Gulf of Alaska Pacific Ocean Perch

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NPFMC Groundfish Plan Team
November 2026

Overview

Author's 2027 ABC = 36,317 t

- Decrease of 3% from 2026 (2024 SAFE)
- 2028 ABC decreases to 34,363 t
- B62% in 2027
- No reduction from max ABC

Concerns:

- Substantial survey biomass decline in 2025 (~50%)
- Continued data conflicts

Positives:

- Model is consistent with good practices

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Overview

Tier 3a: statistical age-structured assessment

- 1 sex, 1 fleet, 1 survey, 1 area
- 2 size-to-age transition matrices
  - 1961-1989, ≥1990
- 4 fishery selectivity time blocks (mgmt-based)
  - Block 1: 1961-1976 – logistic
  - Block 2: 1977-1995 – **average of blocks 1 & 3**
  - Block 3: 1996-2006 – gamma
  - Block 4: 2007-present – gamma
- 1 survey selectivity
  - Logistic

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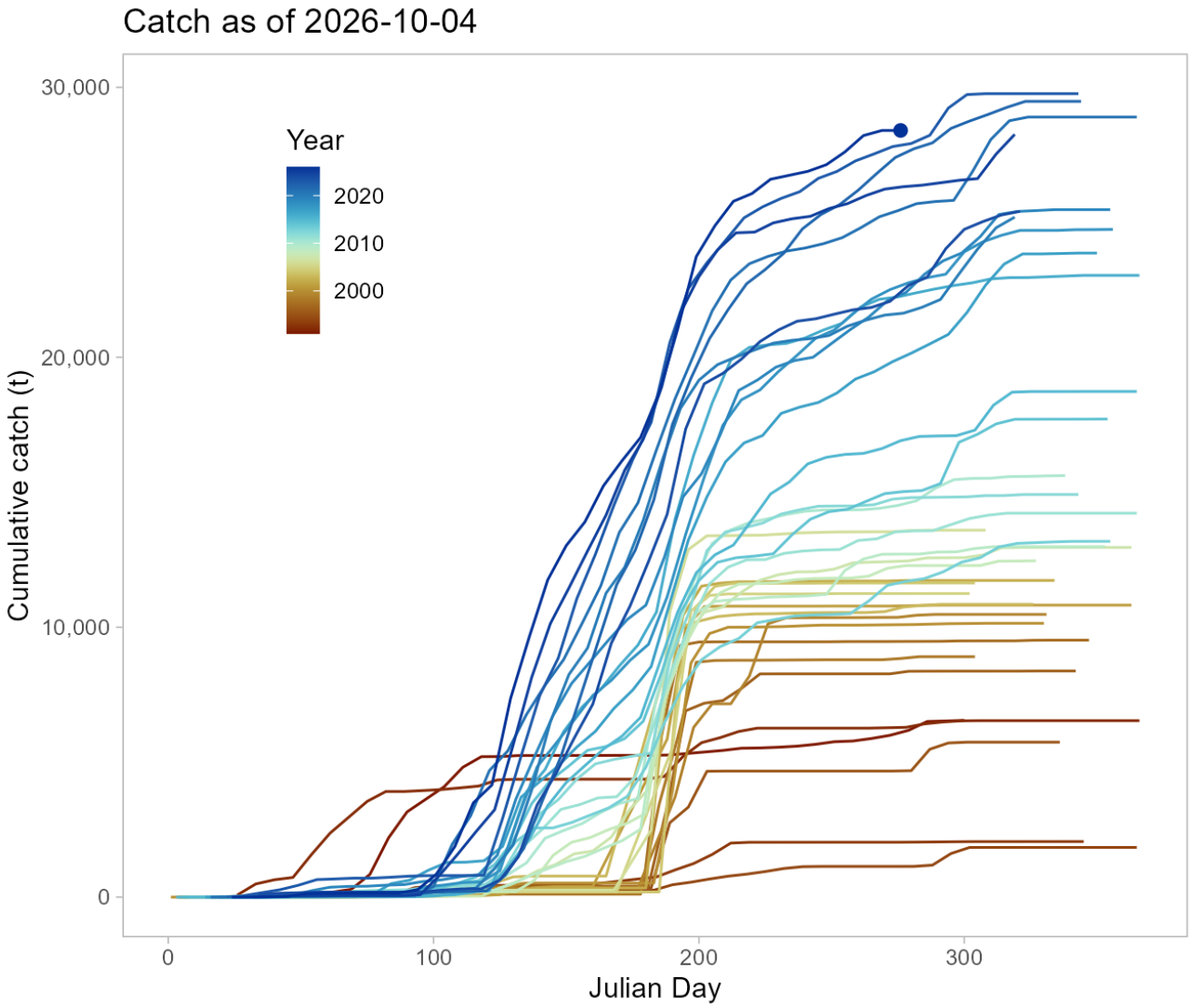
Background

- Last SSC approved POP model (2023, Model 2020.1)
- Bridged to RTMB, reviewed by PT and SSC in Sep 2025 (Model 25.0)
  - Moves maturity outside the model
- Proposed model changes
  - Change likelihoods to follow best practices (Model 25.1)
  - Change 2nd fishery slx timeblock to gamma (Model 25.2)
  - Explore model reweighting (Francis)
- Plan Team recommended explorations (Sep 2025)
  - Survey age comp ISS from surveyISS
  - Model-based index of survey biomass
- All models converged (positive definite Hessian, etc.)

Data updates

- Catch
  - Total 2023, 2024, 2025, 2026
  - Estimated 2026 (projection)
- Survey biomass - 2025
- Survey age compositions – 2023, 2025
- Fishery age compositions - 2024
- Weight-at-age
- Size-at-age

Data Inputs – Catch History



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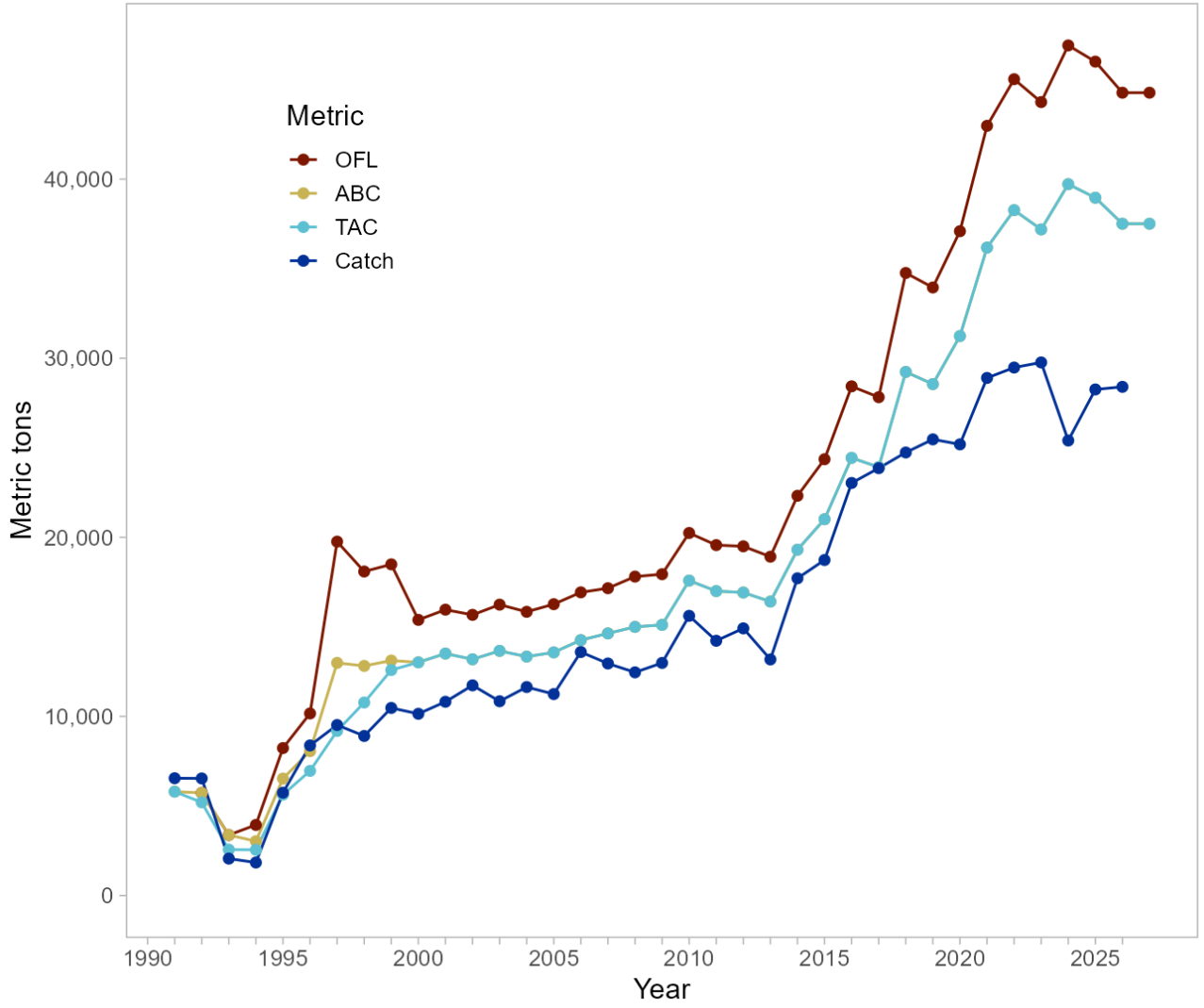
Data Inputs – Catch History



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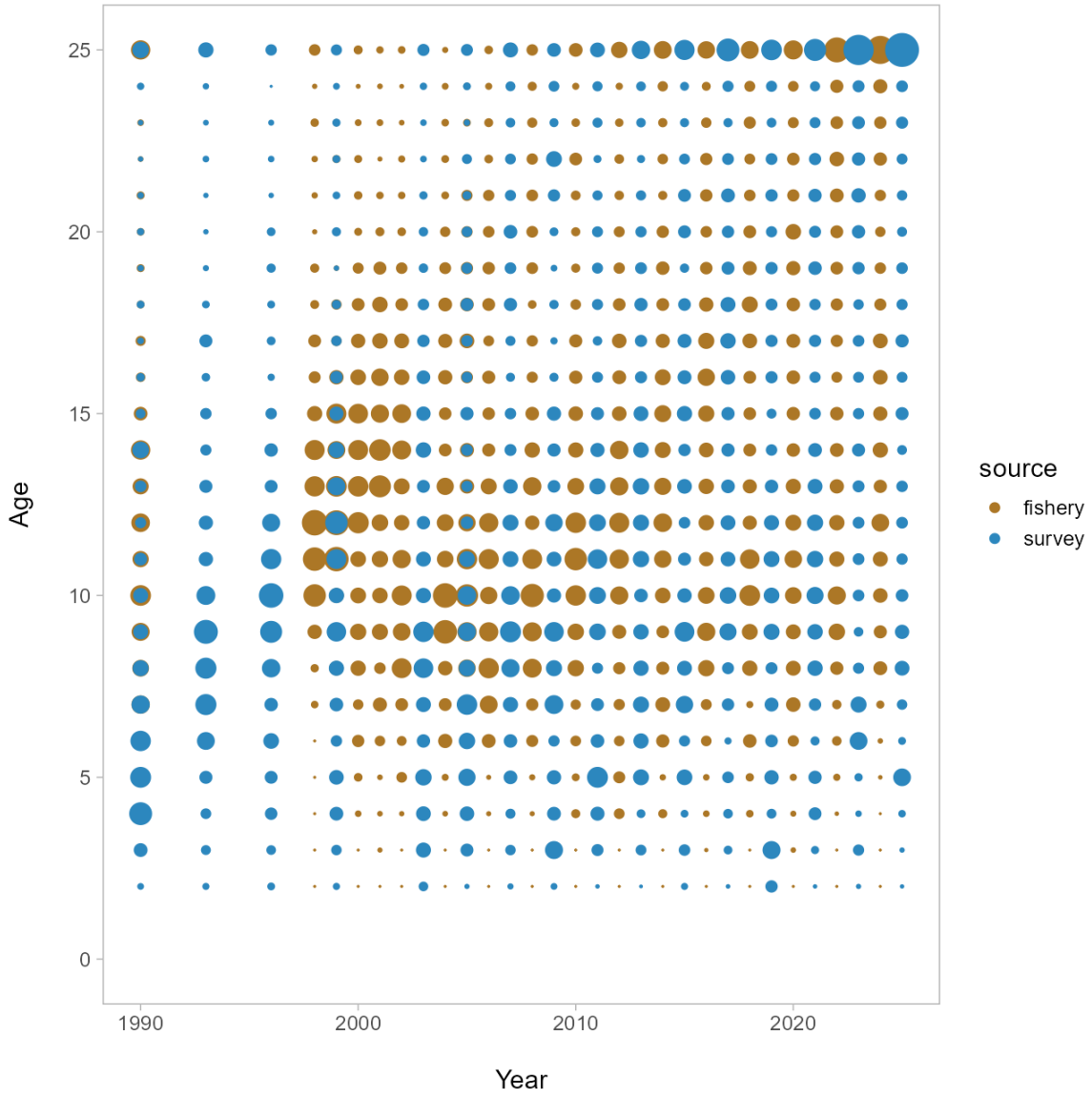
Data Inputs – age comps



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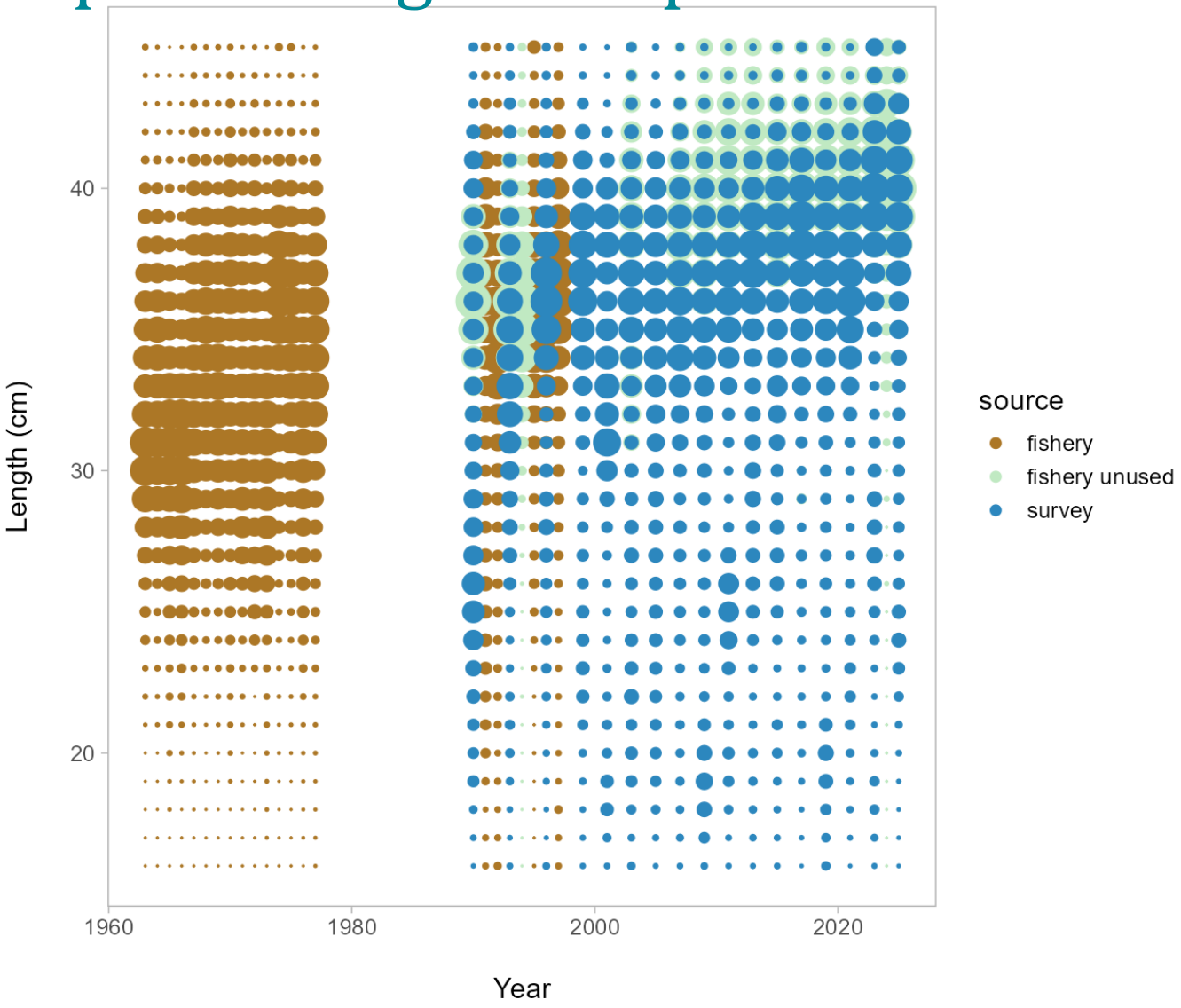
Data Inputs – length comps



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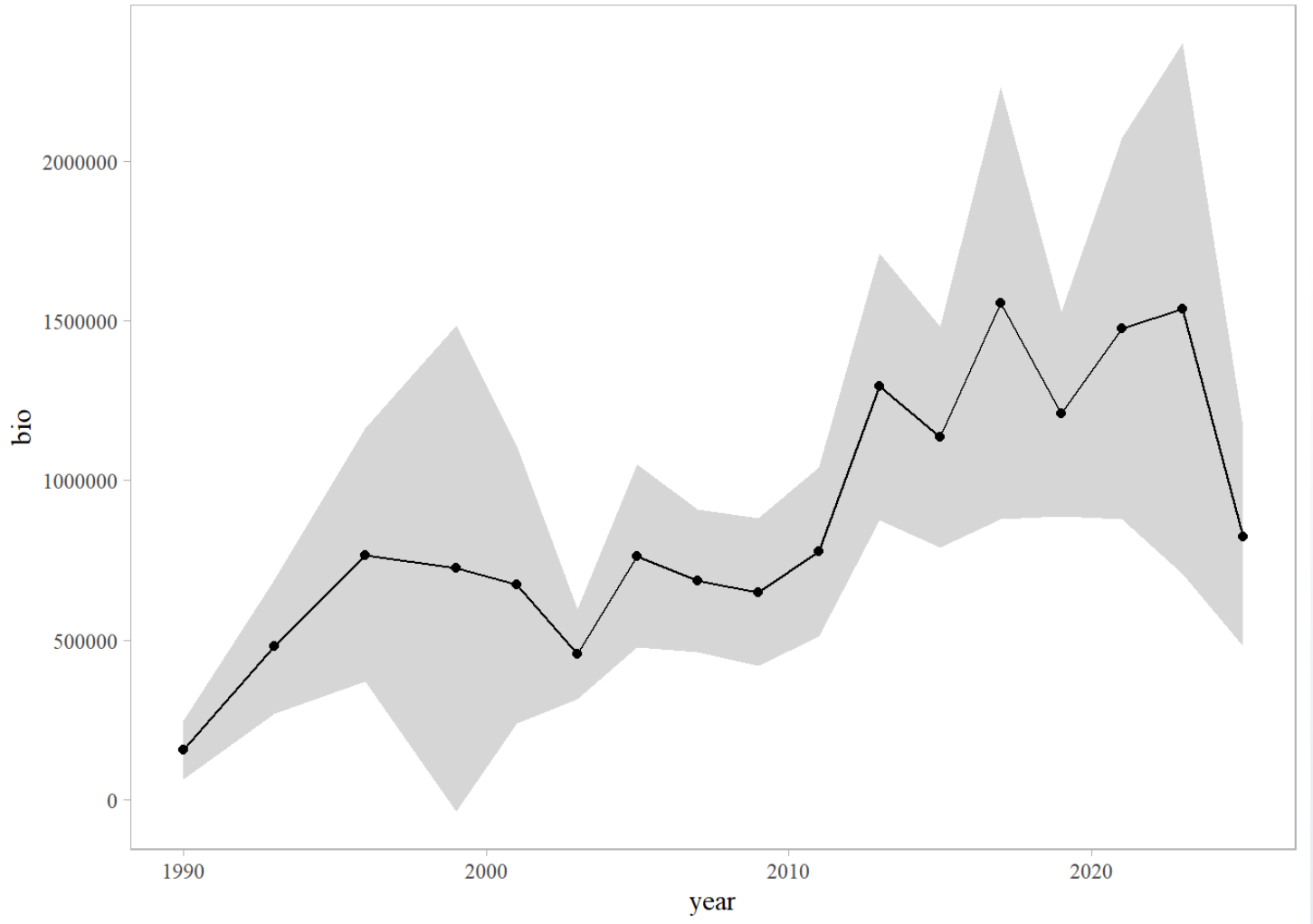
Data Inputs – survey biomass



