



NOAA
FISHERIES

Preliminary assessment of BSAI Greenland turbot

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September 2026

Introduction

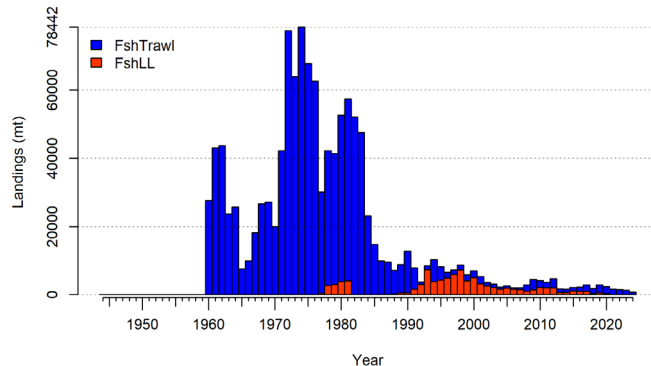
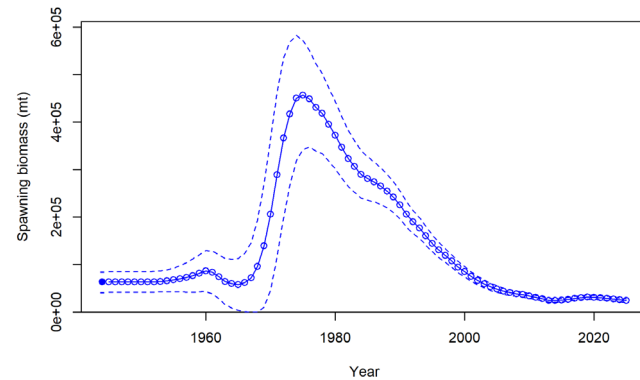
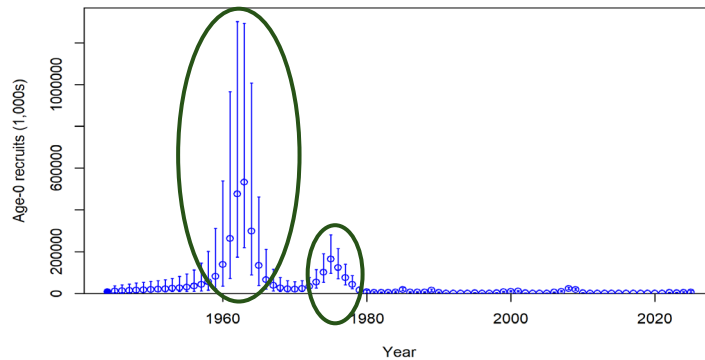
- Presented preliminary assessment in September 2025
- Authors have worked to rebuild the model
 - Model explorations
 - Estimated catchability, R_0 , and recruitment deviations
 - Fixed growth
 - Selectivity (simplified: no time blocks)
 - Fixed: Parameters to better fit sex-specific length comp
 - Estimated (minimal number of double normal parameters)
 - Models with single surveys and two fisheries before including all three surveys in model
- Data conflicts identified through this process

Introduction

- Data conflicts
 - Considerable tension between the survey length composition data and survey indices
 - Francis reweighting leads to strong down weighting of length composition data, especially survey length compositions
 - Survey indices
 - Deep water surveys drive overestimation of shelf survey biomass in the absence of time blocks
 - Improved fit to the longline survey can result in poorer fits to other surveys

Introduction

- Data conflicts
 - Model used for management starts in 1945
 - Uncertainty about whether the stock was incredibly productive and small or large and less productive



