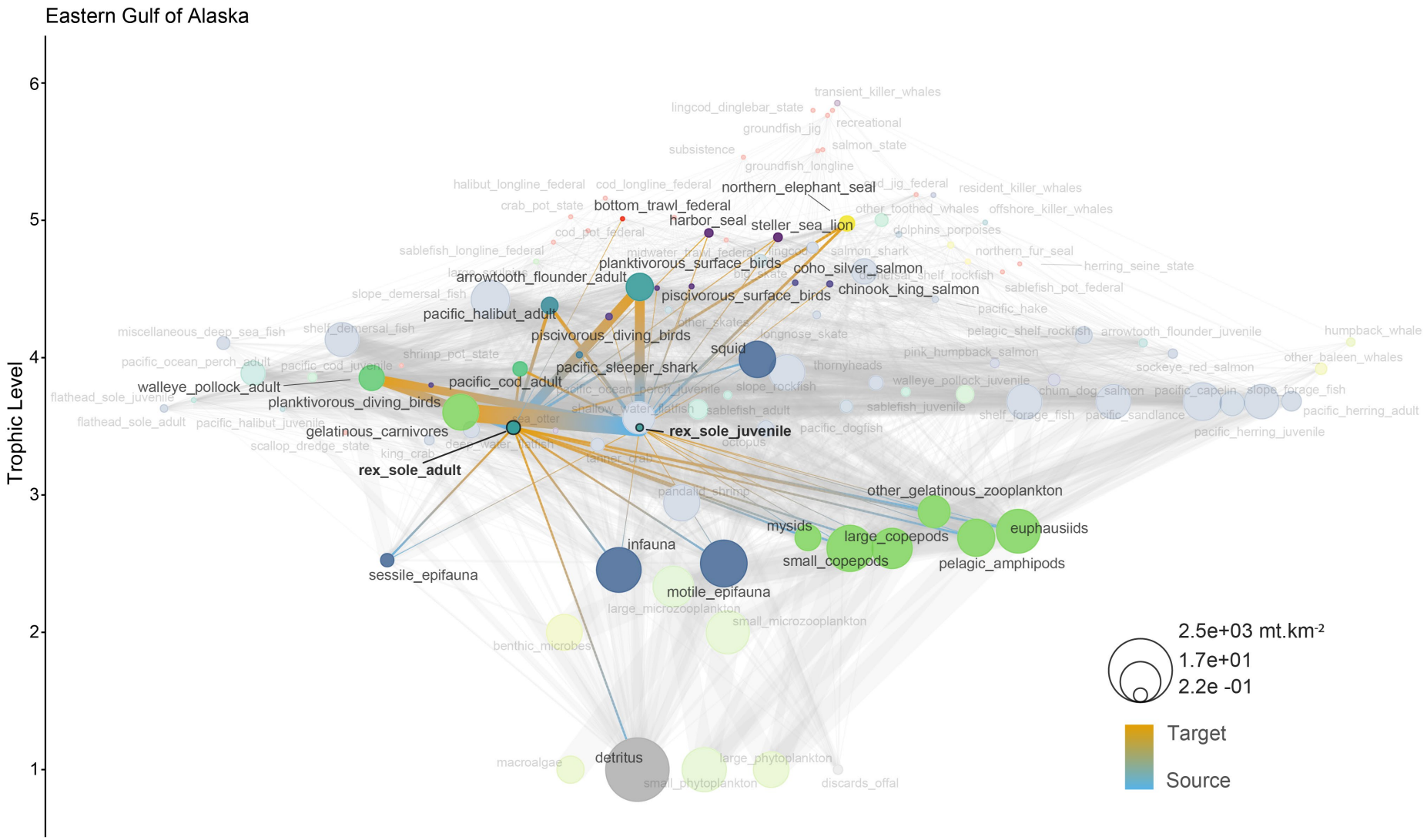


New Rpath/Ecopath Information