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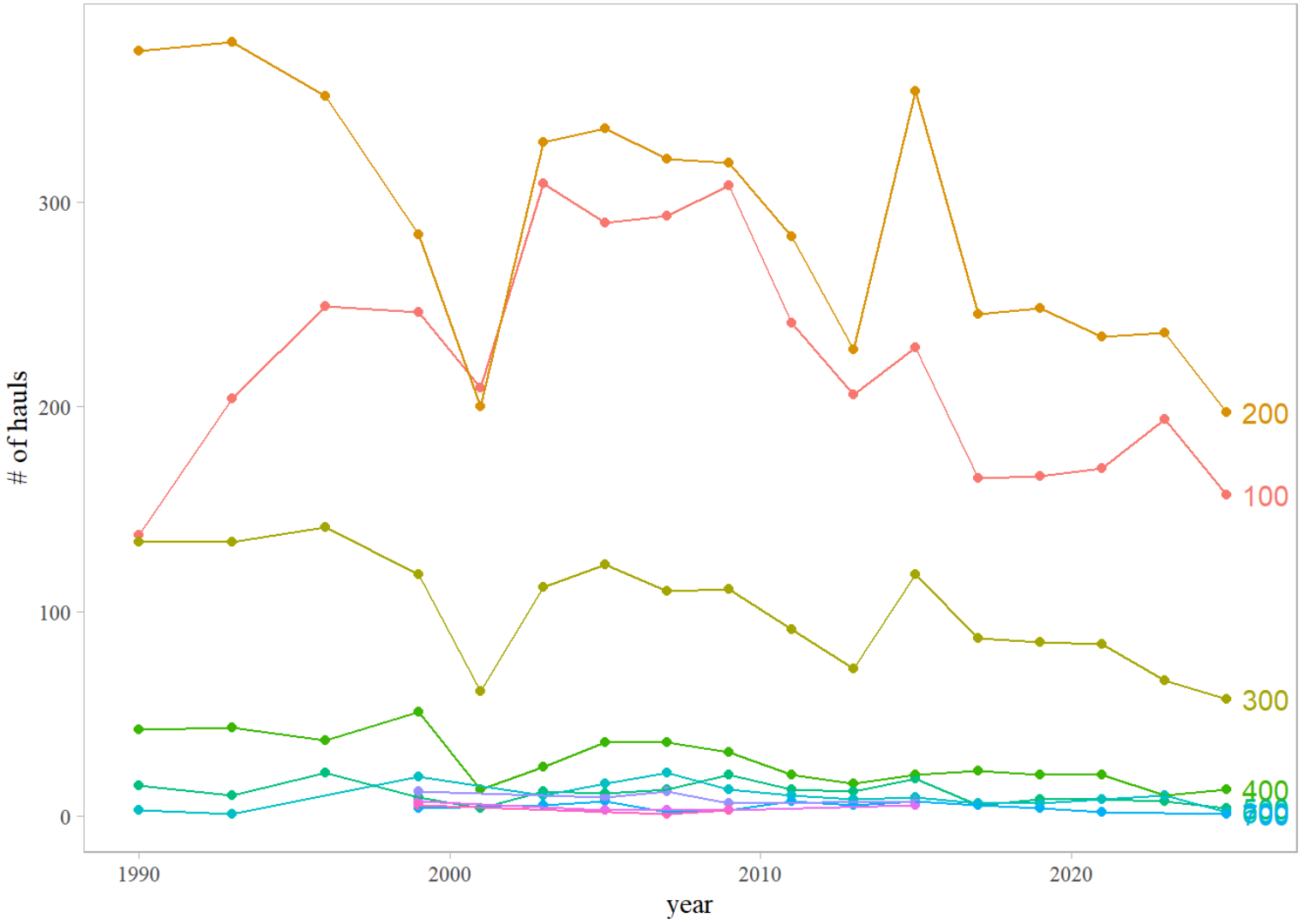
Data Inputs – survey biomass

year	w	c	wyak	seo	total
1990	136	371	99	99	705
1993	167	419	87	97	770
1996	194	395	81	130	800
1999	144	417	90	104	755
2001	137	349	1	0	487
2003	226	425	55	95	801
2005	177	471	65	118	831
2007	201	474	55	82	812
2009	195	470	55	97	817
2011	160	386	46	73	665
2013	134	314	47	52	547
2015	188	435	57	87	767
2017	125	296	46	68	535
2019	117	299	52	69	537
2021	108	298	44	76	526
2023	116	304	42	61	523
2025	96	234	43	58	431

Data Inputs – survey biomass



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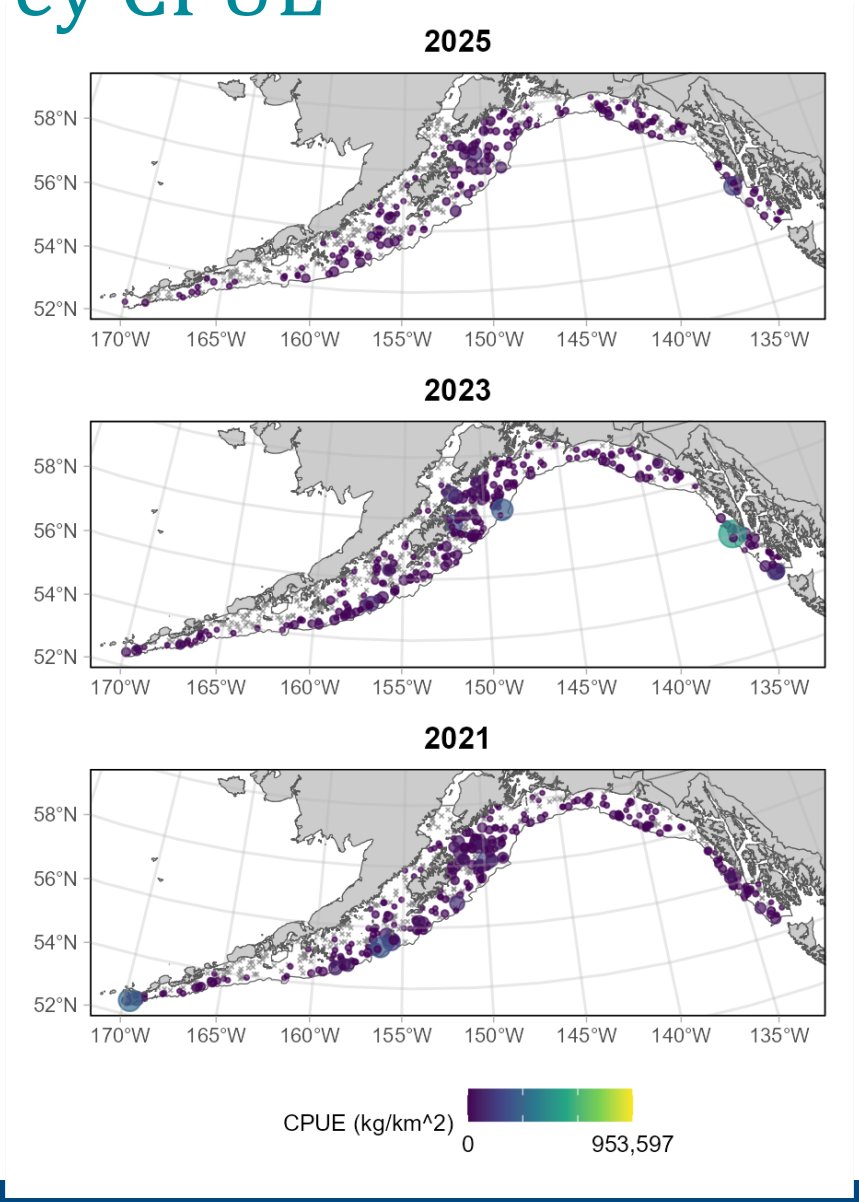
Input – survey CPUE



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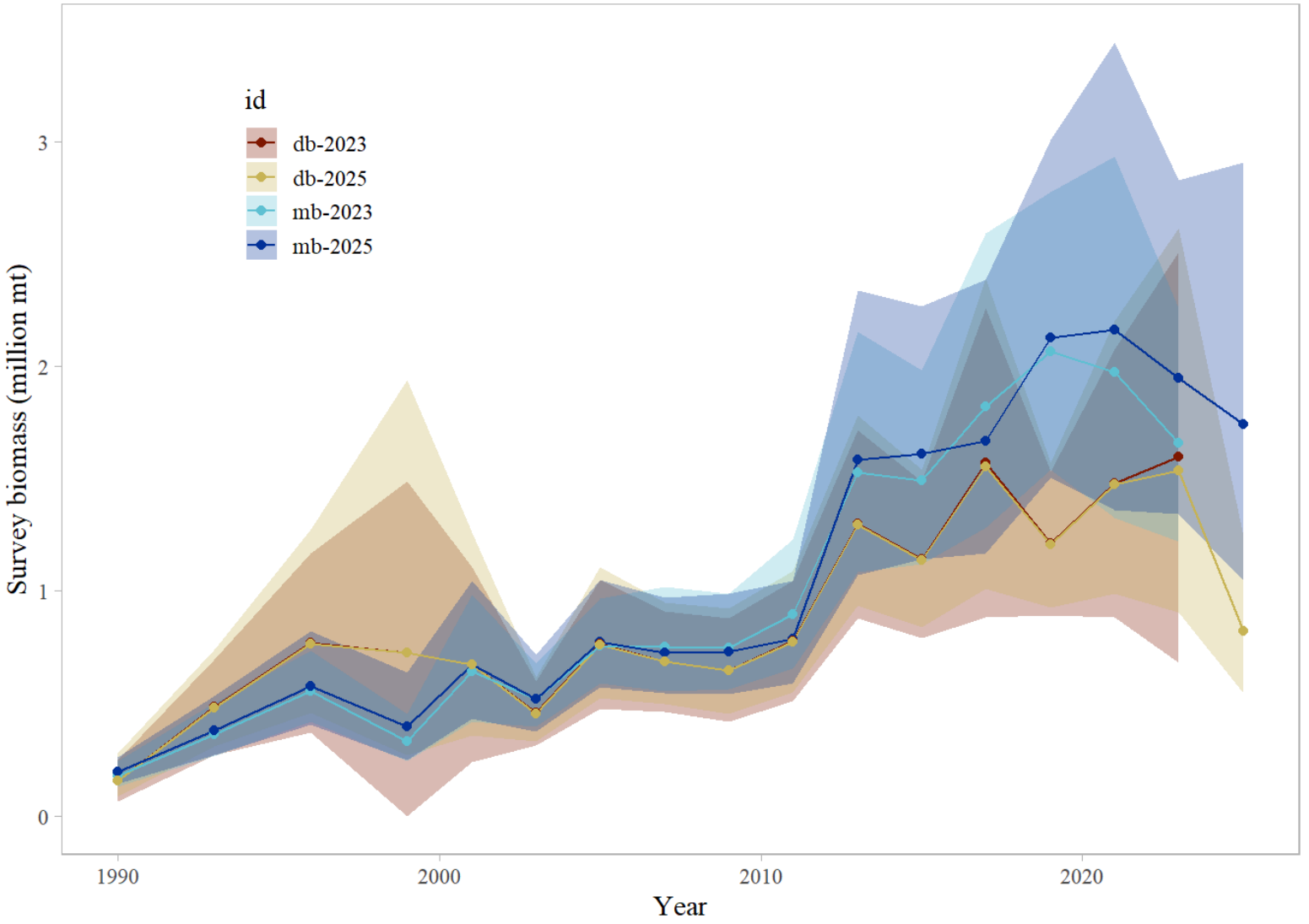
Data Inputs – survey biomass



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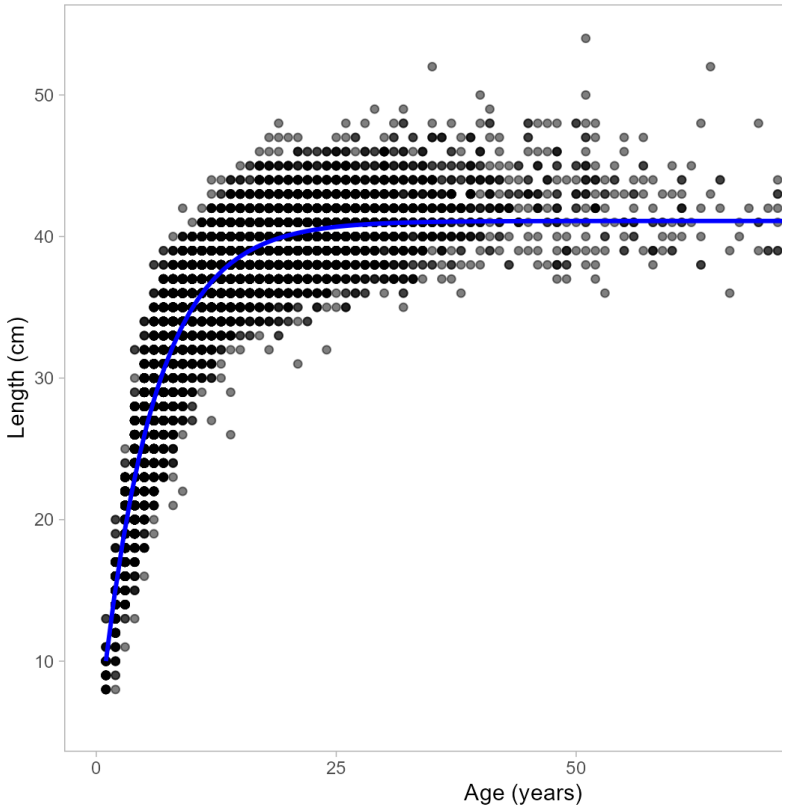
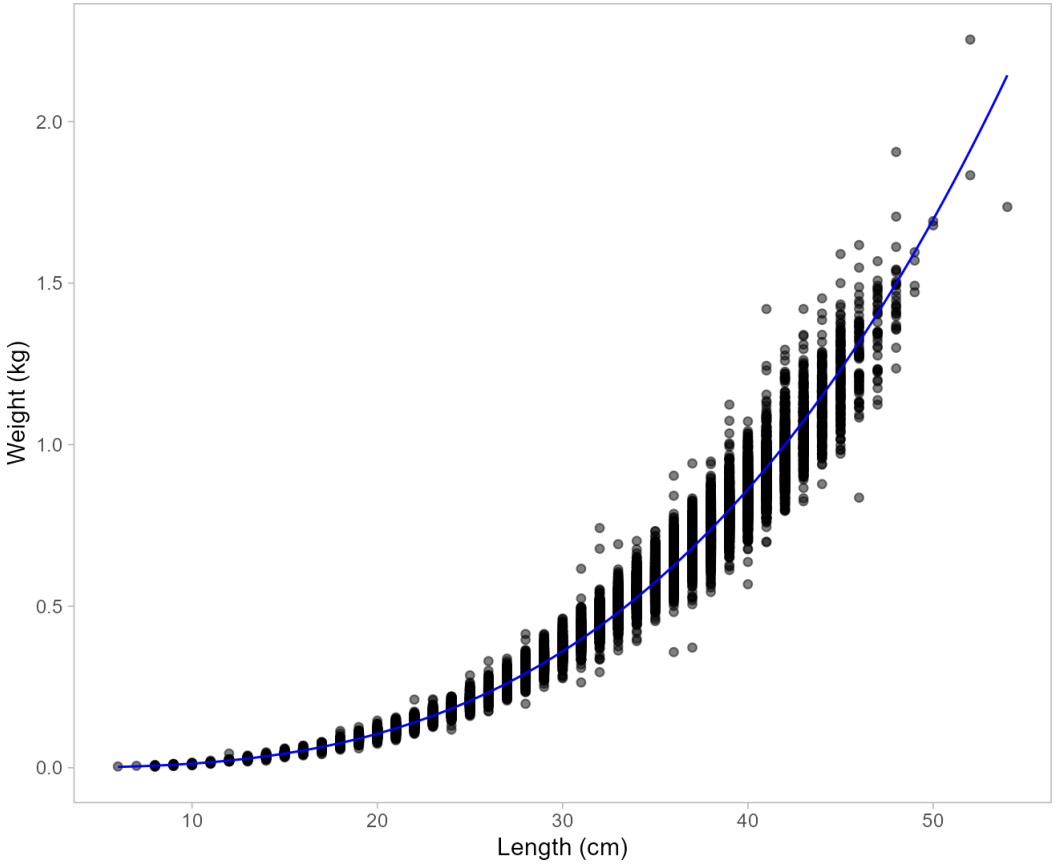
Data Inputs





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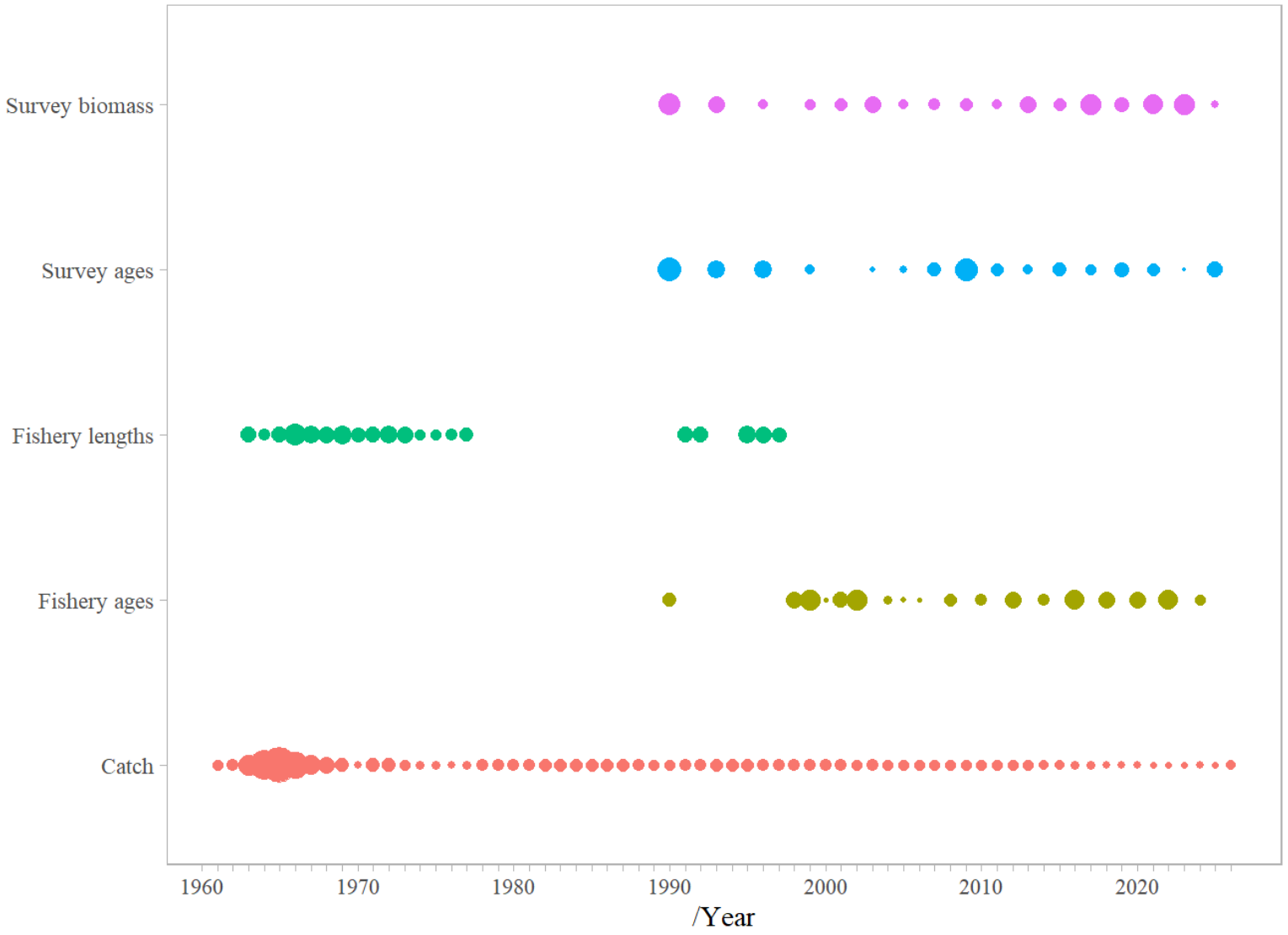