Model structure

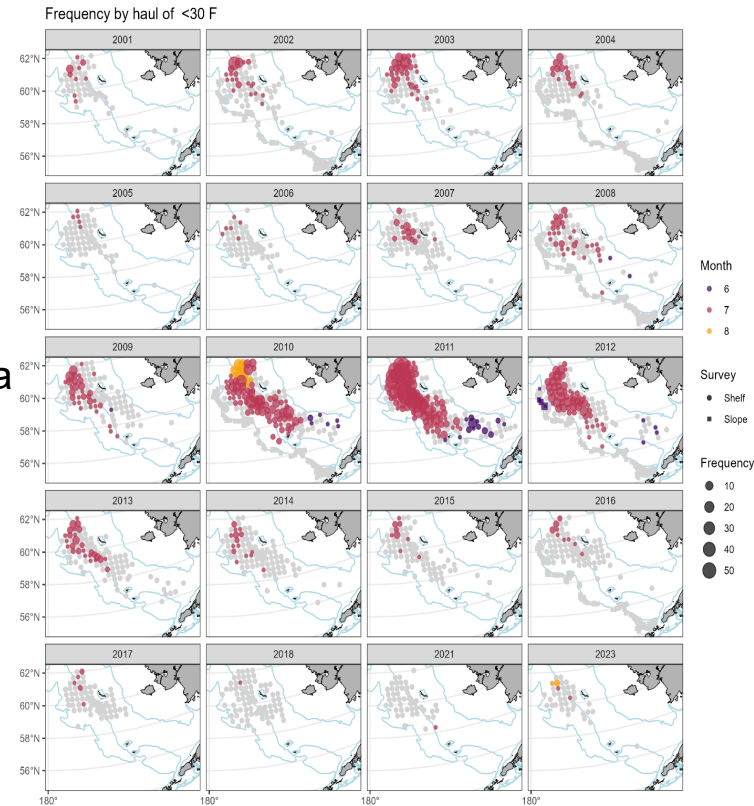
- Fleet structure
 - Two fisheries
 - Trawl fishery
 - Fixed gear (primarily longline)
 - Three surveys
 - EBS shelf bottom trawl survey
 - EBS slope bottom trawl survey
 - AFSC longline survey (Bering Sea and Aleutian Islands)
- Sex-specific model
- von Bertalanffy growth estimated
 - CV associated with young and old fish fixed (15% and 9%)

Model structure

- Natural growth fixed and assumed the same for females and males (Cooper et al. 2007)
- Maturity at length externally estimated (D'yakov 1982)
- Stock-recruitment relationship (Beverton – Holt)
 - σ_R – 0.6
 - Steepness (h) – 0.79 (Myers et al. 1999)
 - R_0 and autocorrelation estimated
 - SS3 developers recommend not estimating autocorrelation (suggested model change)
 - Recruitment deviations estimated
 - Early (1945-1970)
 - Main (1970 – 2020)
 - Forecast (2021-2024)

Model structure

- Survey catchability
 - EBS bottom trawl surveys - catchability not estimated
 - Fixed estimates from a 2015 model run
 - Did not include the bottom trawl survey data from 2007-2015
 - CIE reviewers recommended estimating or using derivation of MLE (suggested model change)
 - AFSC longline survey estimated
- Selectivity
 - AFSC longline survey
 - Logistic
 - Not sex-specific – prior to 2021 sex not identified when measuring lengths



- All other fleets
 - Double normal pattern
 - Sex - specific
 - Time blocks

Fleet/Survey			
EBS shelf survey	1945 – 1991	1992 – 1995	1996-2000, 2001 - 2024
EBS slope survey	1945 – 2001	2002 – 2010	2011 – 2024 (2 years of data)
Trawl fishery	1945 – 1988	1989 – 2005	2006 - 2024
Longline fishery	1945 – 1990	1991 – 2007	2008 - 2024