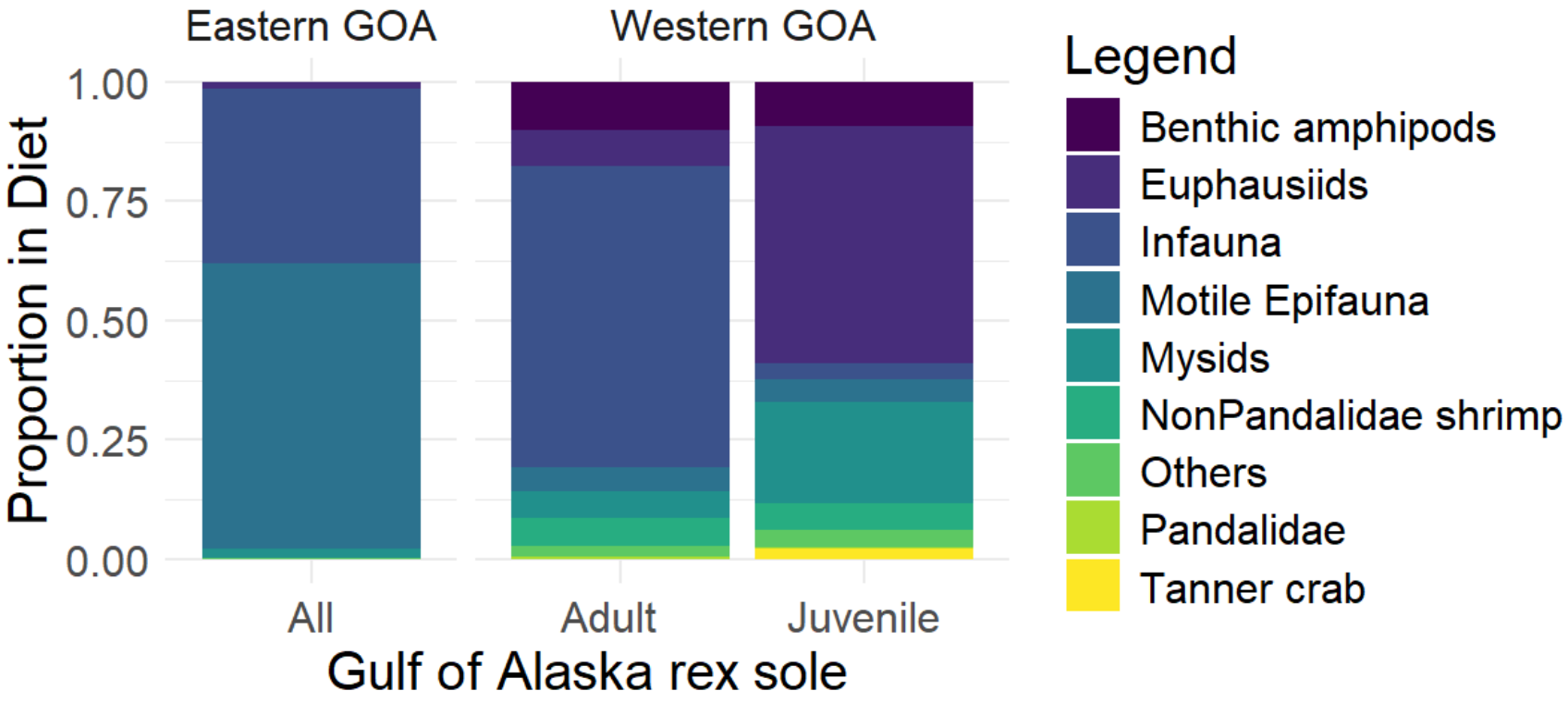
Credit: Bia Dias, Szymon Surma, Bridget Ferriss