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Model runs

Model 23.0 – Base model (2020.1 – 2023)
Model 25.0 – updated w/data through 2026

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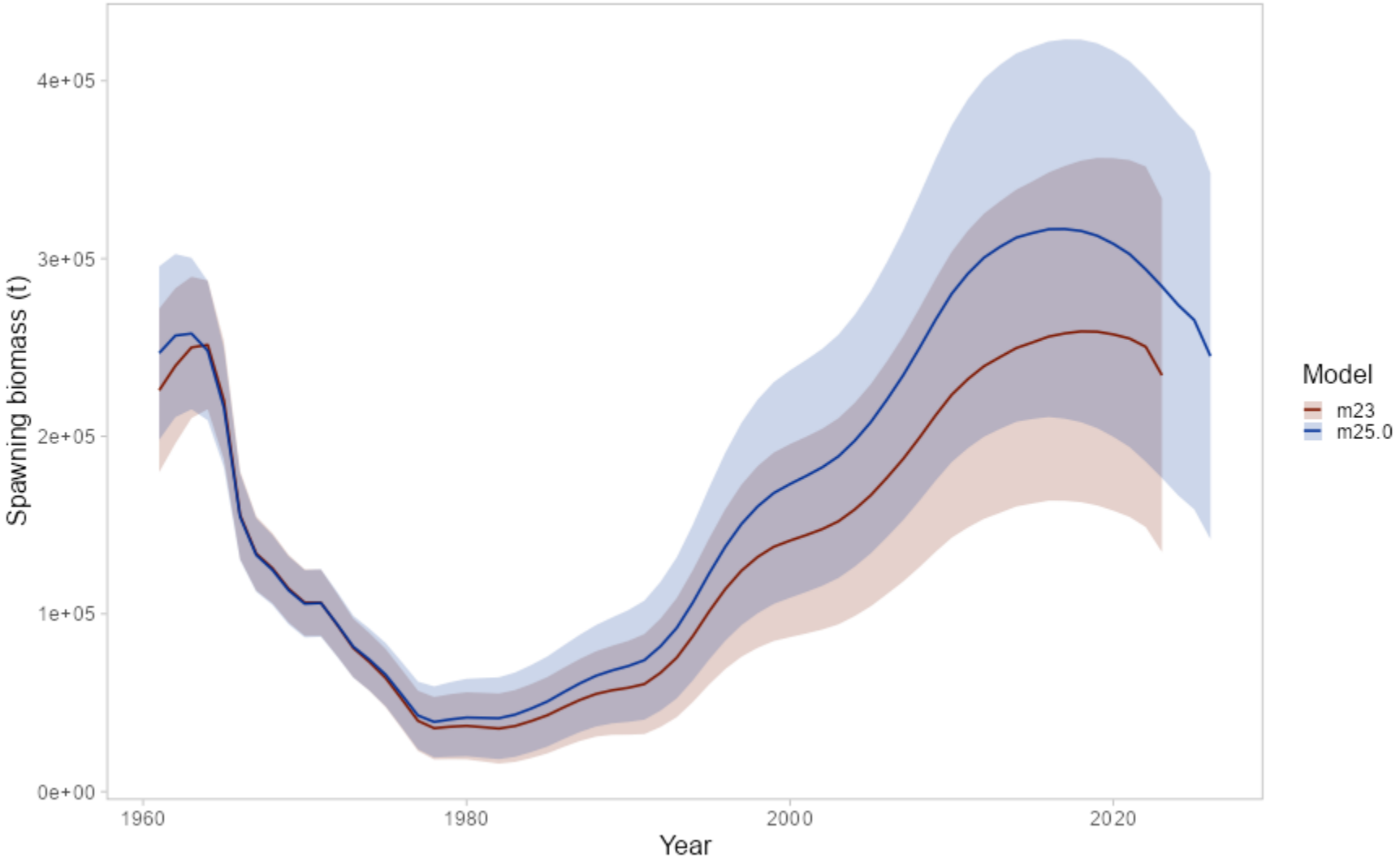
Base model - updated data



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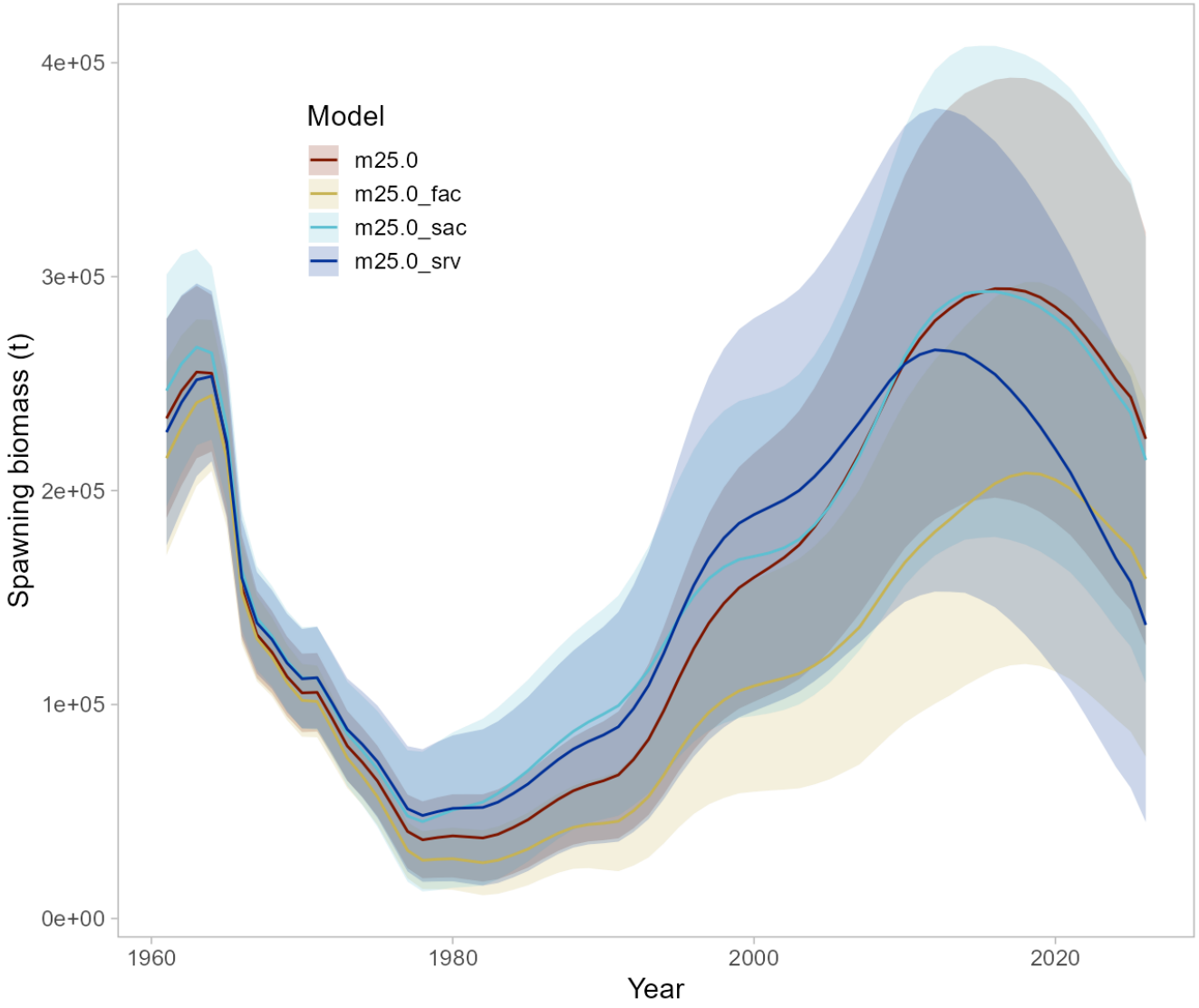
Base model - remove data components



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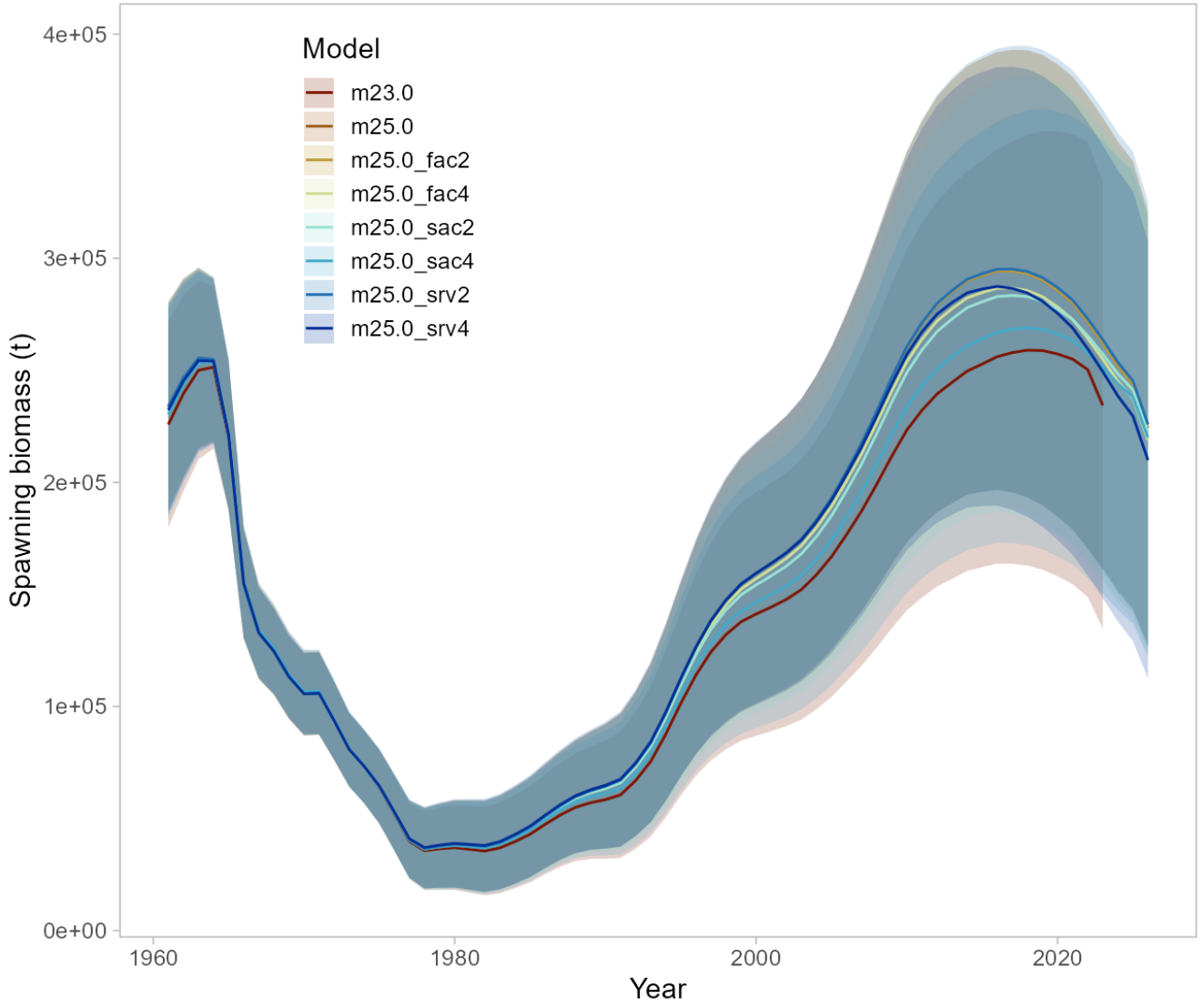
Base model - reduce data component years



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Base model results

Fishery age comps govern overall stock scale

- removal reduces spawning biomass substantially

Survey index anchors post-2010 trajectory

- omitting it produces an earlier peak (~2012) followed by a steep decline
- removing its last 4 years pulls the 2026 estimate downward.

Survey age comps are the primary data component driving the 2005–2023 upward shift

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Results

Base: SSC accepted 2023

Model 25.0: RTMB w/2026 data

Model 25.1: m25.0 w/updated likelihoods

Model 25.2: m25.1 w/gamma slx (2nd time block)

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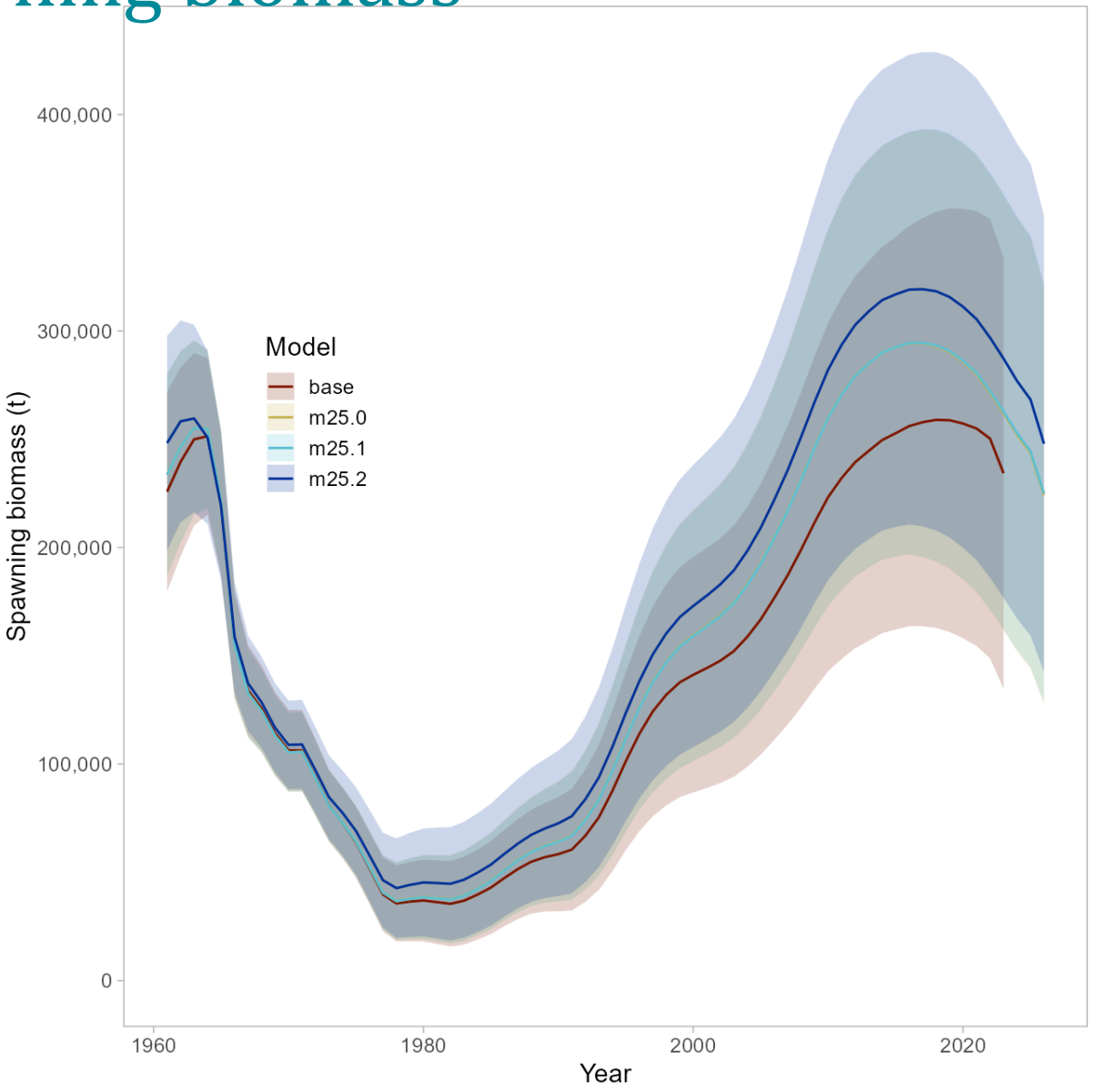
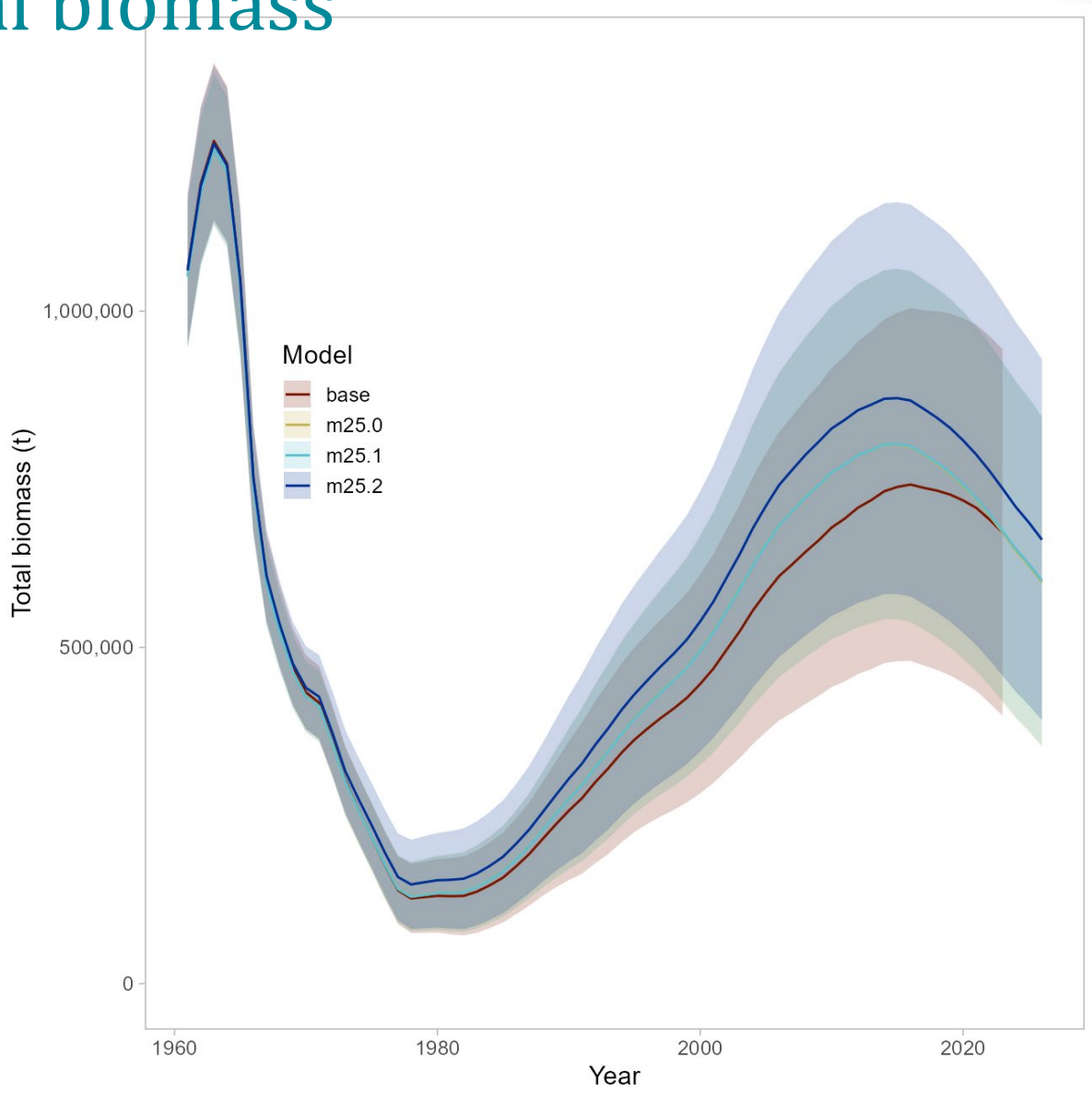
Results- Spawning biomass

M25.0 and M25.1 are essentially the same



Results- Total biomass

M25.0 and M25.1 are essentially the same



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Results – key params & outputs

M	0.070	0.070	0.072
q	1.513	1.516	1.390
sigmaR	0.758	0.759	0.745
log_mean_R	4.399	4.398	4.518
log_mean_F	-2.689	-2.689	-2.739
a50C1	6.300	6.296	6.124
a50C2	NA	NA	13.064
a50C3	12.387	12.389	12.447
a50C4	15.487	15.522	15.580
deltaC1	1.973	1.959	1.570
deltaC2	NA	NA	5.929
deltaC3	4.919	4.920	4.878
deltaC4	9.324	9.351	9.394
a50S	5.040	5.054	5.030
deltaS	5.583	5.597	5.547

tot_bio	573,543	575,634	636,156
spawn_bio	215,079	215,931	238,113
catch_ofl	38,014	38,244	43,289
F35	0.11	0.11	0.11
catch_abc	32,031	32,219	36,449
F40	0.09	0.09	0.09