Models

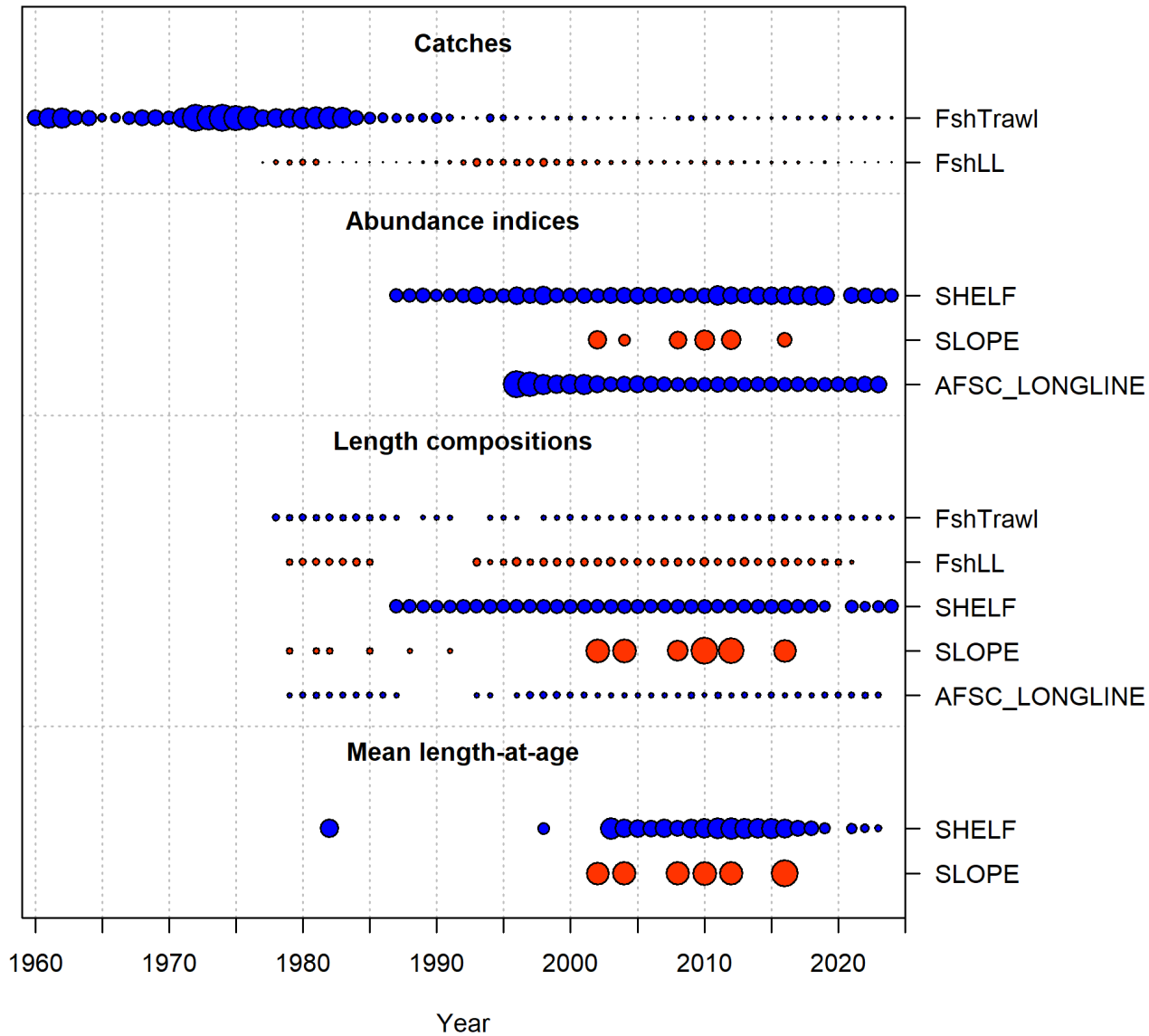
Model	Description	Reason for change
16.4c	Last accepted model for management	-
25.0	16.4c with AFSC longline survey RPNs using the SSC-recommended interpolation method	SSC and PT recommendation. This did not impact the model outcomes
25.1	Bottom trawl survey length composition input sample size from afscISS	Allowed for interannual variability in bottom trawl survey input sample size that better reflects sampling
25.1a	25.1 + number of observed hauls for fishery fleets	Allowed for interannual variability in fishery input sample size that better reflects sampling
25.2	25.1a + SRR autocorrelation parameter fixed = 0.437	The autocorrelation parameter is not estimated confidently. The value used is based on a published value for flatfish.
25.3	25.2 + survey catchability from qfloat option in SS3 for all three survey fleets	Allows the model to derive the MLE for catchability as opposed to fixing the values for the bottom trawl



Models

Model	Description	Reason for change
25.2a	25.2 + Length composition variance adjustment from the Francis reweighting approach	An objective approach to weight the data was used
25.b	25.2 + Length composition variance adjustment from 16.4c	
25.3a	25.3 + Length composition variance adjustment from the Francis reweighting approach	An objective approach to weight the data was used
25.3b	25.3 + Length composition variance adjustment from 16.4c	
25.4	25.3 + Remove last time block (2011- model end year) on EBS slope bottom trawl survey selectivity	The 2011_time block for the slope survey contains two years of data. This modification is meant to stabilize the estimation of the slope survey selectivity.
25.4a	25.4 + Length composition variance adjustment from the Francis reweighting approach	
25.4b	25.4 + Length composition variance adjustment from 16.4c	