New Rpath/Ecopath Information from GOACLIM



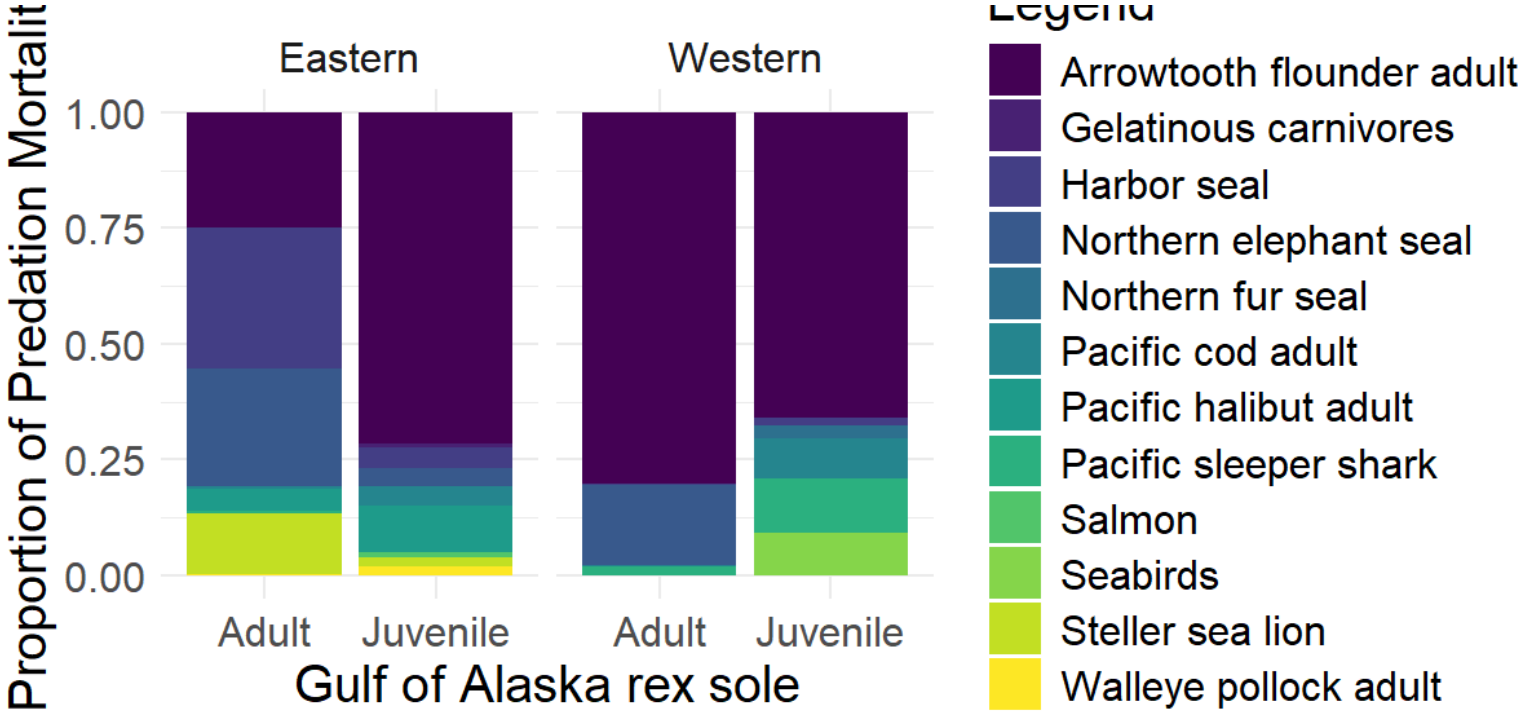
Credit: Bia Dias, Szymon Surma, Bridget Ferriss

What do GOA rex sole eat?



Credit: Bia Dias, Szymon Surma, Bridget Ferriss

Who eats GOA rex sole?



Credit: Bia Dias, Szymon Surma, Bridget Ferriss

Overall Executive Summary Table

Quantity	As estimated or *specified this* year for:		As estimated or *recommended this* year for:	
	2025	2026	2027	2028
M (natural mortality rate)	0.17	0.17	0.17	0.17
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	129,835	129,082	98,311	97,271
Female spawning biomass (t)	61,695	61,649	48,911	47,195
$B_{100\%}$				
$B_{40\%}$				
$B_{35\%}$	See area-specific tables below		See area-specific tables below	
F_{OFL}				
$maxF_{ABC}$				
F_{ABC}				
OFL (t)	26,002	25,743	19,523	18,683
maxABC (t)	21,387	21,173	16,077	15,381
ABC (t)	21,387	21,173	16,077	15,381
Status	As determined *last* year 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

Western-Central Executive Summary Table

Quantity: (Western-Central GOA)	As estimated or *specified this* year for:		As estimated or *recommended this* year for:	
	2025	2026	2027	2028
M (natural mortality rate)	0.17	0.17	0.17	0.17
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	104,776	104,311	79,489	78,746
Female spawning biomass (t)	50,756	50,811	40,304	38,952
$B_{100\%}$	46,850	46,850	41,255	41,255
$B_{40\%}$	18,740	18,740	16,502	16,502
$B_{35\%}$	16,398	16,398	14,439	14,439
F_{OFL}	0.28	0.28	0.28	0.28
$maxF_{ABC}$	0.23	0.23	0.22	0.22
F_{ABC}	0.23	0.23	0.22	0.22
OFL (t)	20,747	20,572	15,575	14,925
maxABC (t)	17,080	16,935	12,839	12,300
ABC (t)	17,080	16,935	12,839	12,300
Status	As determined *last* year 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