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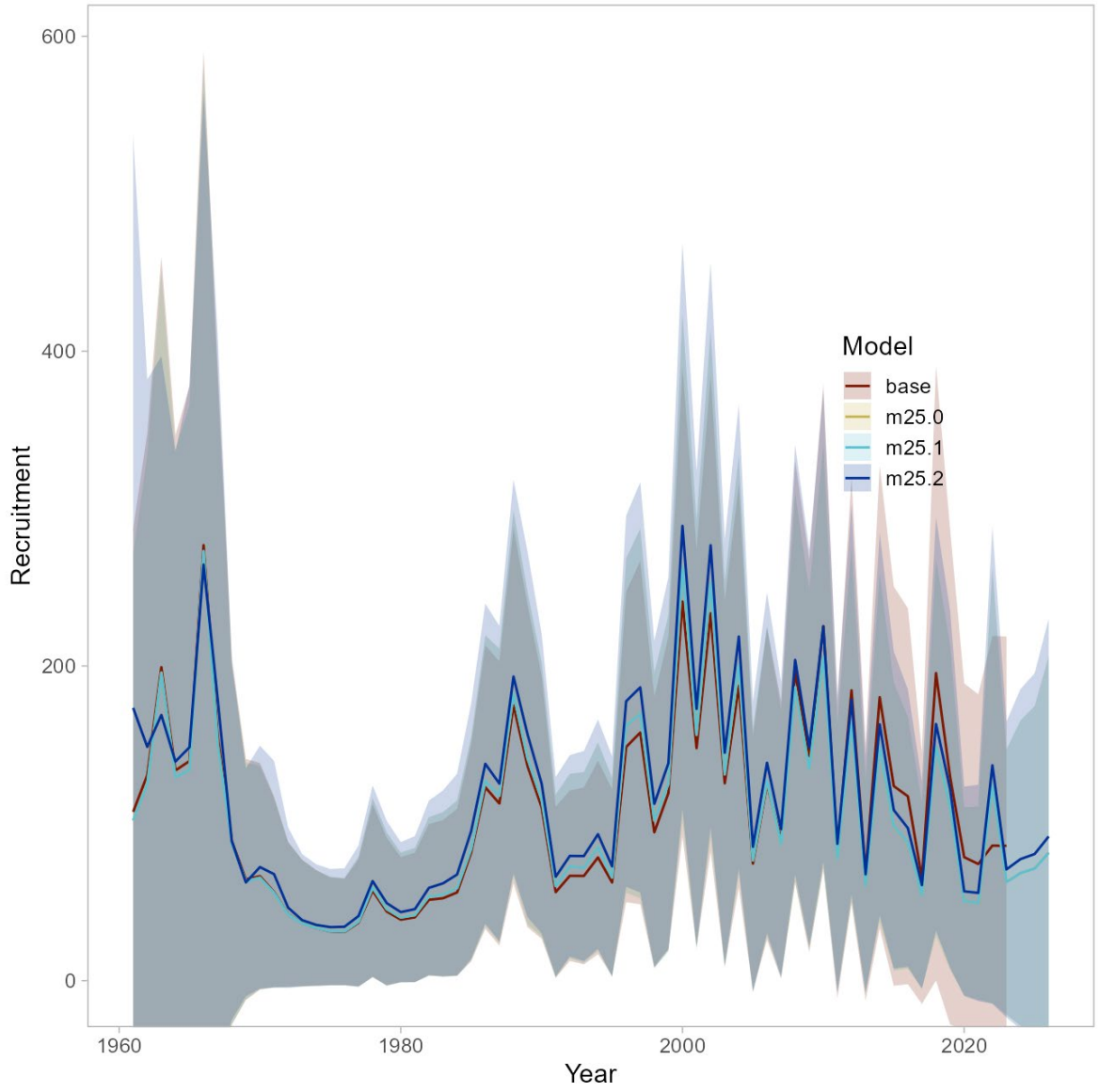
Results - Likelihoods

Item	m25.0	m25.1	m25.2
like_catch	NA	-91.210	-91.267
ssq_catch	0.275	NA	NA
like_srv	18.874	8.456	8.588
like_fish_age	26.408	354.190	355.517
like_srv_age	37.056	376.219	376.525
like_fish_size	68.097	487.877	488.488
like_rec	10.391	95.066	93.087
f_regularity	6.719	6.711	6.569
sprpen	0.000	0.000	0.000
nll_q	0.188	0.305	0.204
nll_M	0.859	-0.529	-0.089
nll_sigmaR	8.159	7.443	7.829
nll	177.03	1244.53	1245.45
n_pars	174	174	176

Results – Recruitment



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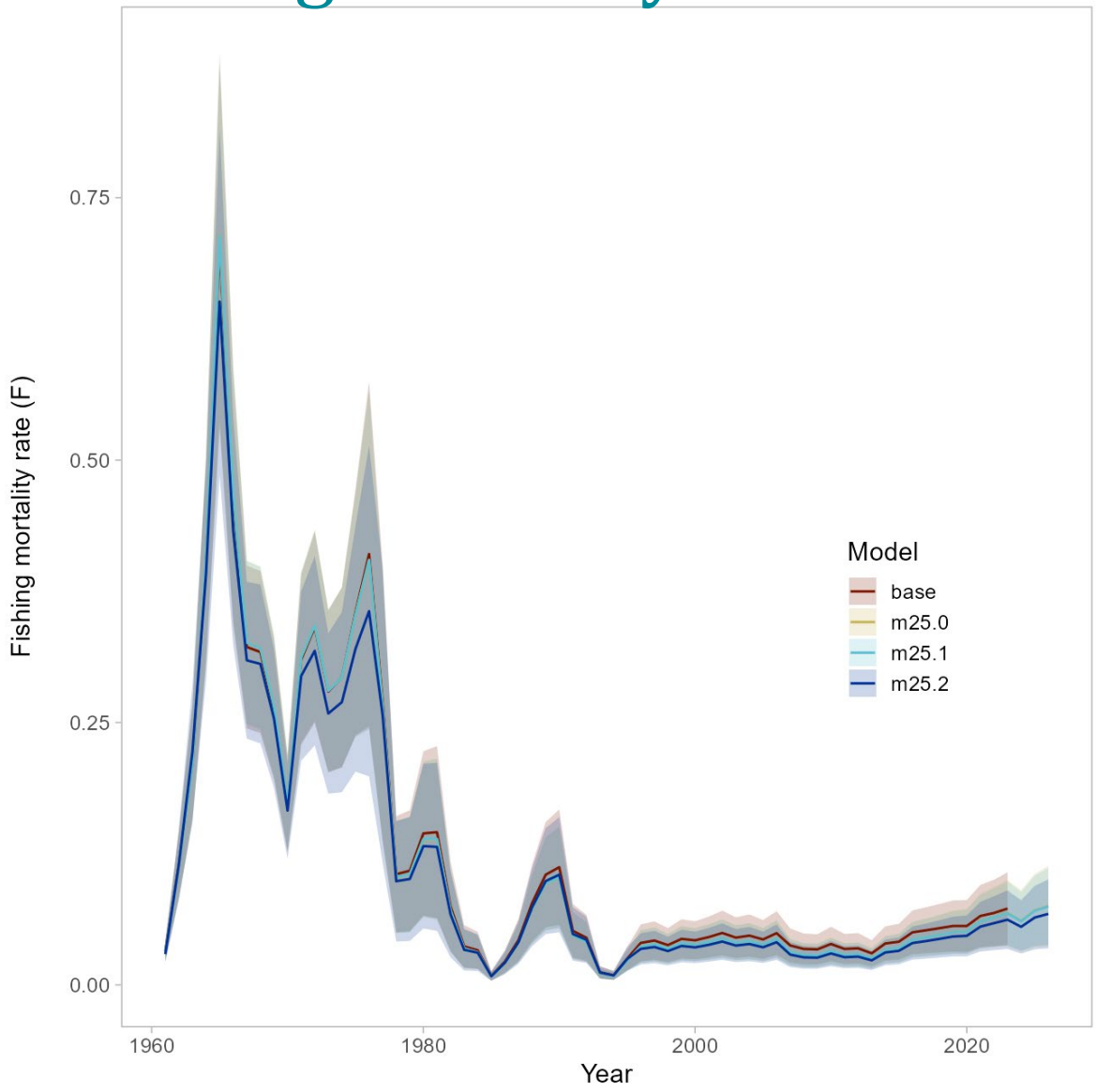
Results – Fishing mortality



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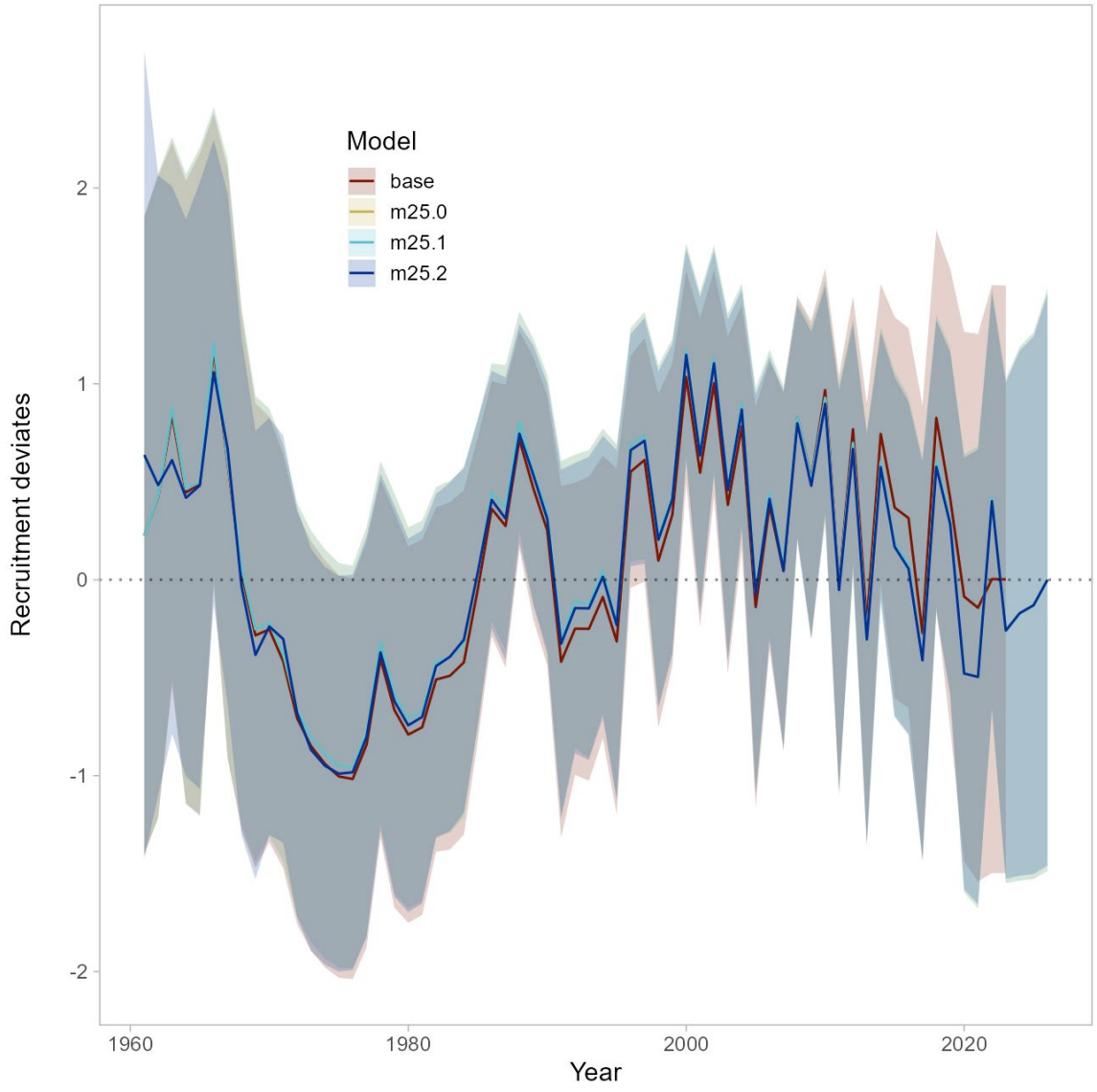
Results – Recruitment devs



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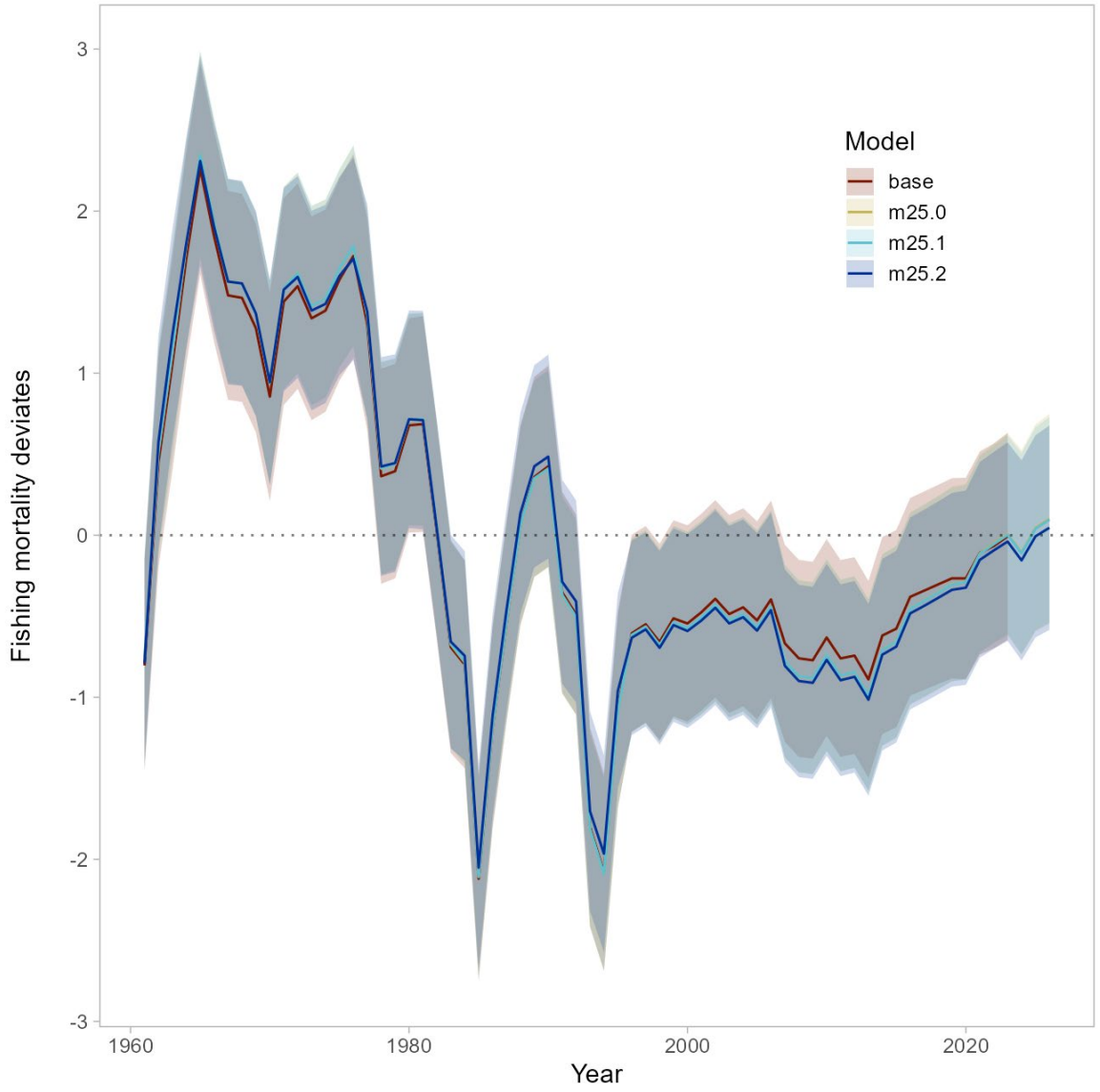

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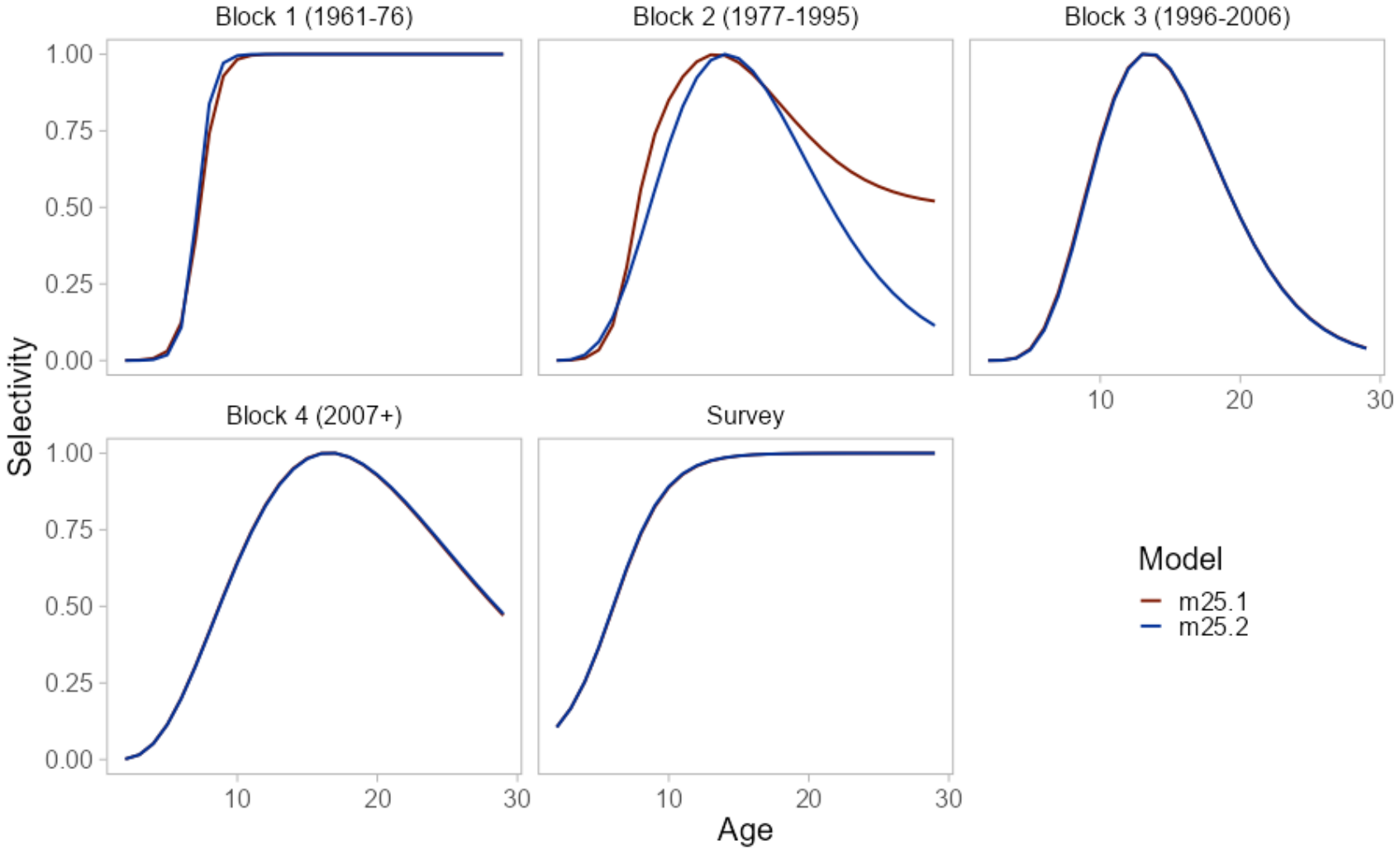
Results - selectivity



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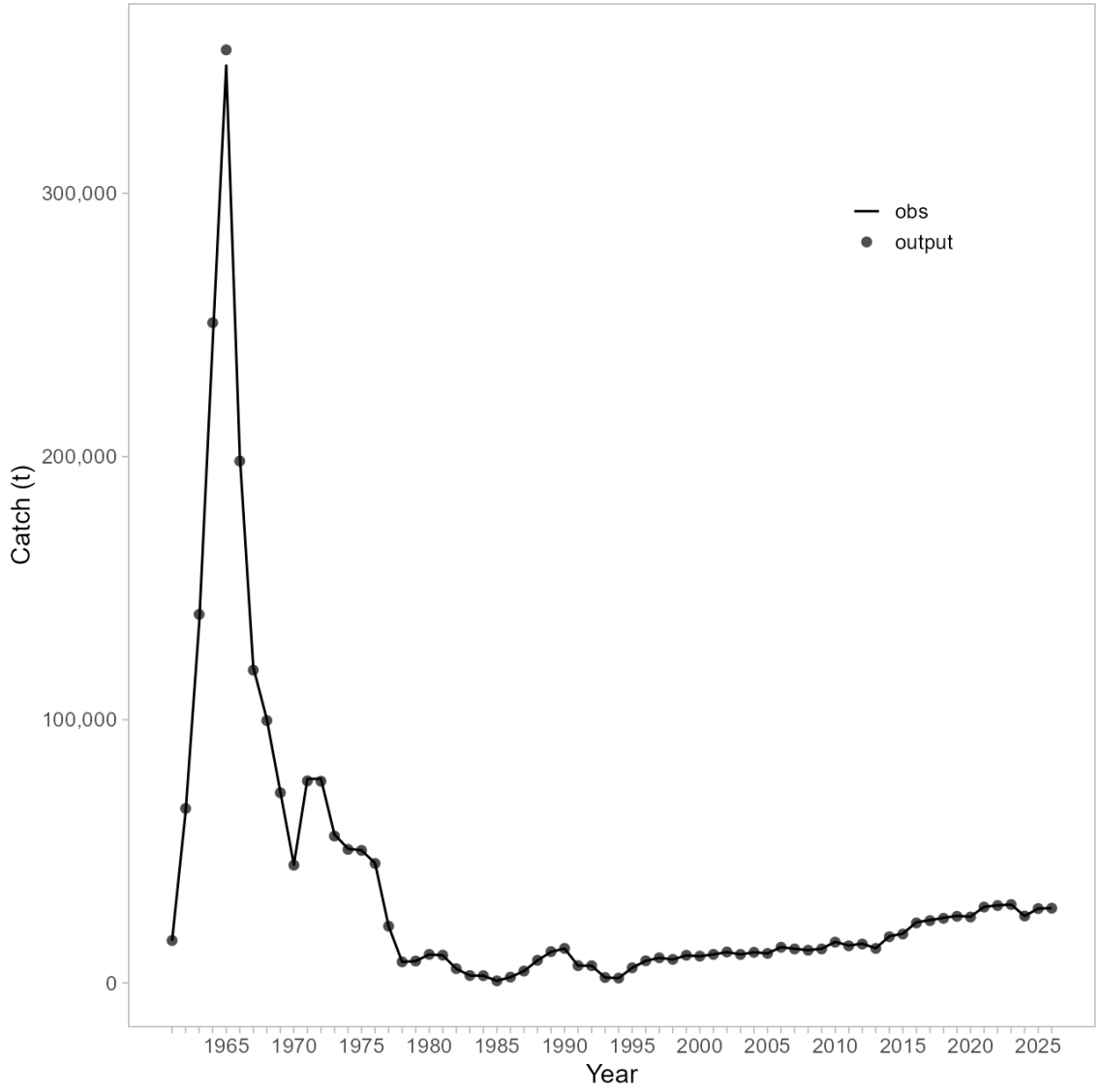
Results – Catch