Data

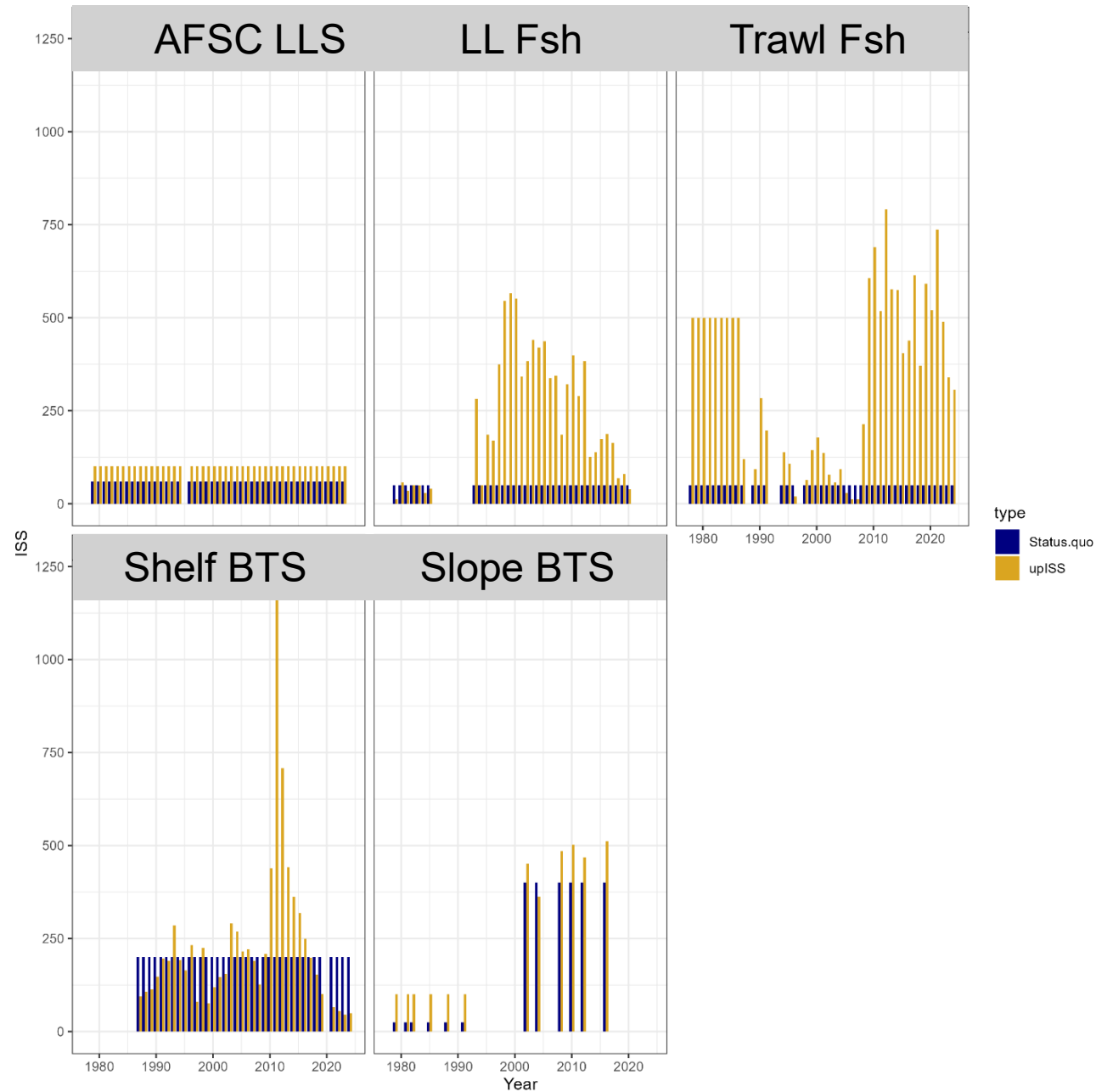


Data weighting

Fleet	Status quo ISS[†]	Adjusted sample size using the variance adjustment in last assessment[†]	updated ISS^{**}	Adjusted sample size using variance adjustment from last assessment *	Adjusted sample size using variance adjustment from Francis method⁺
Fsh trawl	50	12.5	349.7	87.4	8.2
Fsh longline	50	25.0	235.8	117.9	54.5
Shelf survey	200	50.0	228.1	57.0	5.3
Slope survey	212.5	106.3	281.8	140.9	9.8
AFSC longline survey	60	30	100	50	10.9