Eastern Executive Summary Table

Quantity: (Eastern GOA)	As estimated or *specified this* year for:		As estimated or *recommended this* year for:	
	2025	2026	2027	2028
M (natural mortality rate)	0.17	0.17	0.17	0.17
Tier	3a	3a	3a	3a
Projected total (3+) biomass (t)	25,059	24,771	18,822	18,525
Female spawning biomass (t)	10,939	10,838	8,607	8,243
$B_{100\%}$	8,998	8,998	7,823	7,823
$B_{40\%}$	3,599	3,599	3,129	3,129
$B_{35\%}$	3,149	3,149	2,738	2,738
F_{OFL}	0.31	0.31	0.3	0.3
$maxF_{ABC}$	0.25	0.25	0.24	0.24
F_{ABC}	0.25	0.25	0.24	0.24
OFL (t)	5,255	5,171	3,948	3,758
maxABC (t)	4,307	4,238	3,238	3,081
ABC (t)	4,307	4,238	3,238	3,081
Status	As determined *last* year 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

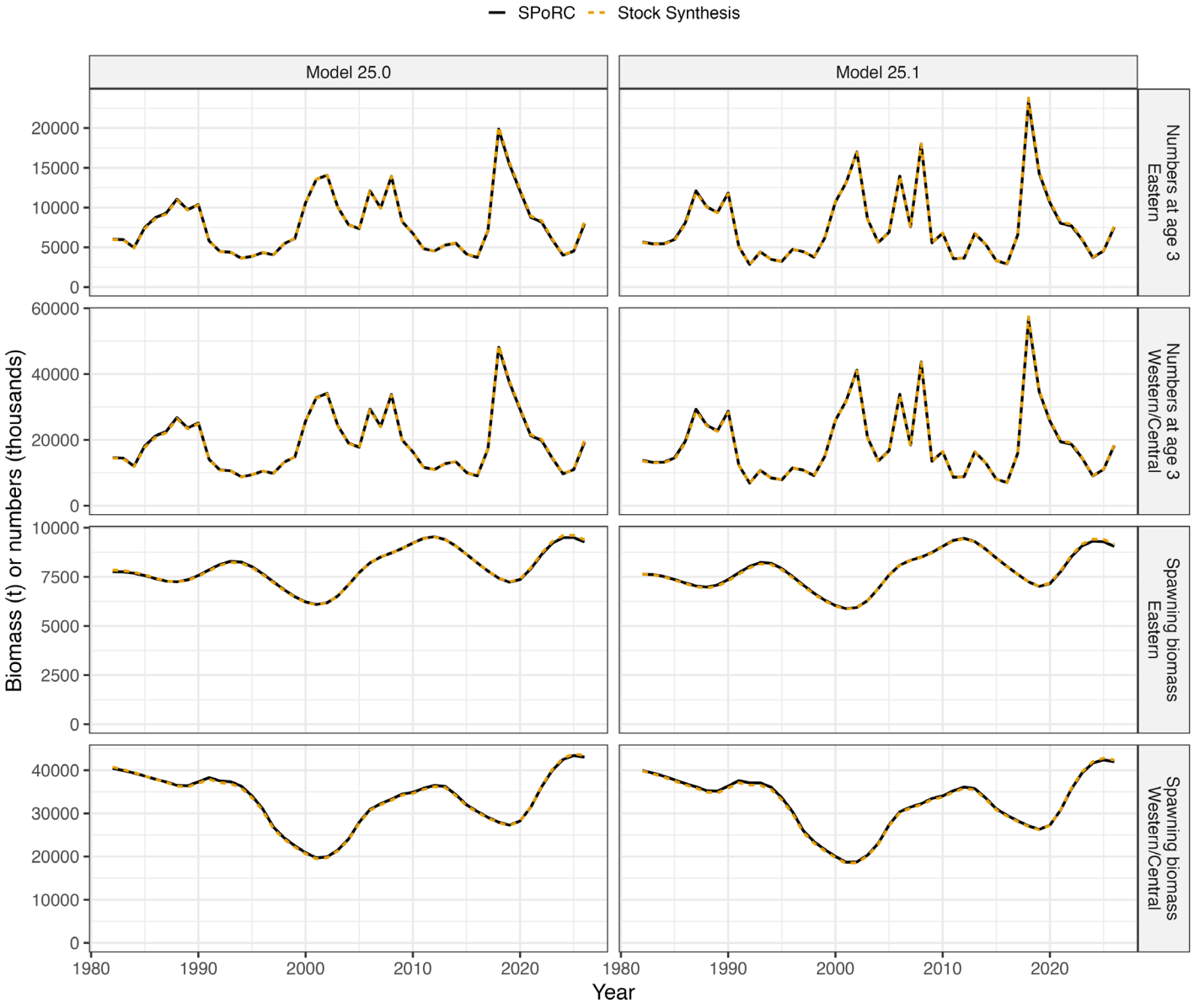
BRDs

Quantity	Western	Central	Total Western-Central	West Yakutat	Southeast	Total Eastern
Area Apportionment	21.7%	78.3%	100.0%	47.3%	52.7%	100.0%
2027 ABC (t)	2,786	10,053	12,839	1,532	1,706	3,238
2028 ABC (t)	2,669	9,631	12,300	1,457	1,624	3,081

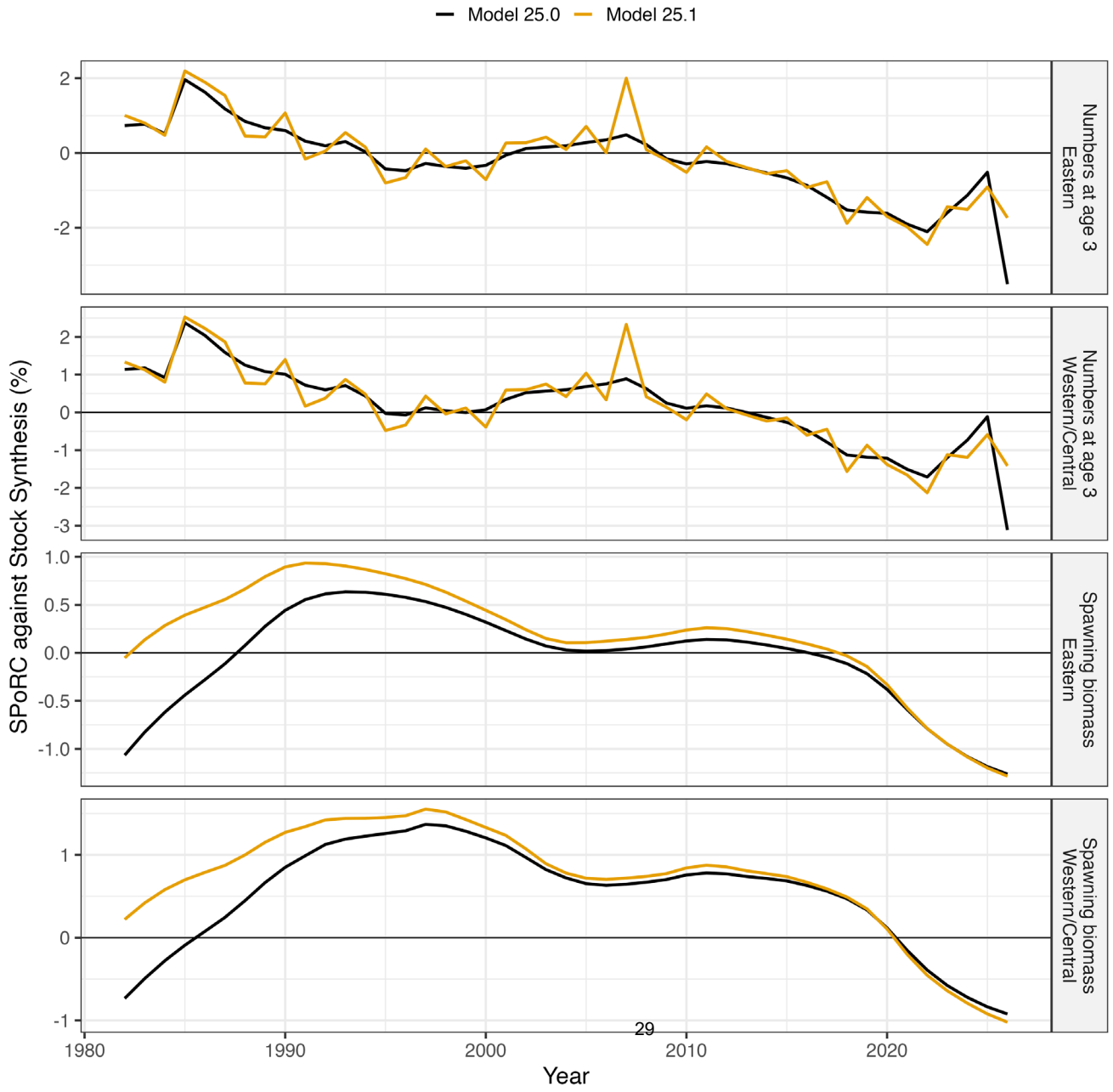
Bridge from ss3 to SPoRC (Matt Cheng)