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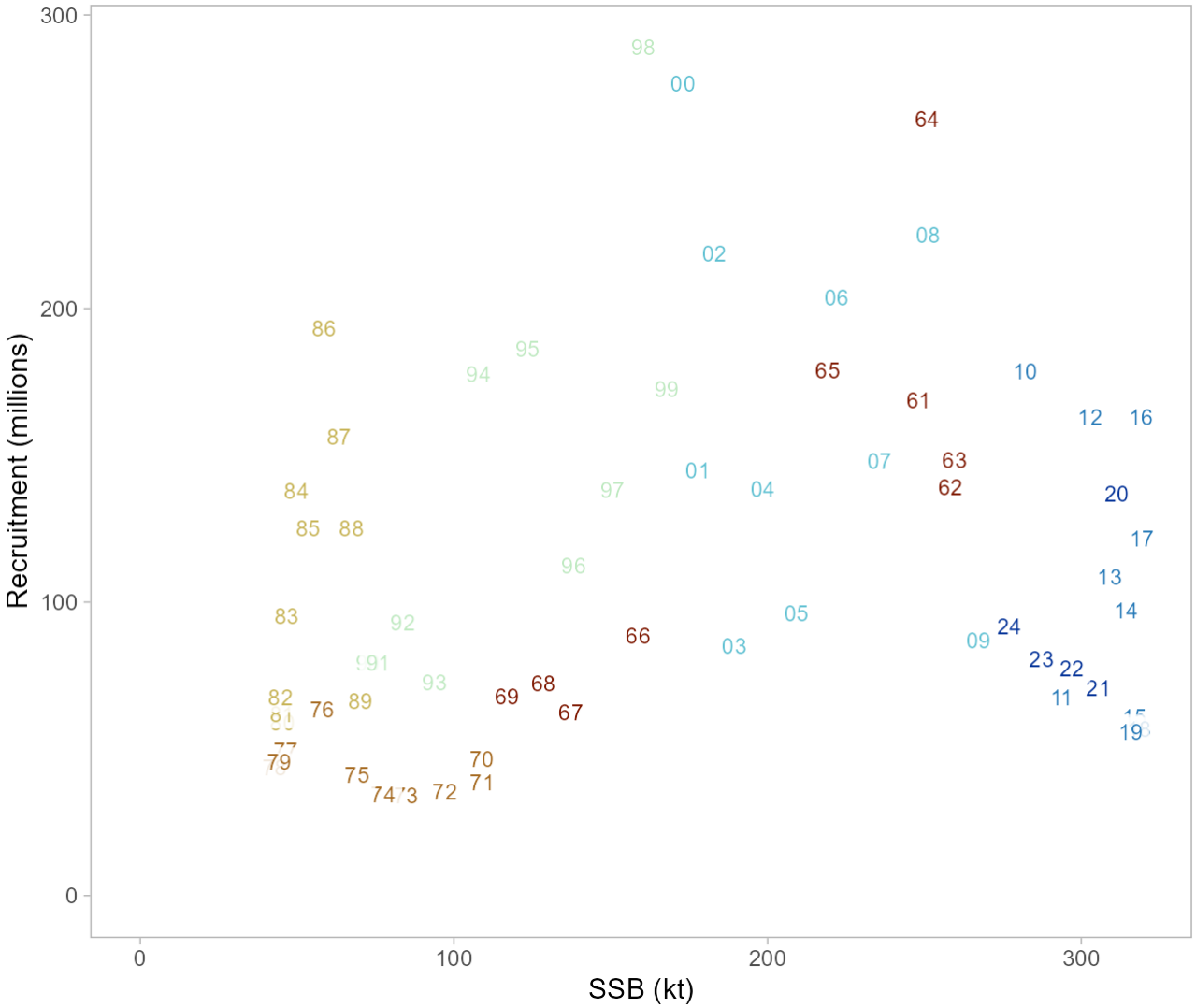
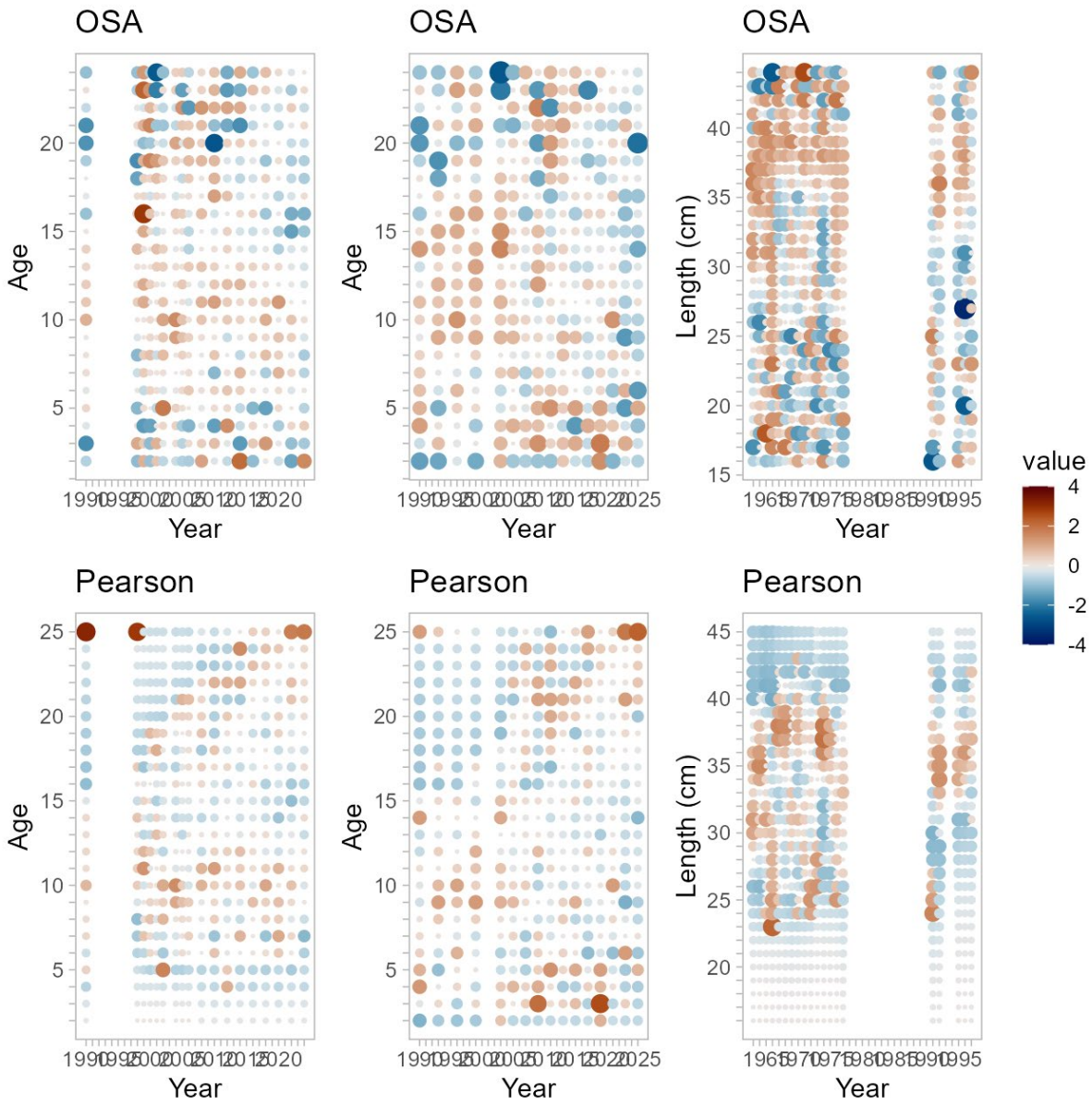
Results – Spawner/Recruits (m25.2)



NOAA FISHERIES

Results



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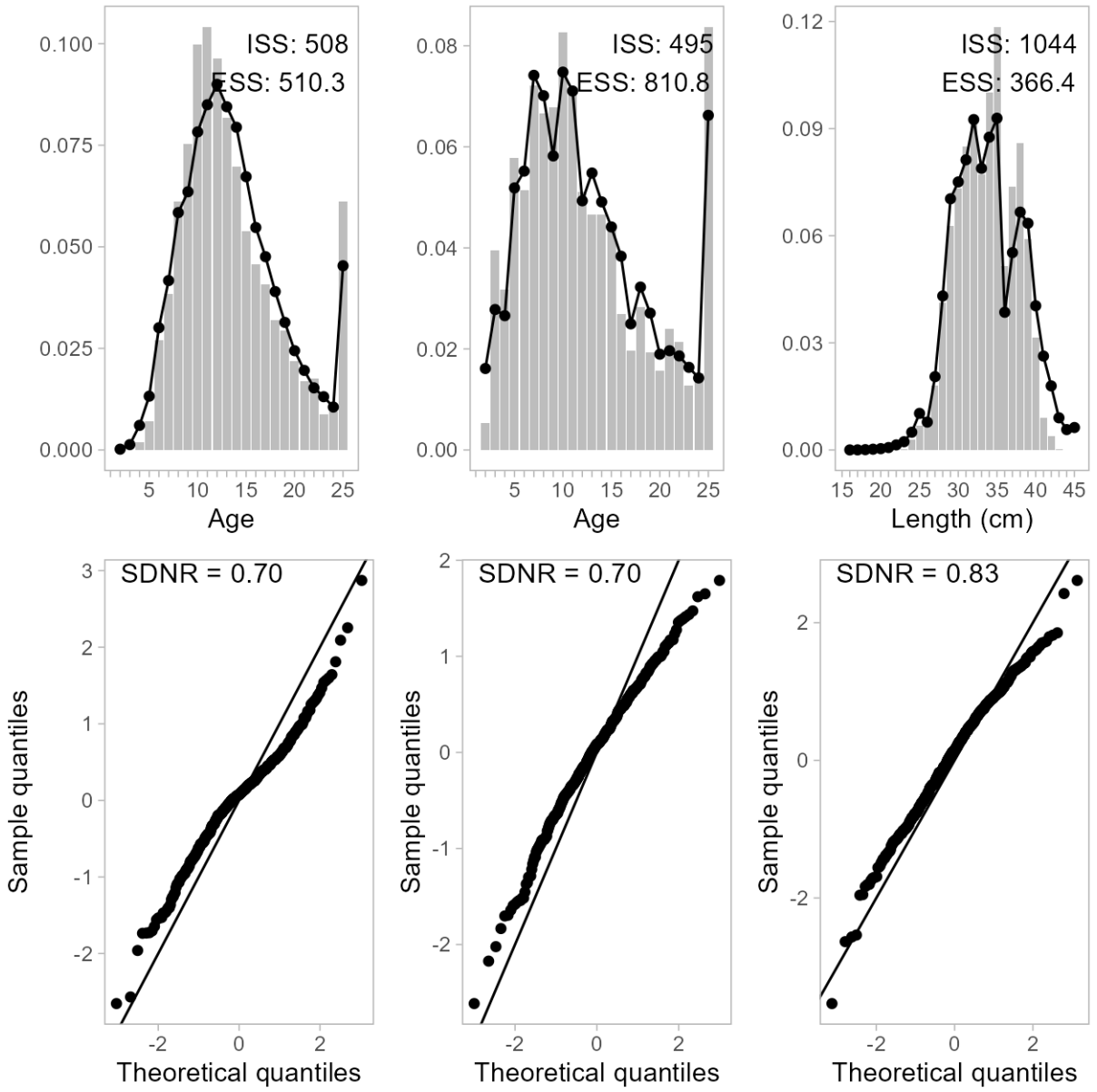

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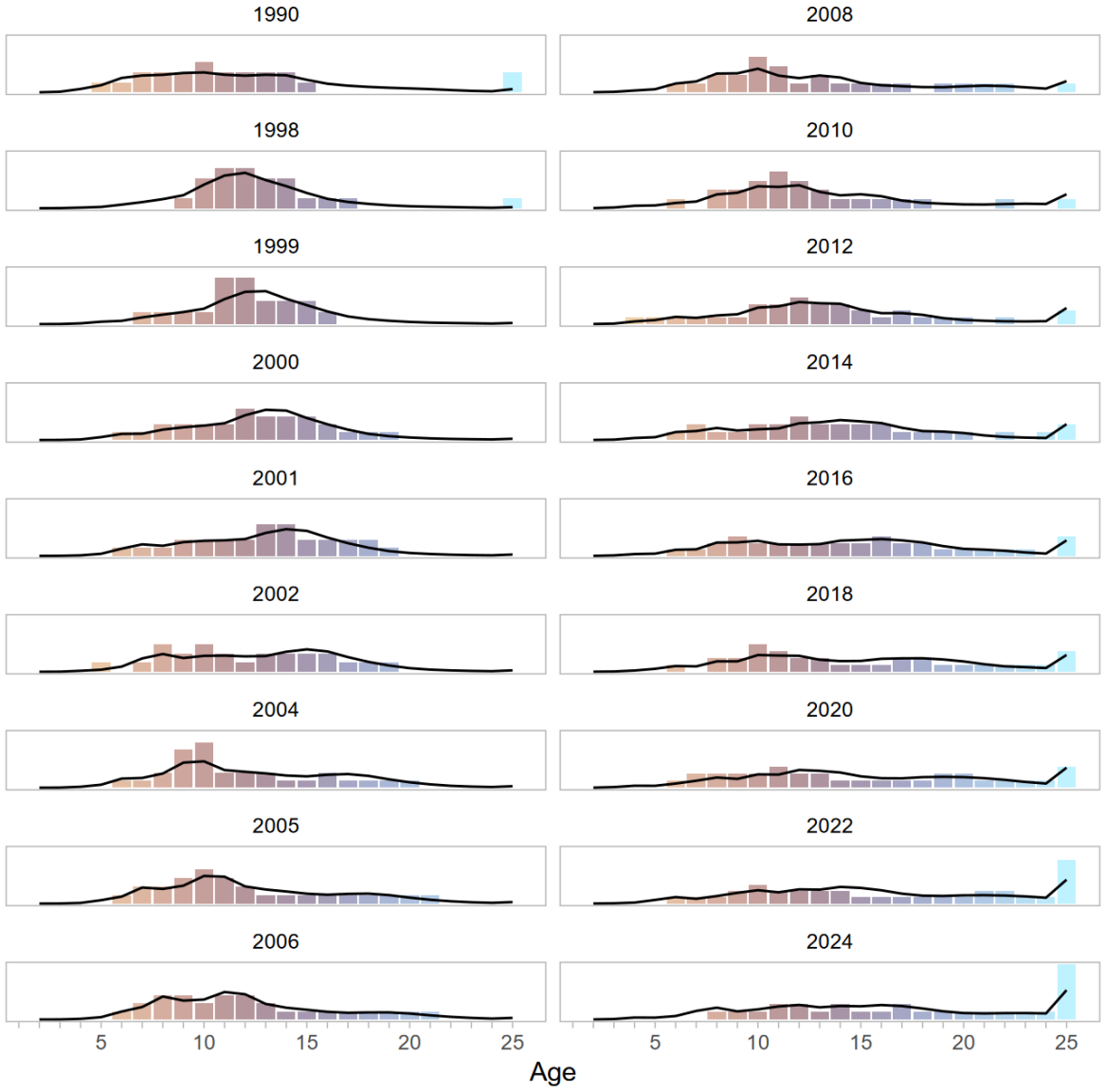
Results – Fishery age comps



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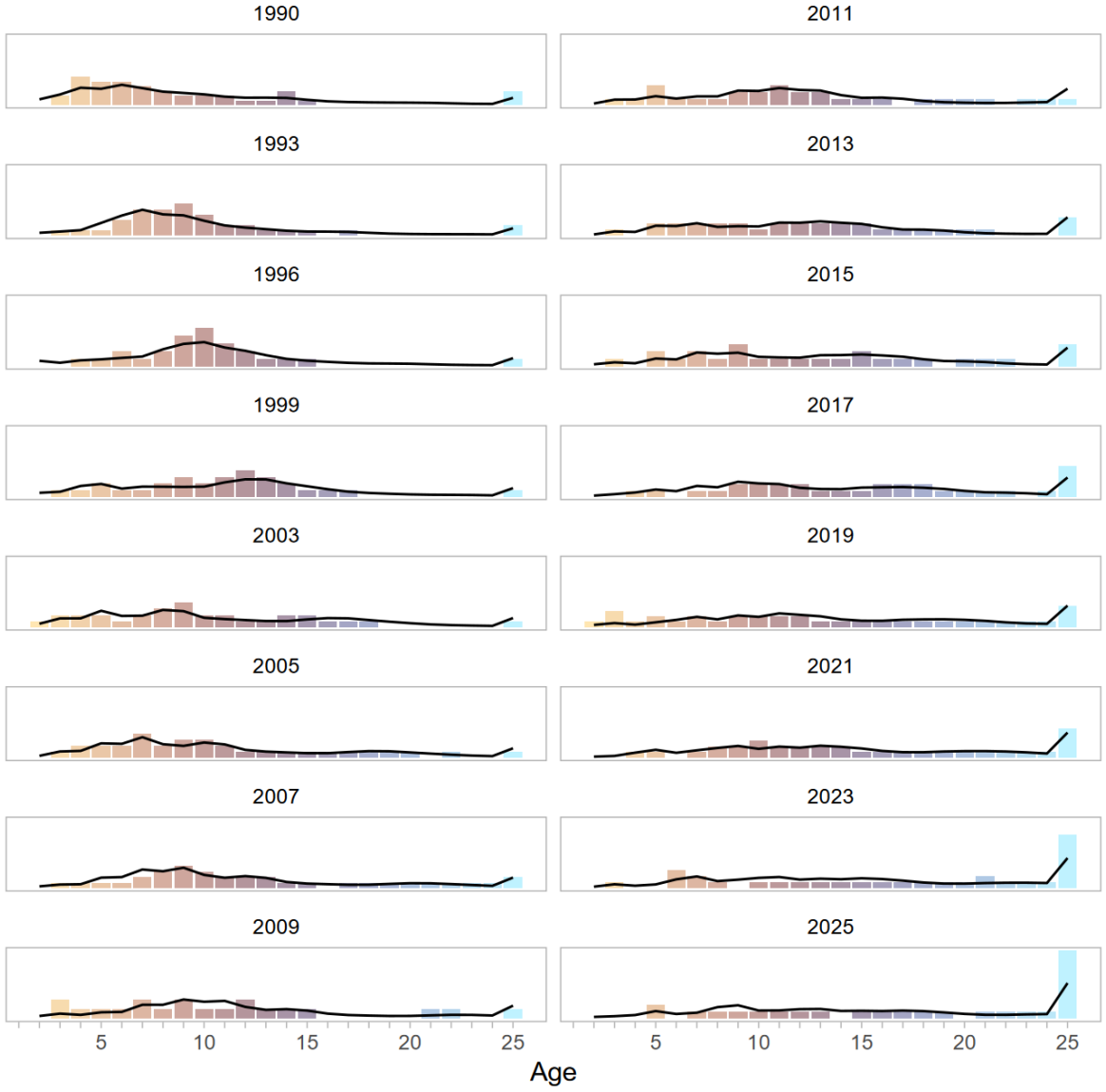
Results – Survey age comps