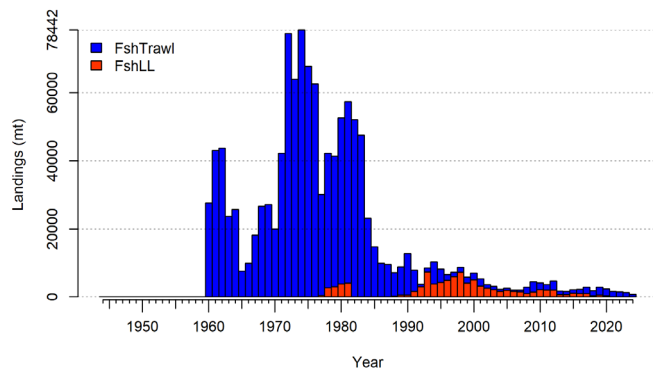
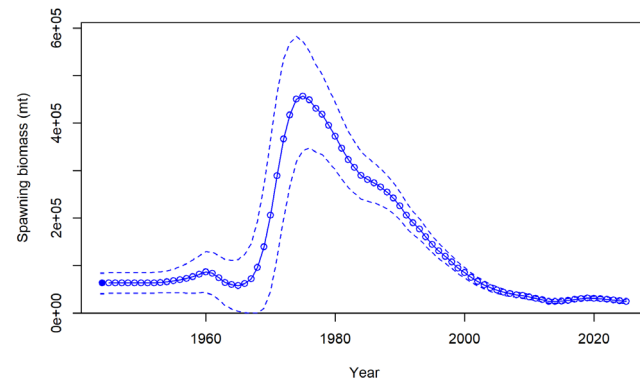
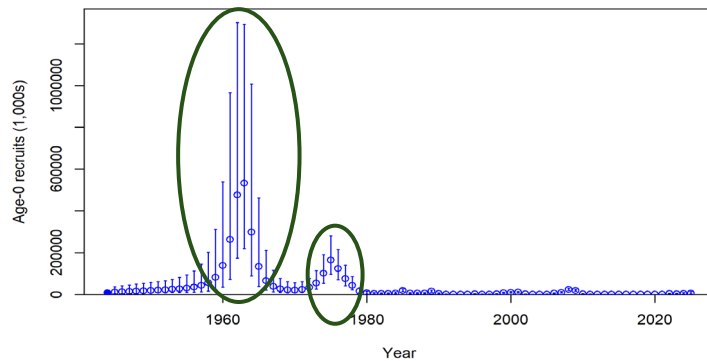


Data weighting



Models

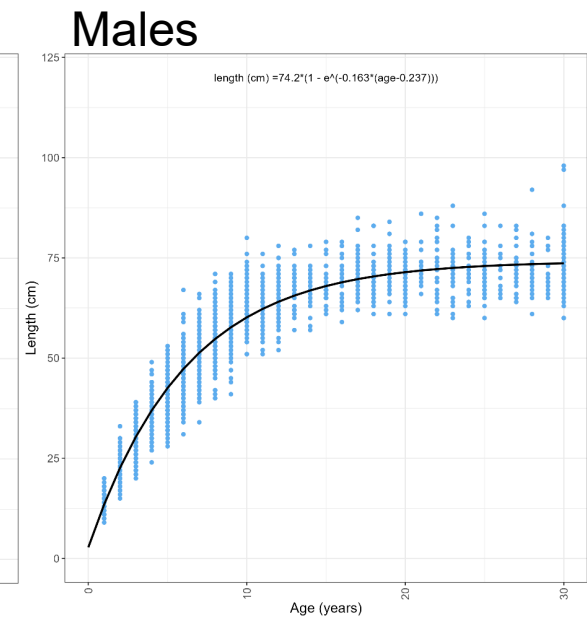
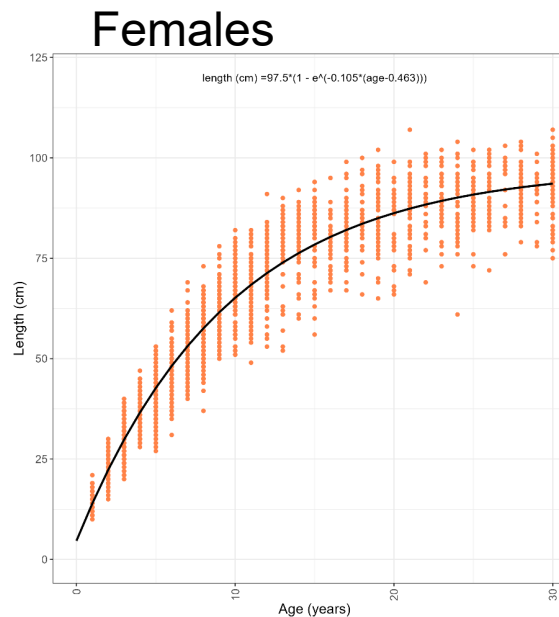
Model	Description	Reason for change
26.1	25.2b + 1977 model start year	Addresses uncertainty about model initial conditions
26.2	25.3b + 1977 model start year	
26.2a	25.3a + 1977 model start year	
26.3	25.4a + 1977 model start year	