- Matt added capability for internal estimation of growth to SPoRC
- SPoRC allows for 2-areas with estimation of growth in each area
- SPoRC allows for a variety of assumptions about the spatial dynamics of recruitment, as well as adult movement configurations
- Nimble for adding new features as needed
- Transitioned GOA rex sole model with nearly identical model fits and projection results
- ss3 is no longer adding new features, planned for retirement as FIMS develops further (currently 1 area capabilities in FIMS)

Model Bridge to SPoRC: SSB and Age 3 comparisons



Ss3 to SPoRC: % Difference between platforms



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Potential future research

- Maturity studies

SPoRC explorations:

- Explore time-varying spatial availability questions
  - Alternative spatial recruitment assumptions
  - Alternative adult movement vs selectivity assumptions
  - Explore hypotheses about time-varying dynamics (such as availability)

End of Slides

SSC and PT Comments

- *Sept 2025, PT: The Team appreciates the greater use of Input Sample Size (ISS) for age and length composition data from surveys. The Team also recommended that authors continue to work with other research partners to develop methods and software to develop an ISS for fishery age and length composition samples.*

- Within-year relative sample sizes are set to the number of hauls with relevant data for age and length comps, number of samples for CAAL data
- Plan to move to ISS for all age and length data when fisheryISS is ready for use

SSC and PT Comments

Sept 2025, PT: Multiple GOA assessments may use, or could potentially use, water temperature covariates, and the Team recommended that authors continue to collaborate across assessments to develop a temperature product using spatial delta correction that calibrates numerical models (e.g., HYCOM) and in situ measurements.

This could be explored in the future, in the context of all of the GOA flatfish species

SSC and PT Comments

- *Nov 2023, PT: "The Team recommended as a best practice that appendices be linked in the front of the document (as with the sablefish assessment) to allow for an easier review of the appendices."*
The appendices are linked separately in the Plan Team Agenda and are listed in the front of the document.

- *SSC, December 2023, Combined recommendations on the risk table:*
"*The SSC continues to support a three-category risk table with categories normal, increased, and extreme, and requests that the category descriptions be revised to cover the range covered by the original table.*"

- "*The SSC reiterates that only fishery performance indicators that provide some inference regarding biological status of the stock should be used.*"

- "*The SSC recommends that the risk tables consider potential future risks when these can be anticipated.*"

- "*When risk scores are reported, the SSC requests that a brief justification for each score be provided, even when that score indicates no elevated risk.*"

- We follow these requests in the risk table section of the document.

SSC and PT Comments

- *Sept 2025, PT: The Team supported Carey's recommendation to bring forward Models 25.0 and 25.1 in November for management quantities.*
- Models 25.0 and 25.1 are presented in this document. Model 25.1 includes an age error matrix based on analysis of GOA rex sole age reads, and is presented as the base case model.
- *Oct 2025, SSC: The SSC agrees with the GOA GPT and the author's recommendation to bring forward Model 25.0 and Model 25.1 in November/December for management. The SSC also supports the research priorities list provided by the author, recognizing the potential of bringing to November the following short-term priorities: sensitivity runs for steepness, sigmaR, age at 50% maturity, and alternative data weighting approaches.*
- This assessment document brings forward Model 25.1 as a base case and Model 25.0 as an alternative. Appendix D provided sensitivity runs for older and younger ages at 50% maturity. The 2021 assessment provided a comparison of McAllister-Ianelli and Francis data weighting approaches. As an appendix, we present a bridging to an alternative assessment framework for this two-area model in sporc. Using sporc for future assessments, we will continue to explore steepness, sigmaR, and data weighting approaches. These explorations can be presented at the next opportunity for presenting new alternative models for GOA rex sole.
- *December 2017, The SSC recommends that the author prioritize the inclusion of an aging error matrix in the model for next year, which might further improve the fit to the age composition data.*
- Model 25.1 includes an ageing error matrix that is estimated from GOA rex sole age reader data.