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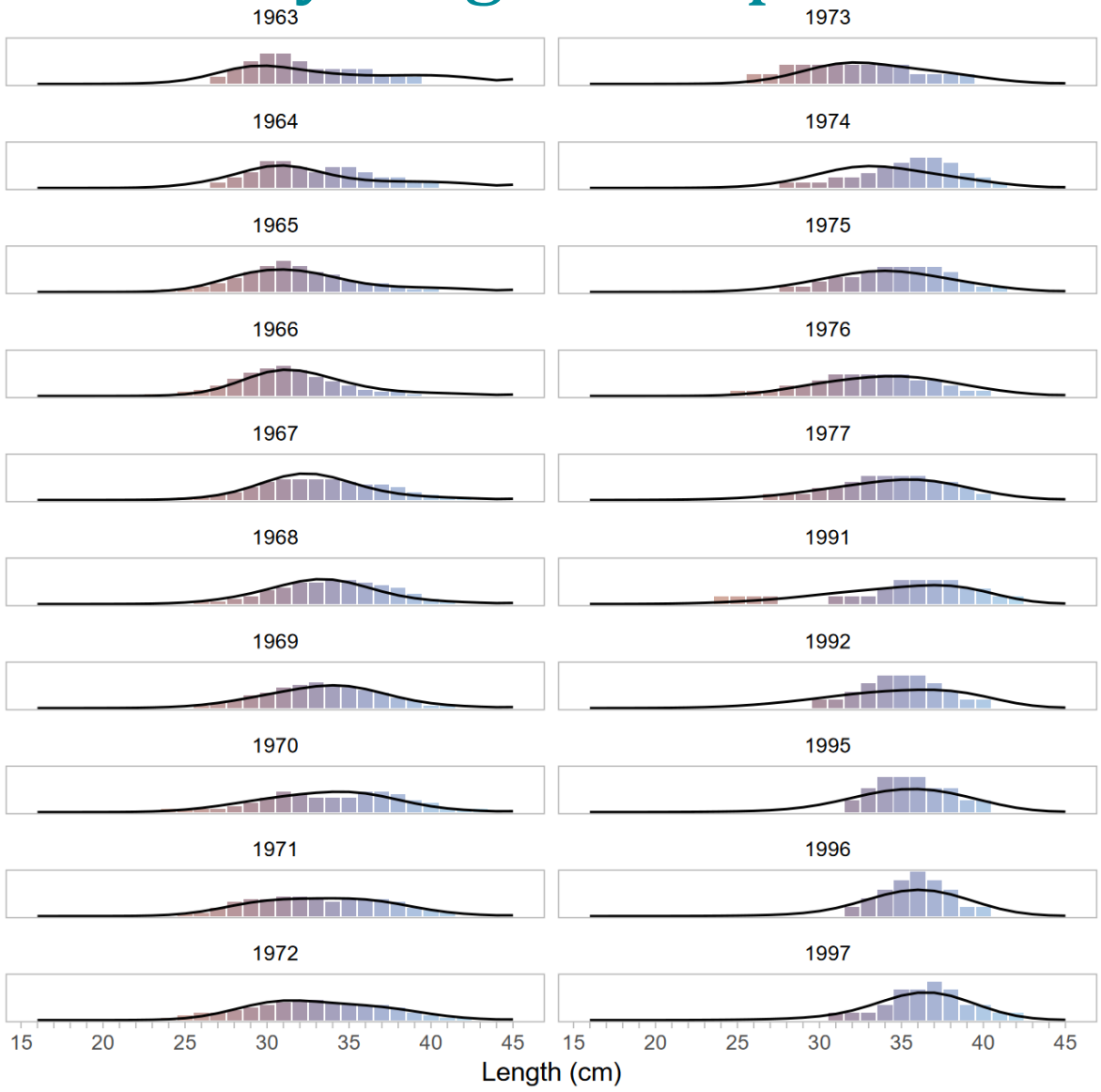
Results – Fishery length comps



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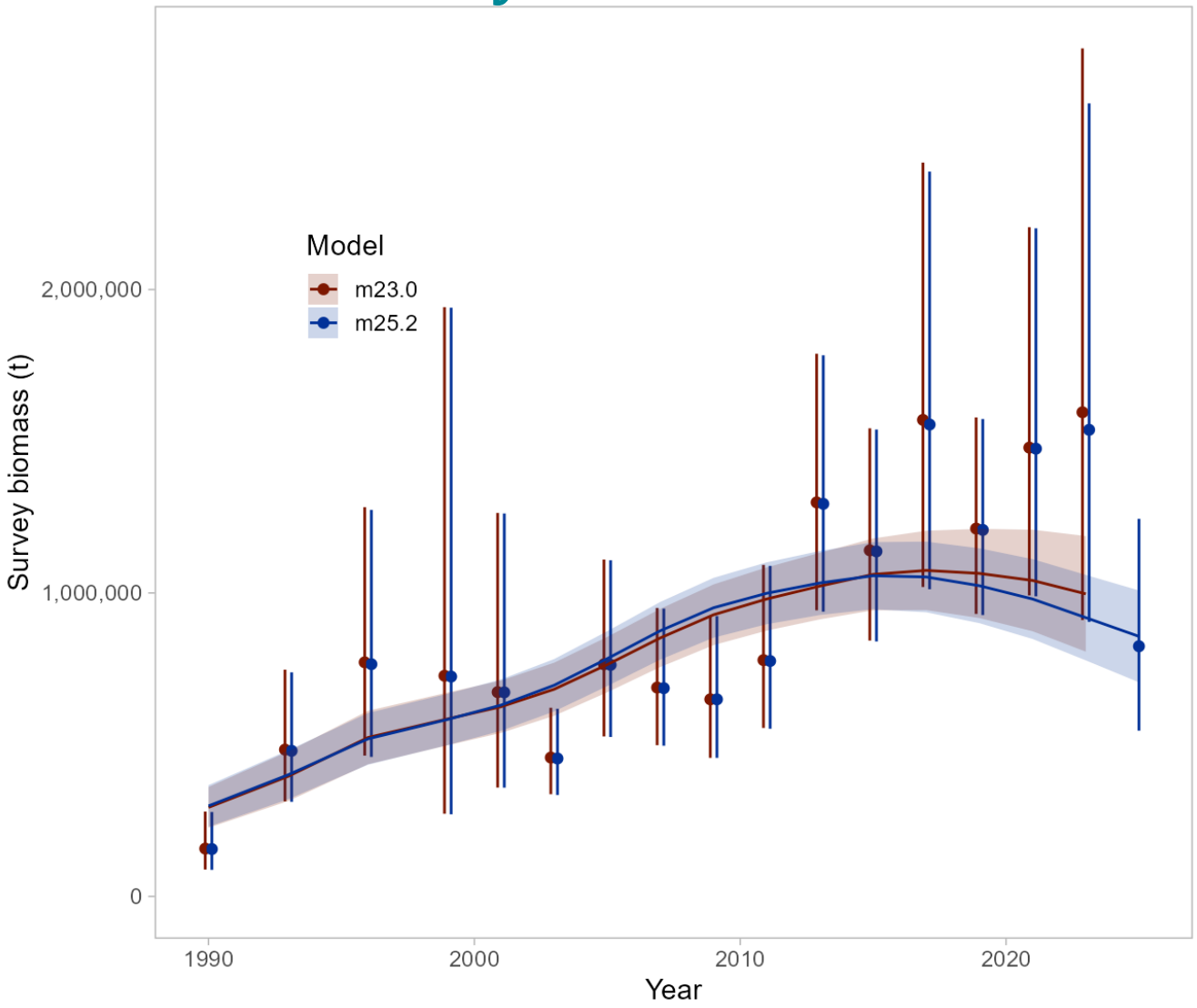
Results - Survey biomass



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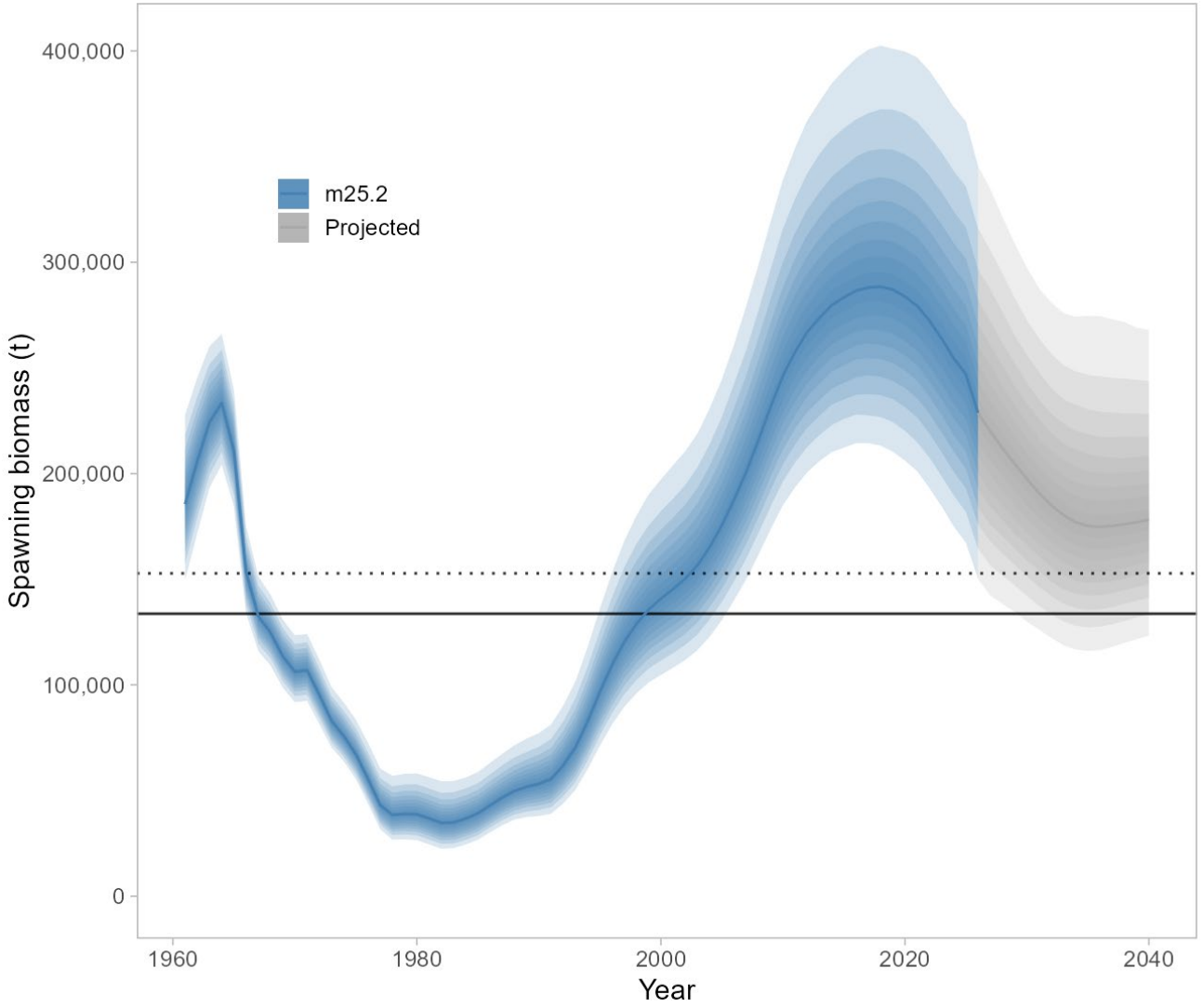
Results – MCMC projection



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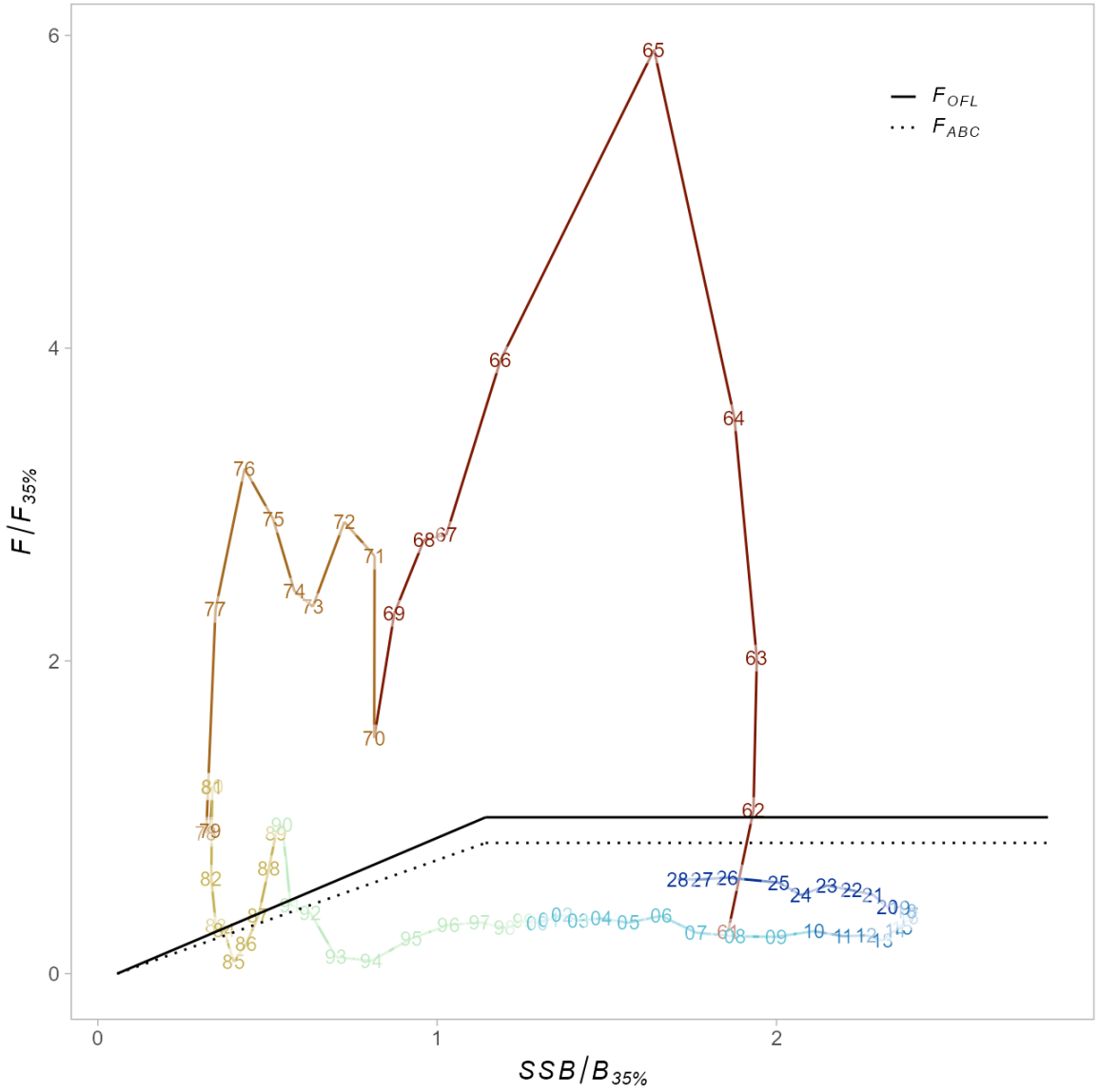

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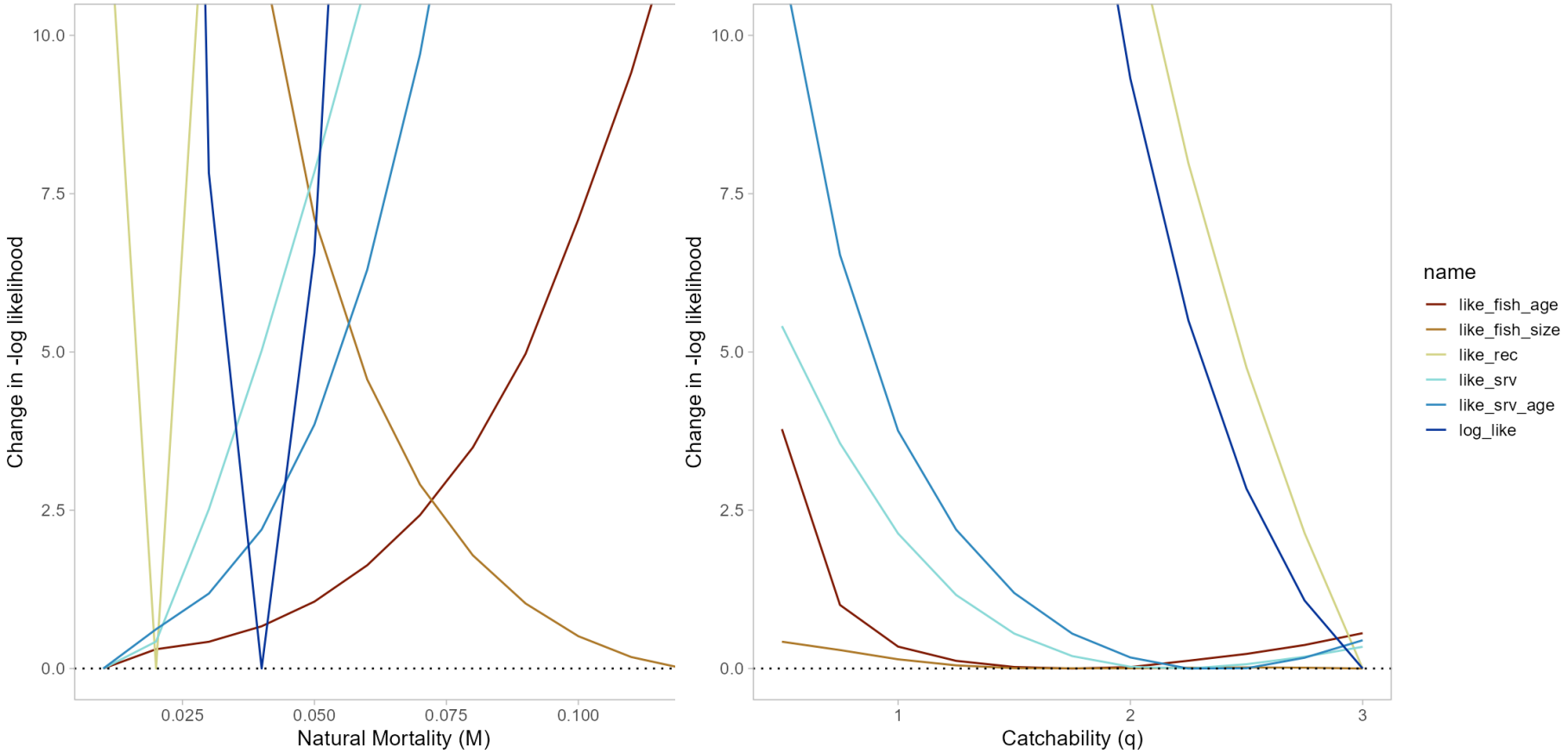
Results – Profiles



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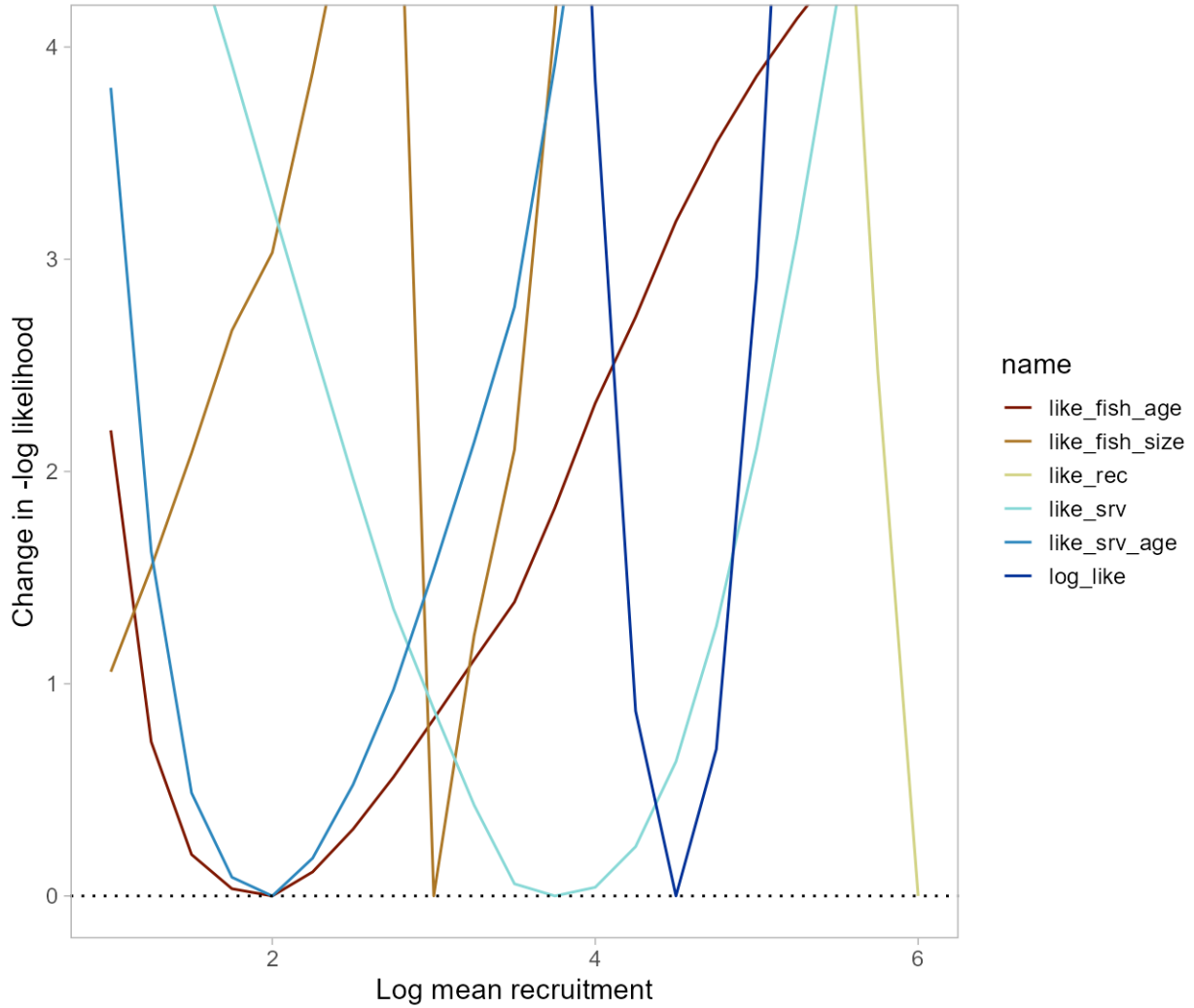
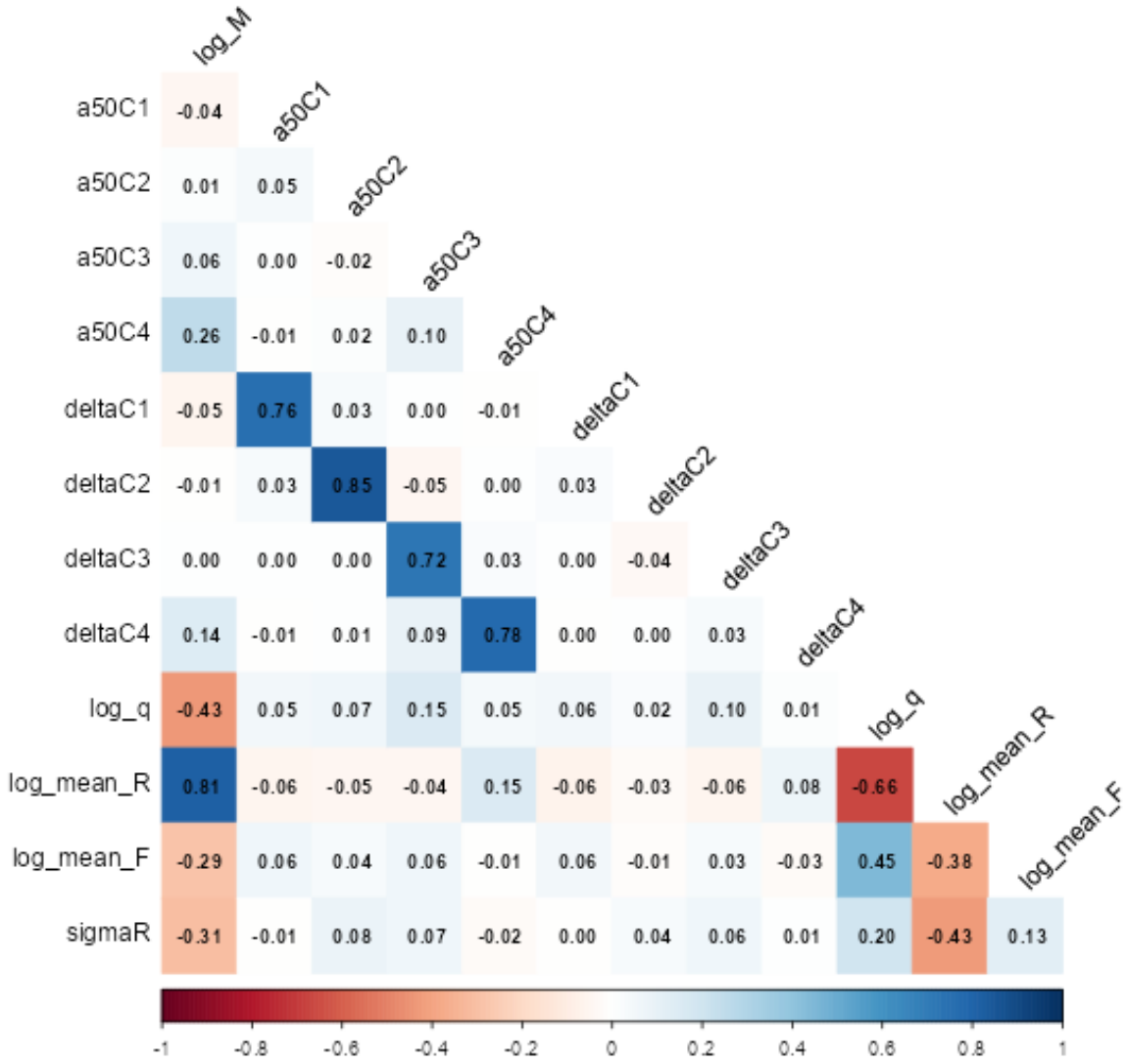


Results – Parameter correlations



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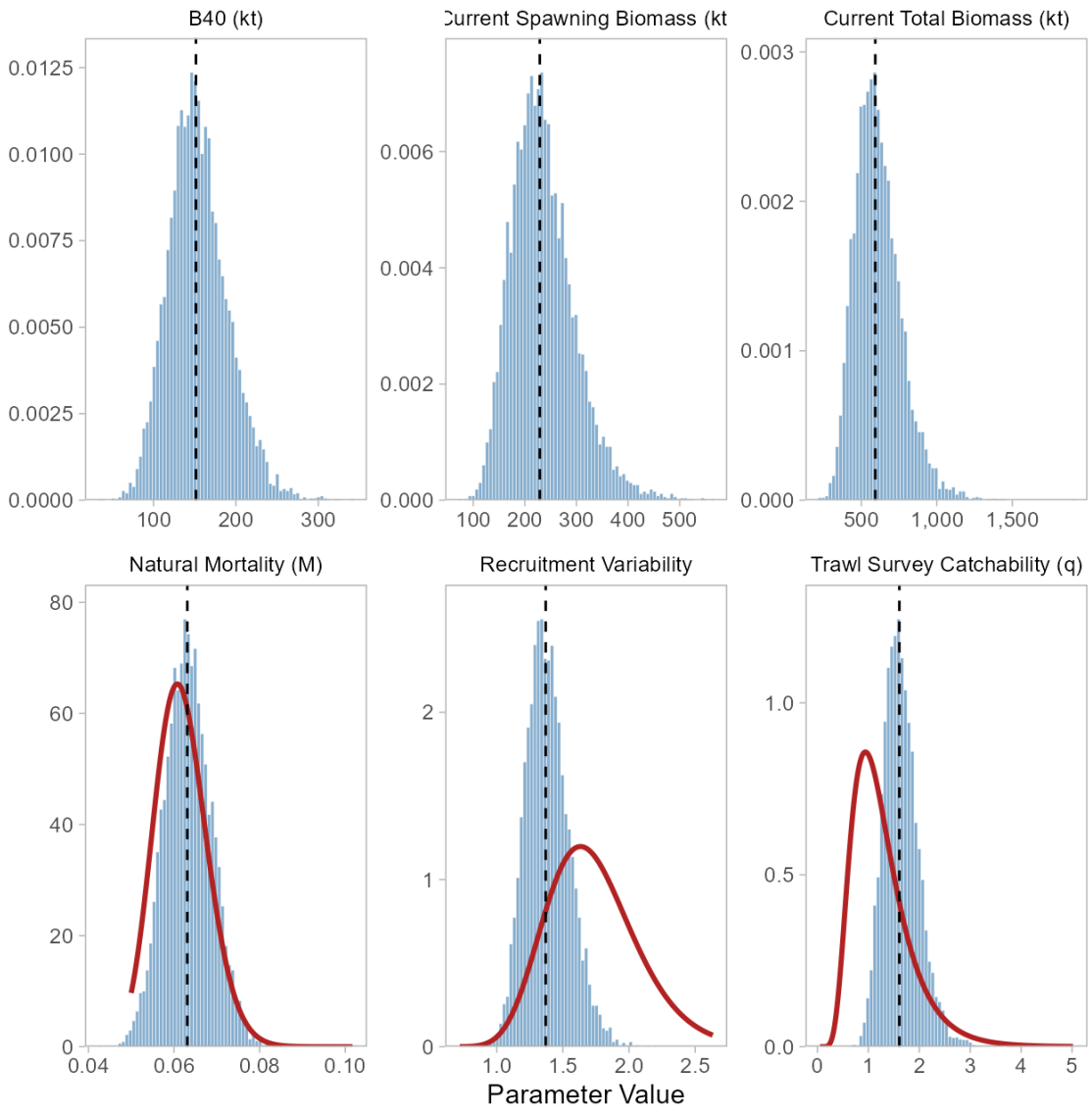
Results – MCMC



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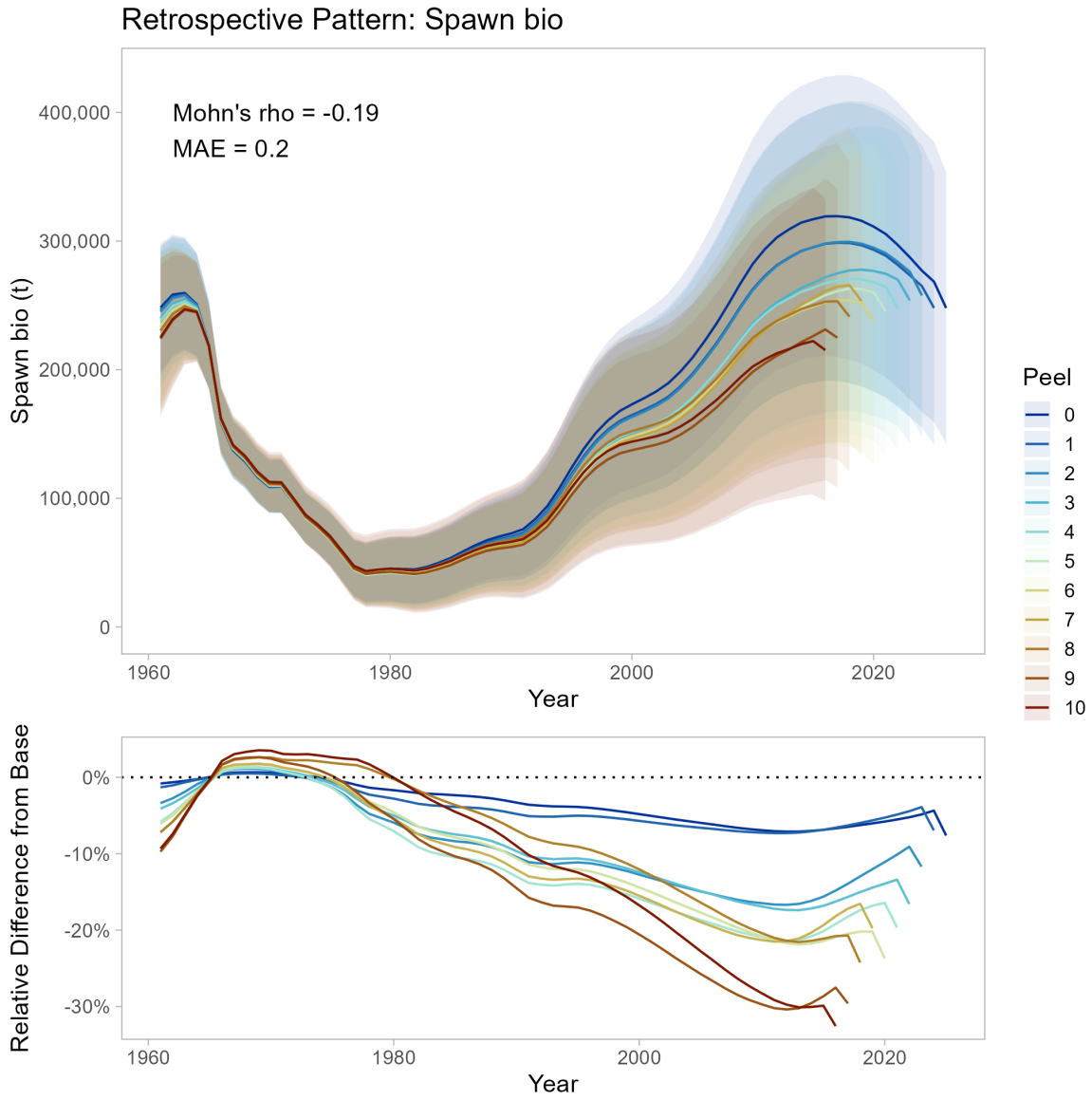
Results – Retrospective



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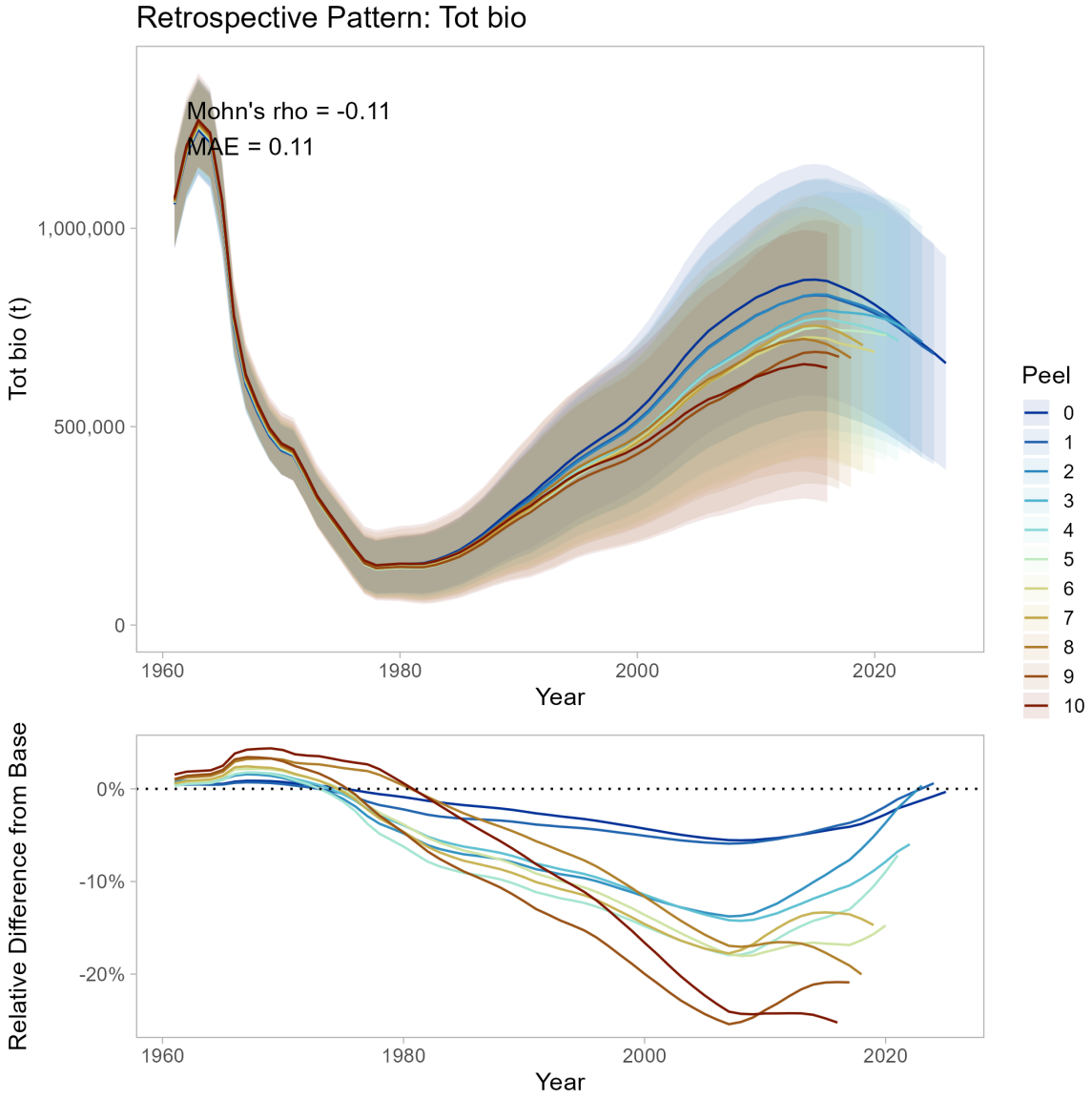

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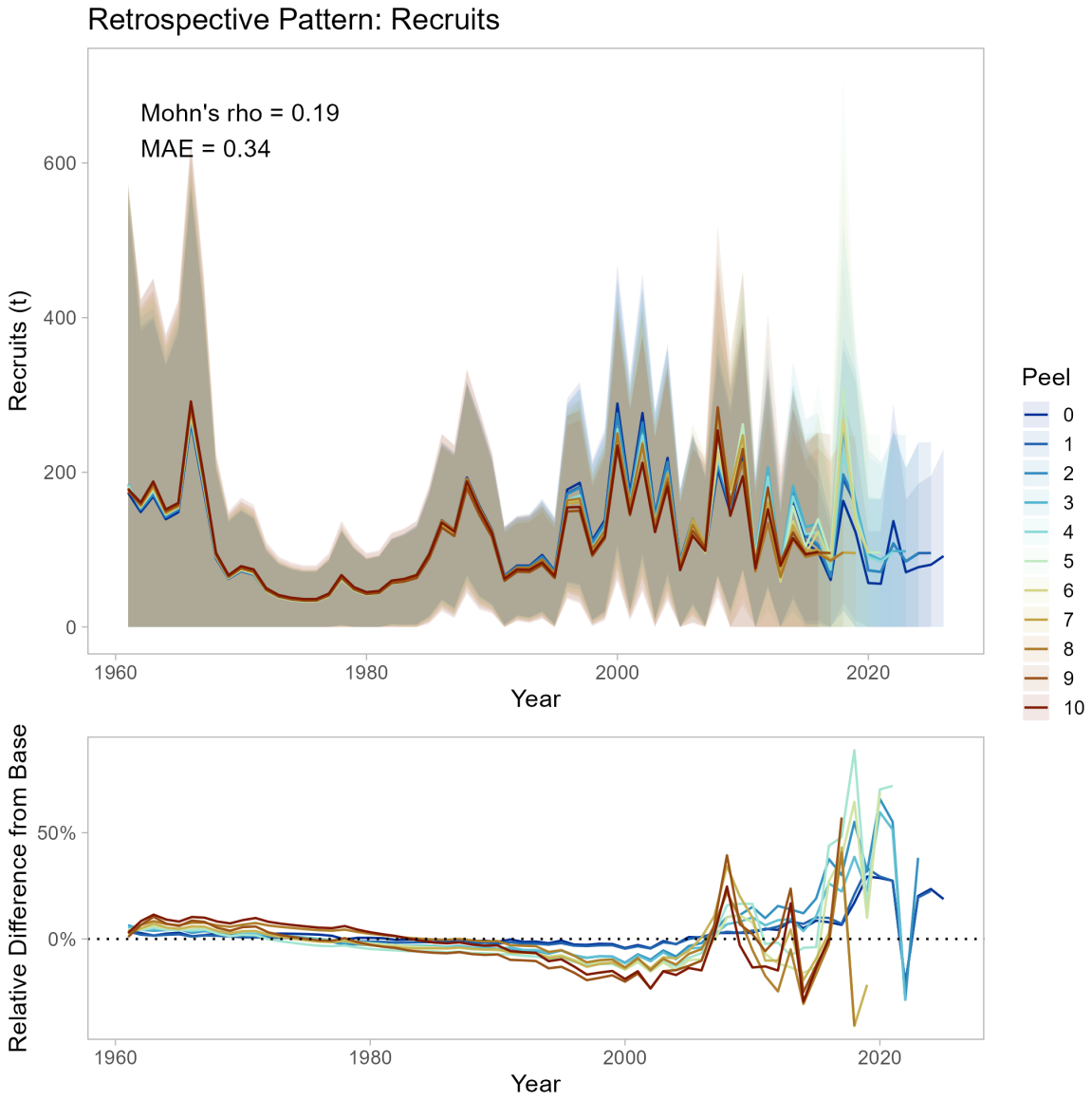

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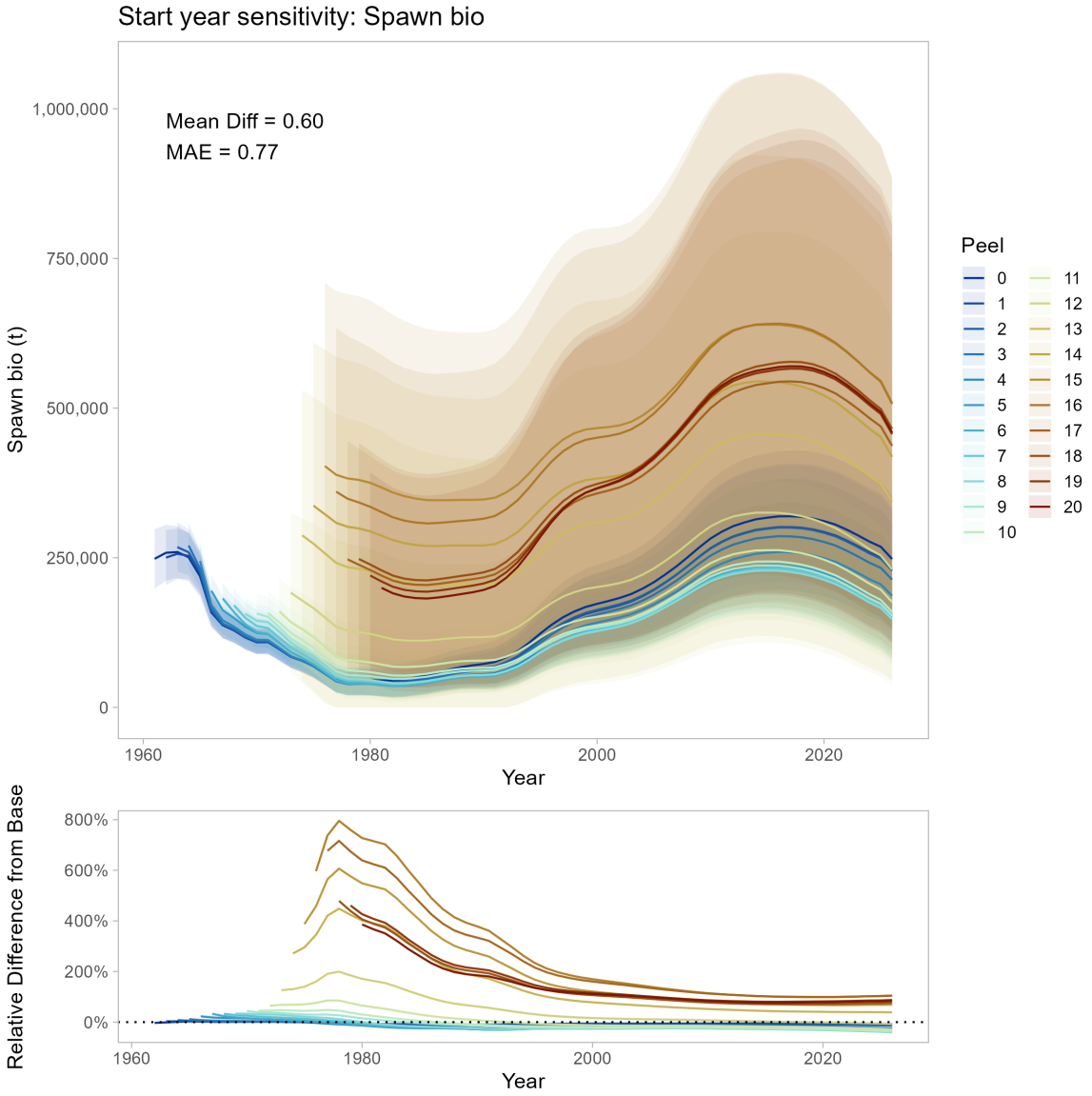
Results – Start year



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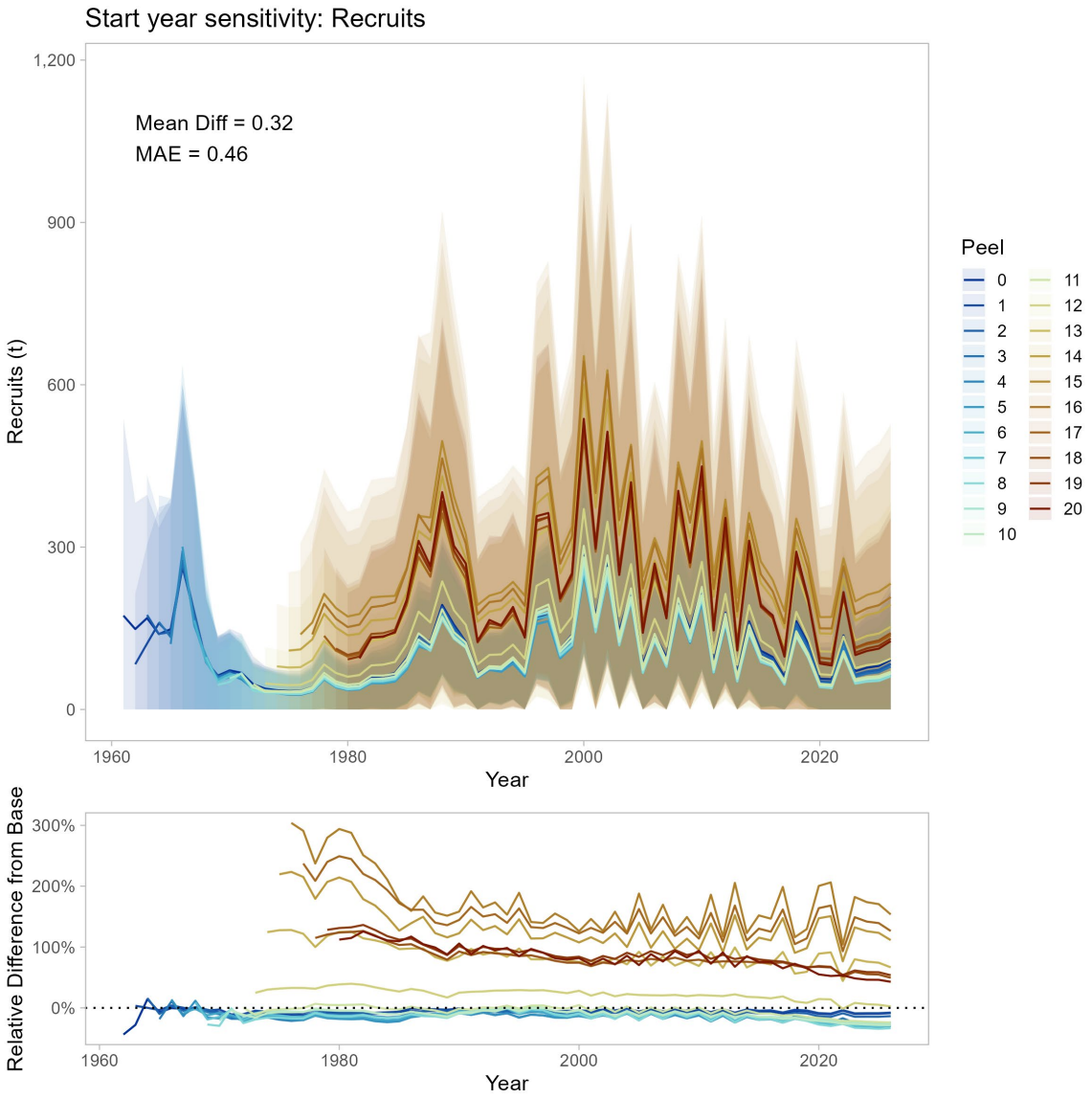

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Results

Quantity/Status	As estimated or specified in 2024 for: 2025	2026	As estimated or *recommended this* year for: 2027*	2028*
M (natural mortality)	0.074	0.074	0.072	0.072
Tier	3a	3a	3a	3a
Projected total (age 2+) biomass (t)	637,024	617,148	634,354	615,309
Projected female spawning biomass (t)	224,800	217,966	237,305	228,050
$B_{100\%}$	343,618	343,618	381,988	381,988
$B_{40\%}$	137,447	137,447	152,795	152,795
$B_{35\%}$	120,266	120,266	133,696	133,696
F_{OFL}	0.119	0.119	0.11	0.11
$maxF_{ABC}$	0.099	0.099	0.092	0.092
F_{ABC}	0.099	0.099	0.092	0.092
OFL (t)	46,562	44,826	**43,132**	41,204
*max*ABC (t)	38,962	37,509	36,317	34,693
ABC (t)	38,962	37,509	**36,317**	34,693
Status	As determined in 2024: 2023	2024	As determined *this* year for: 2025	2026
Overfishing	No	n/a	No	n/a
Overfished	n/a	No	n/a	No
Approaching overfished	n/a	No	n/a	No

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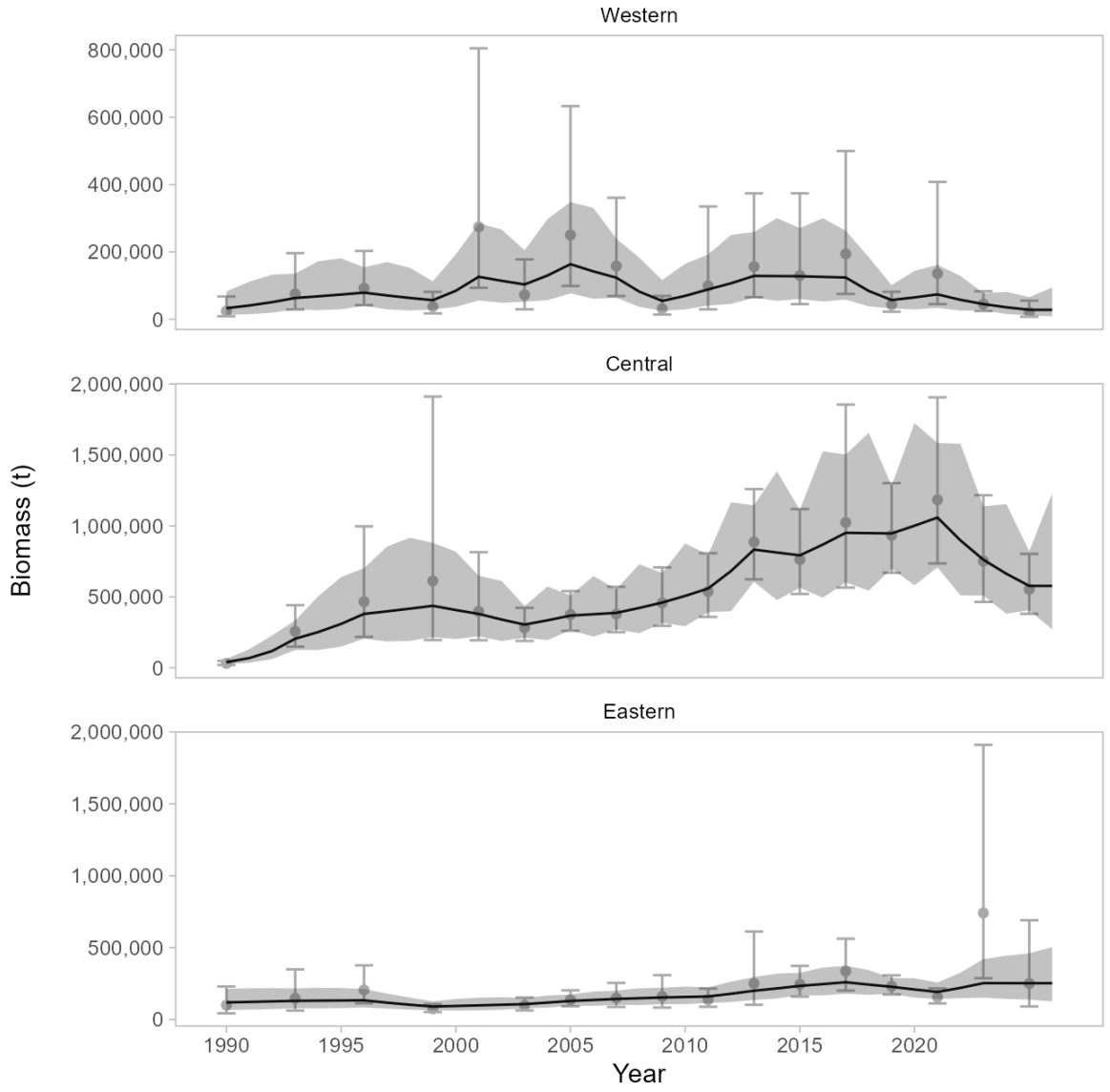
Apportionment



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Apportionment

Biologically-informed recommended distributions (BRDs) for 2027 and 2028 projected GOA Pacific ocean perch abundances.

	BRD Apportionment				
	3.28%	67.26%	29.46%		
Year	Western	Central	Eastern	ABC (t)	OFL (t)
2027	1,191	24,427	10,699	36,317	43,132
2028	1,138	23,334	10,221	34,693	41,204

	W. Yakutat	E. Yakutat/Southeast
2027	2,305	8,394
2028	2,202	8,019

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Apportionment BRDs (previously area-ABCs)

Year	Western	Central	W. Yakutat	SEO	ABC
2016	2,737	17,033	2,847	1,820	24,437
2017	2,679	16,671	2,786	1,782	23,918
2018	3,312	20,112	3,371	2,441	29,236
2019	3,227	19,646	3,296	2,386	28,555
2020	1,437	23,678	1,470	4,653	31,238
2021	1,643	27,429	1,705	5,400	36,177
2022	2,602	30,806	1,409	3,451	38,268
2023	2,529	29,940	1,370	3,354	37,193
2024	1,787	28,757	2,110	7,065	39,719
2025	1,753	28,209	2,070	6,930	38,962
2026	1,688	27,156	1,993	6,672	37,509
2027	1,191	24,427	2,305	8,394	36,317
2028	1,138	23,334	2,202	8,019	34,693

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Apportionment BRDs (previously area-ABCs)

	BRD Catch				
Year	Western	Central	W. Yakutat	SEO	GOA
2016	2,654	17,554	2,827	0	23,035
2017	2,682	18,422	2,757	0	23,861
2018	3,225	18,159	3,352	0	24,736
2019	3,144	19,038	3,288	0	25,470
2020	1,336	22,389	1,466	0	25,191
2021	1,622	25,616	1,662	0	28,900
2022	2,506	25,579	1,395	0	29,480
2023	2,498	25,905	1,363	0	29,766
2024	1,666	21,793	1,946	0	25,405
2025	1,800	24,565	1,892	0	28,257
2026	1,517	25,061	1,825	0	28,403

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Questions?

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Results – Why not these models?

Previously recommended for exploration

Model 25.2a: Update survey ISS
Model 25.2b: Model-based survey biomass
Model 25.2c: a & b
Model 25.2cr: m25.2c w/reweighting (Francis)

All models converged (positive definite Hessian, etc.)

Results – Why not these models?

- Survey ISS vs ad-hoc fishery ISS
- Survey biomass has different scale/trajectories which is not well understood. CIE review recommended staying with design-based
- Reweighting results in weighting distortions

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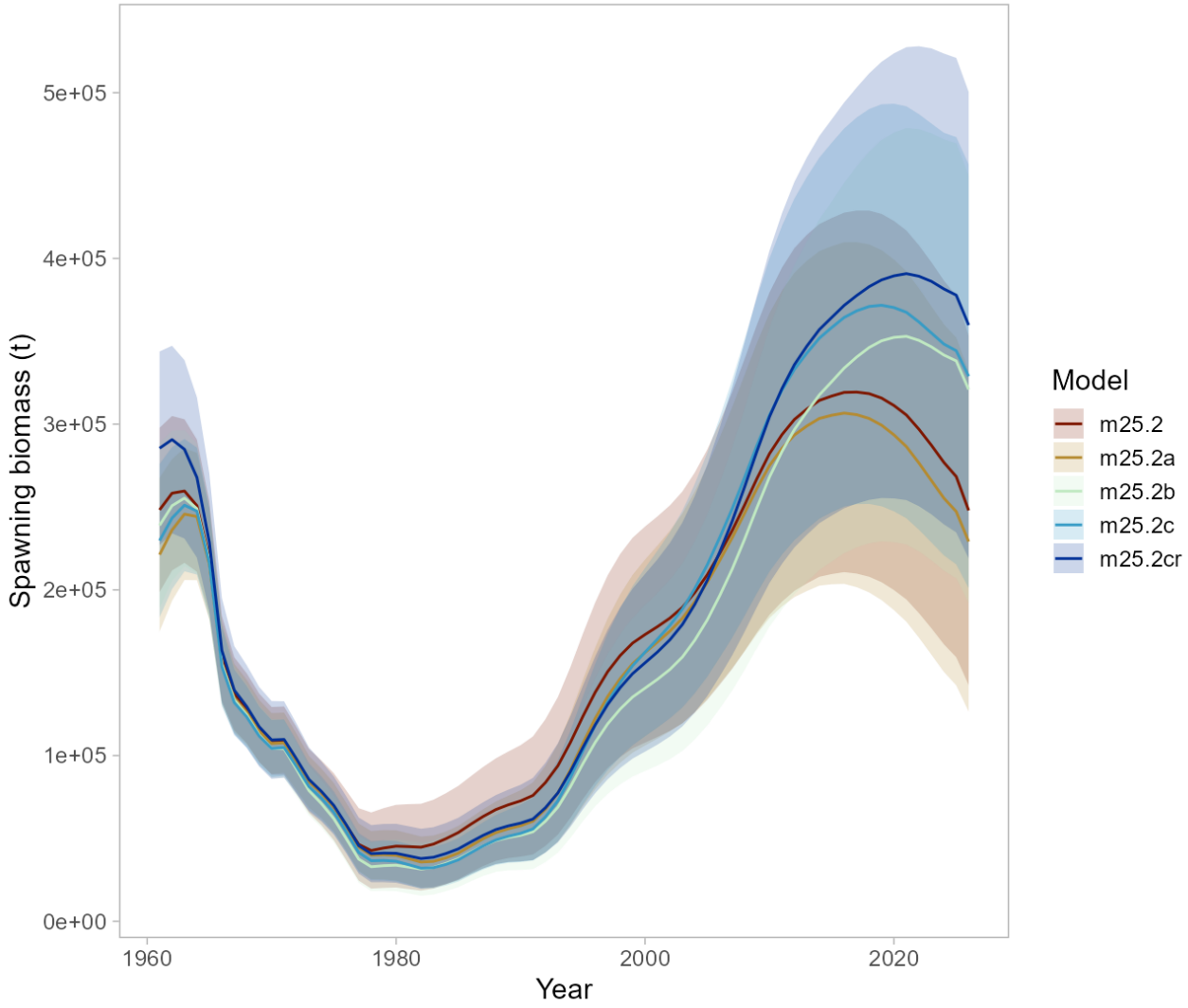
Results – Why not these models?



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Results – Why not these models?

Likelihood	m25.2	m25.2a	m25.2b	m25.2c	m25.2cr
Catch	-91.267	-91.241	-91.207	-91.114	-91.292
Survey biomass	8.588	10.195	8.655	15.406	10.830
Fishery age	355.517	357.665	355.438	357.628	1007.239
Survey age	376.525	739.742	378.437	739.803	198.374
Fishery size	488.488	485.120	487.203	487.742	256.888
Recruitment	93.087	114.681	105.868	120.812	103.584
F regularity	6.569	6.189	6.462	6.741	6.558
SPR penalty	0.000	0.000	0.000	0.000	0.000
q prior	0.204	0.248	0.543	0.250	0.281
M prior	-0.089	-1.349	-0.956	-1.127	-1.379
sigmaR prior	7.829	4.098	5.492	3.233	5.882
Total	1245.451	1625.347	1255.935	1639.375	1496.964
Number of pars	176	176	176	176	176
Fishery age comp wt	1.000	1.000	1.000	1.000	2.861
Survey age comp wt	1.000	1.000	1.000	1.000	0.251
Fishery size comp wt	1.000	1.000	1.000	1.000	0.512

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Results – Why not these models?

Item	m25.2	m25.2a	m25.2b	m25.2c	m25.2cr
M	0.072	0.063	0.067	0.057	0.061
Fishery slx a50 1	6.124	6.078	6.125	6.080	6.024
Fishery slx a50 2	13.064	13.083	13.357	13.115	13.867
Fishery slx a50 3	12.447	12.626	12.805	12.682	12.596
Fishery slx a50 4	15.580	13.911	16.815	14.150	16.036
Fishery slx delta 1	1.570	1.535	1.584	1.539	1.481
Fishery slx delta 2	5.929	5.775	6.005	5.767	6.613
Fishery slx delta 3	4.878	5.099	5.053	5.120	4.922
Fishery slx delta 4	9.394	8.060	10.327	8.228	9.953
Survey slx a50	5.030	4.510	6.197	4.739	5.393
Survey slx delta	5.546	5.197	7.013	5.445	6.315
q	1.390	1.449	1.740	1.452	1.489
sigmaR	0.745	0.915	0.841	0.971	0.823
log mean Recruits	4.518	4.175	4.391	4.099	4.380
log mean F	-2.739	-2.633	-2.632	-2.672	-2.741
Projected Total biomass	636,156	567,226	816,064	818,188	882,915
Projected SSB	238,113	221,365	313,160	323,670	351,056
Projected OFL	43,289	31,954	58,139	45,458	56,872
Projected F35	0.110	0.099	0.108	0.093	0.096
Projected ABC	36,449	27,204	48,627	38,672	47,819
Projected F40	0.092	0.084	0.090	0.079	0.081

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