Models

Model	Description	Reason for change
26.1	25.2b + 1977 model start year	Addresses uncertainty about model initial conditions
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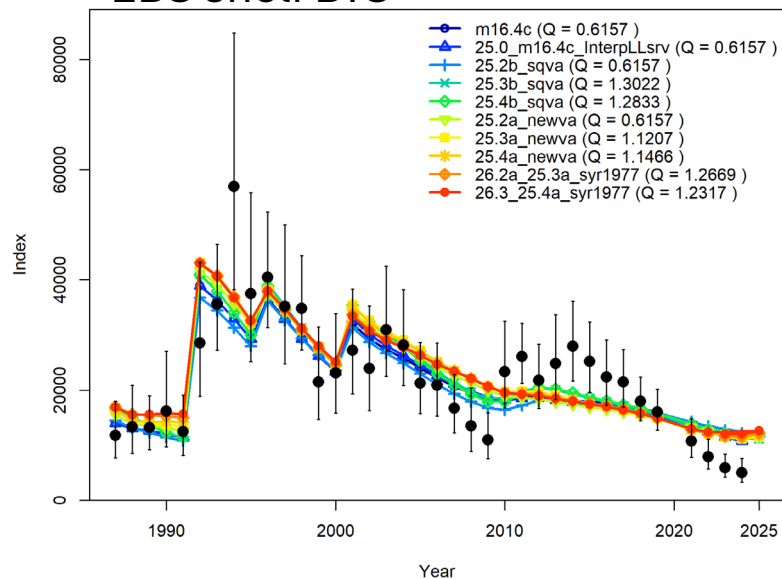
- Early recruitment deviations were estimated from 1967 to 1977
- Limitation: Model is not fit to age data



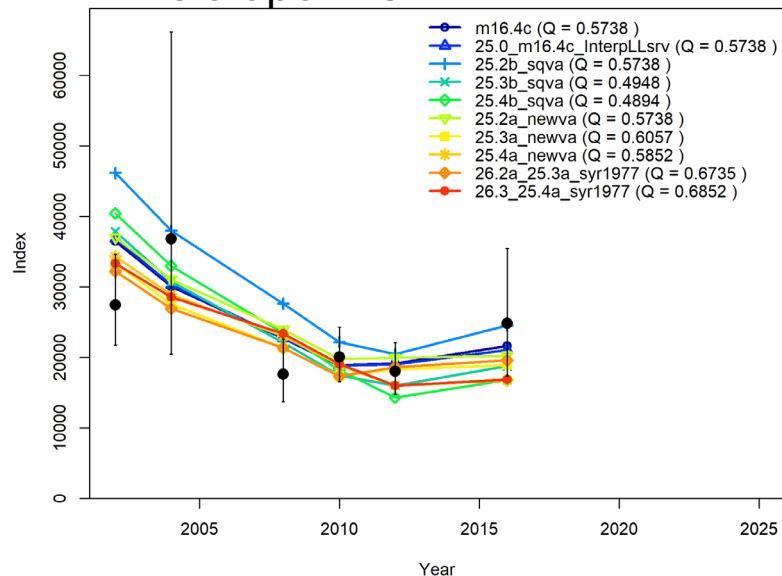


Survey indices

EBS shelf BTS

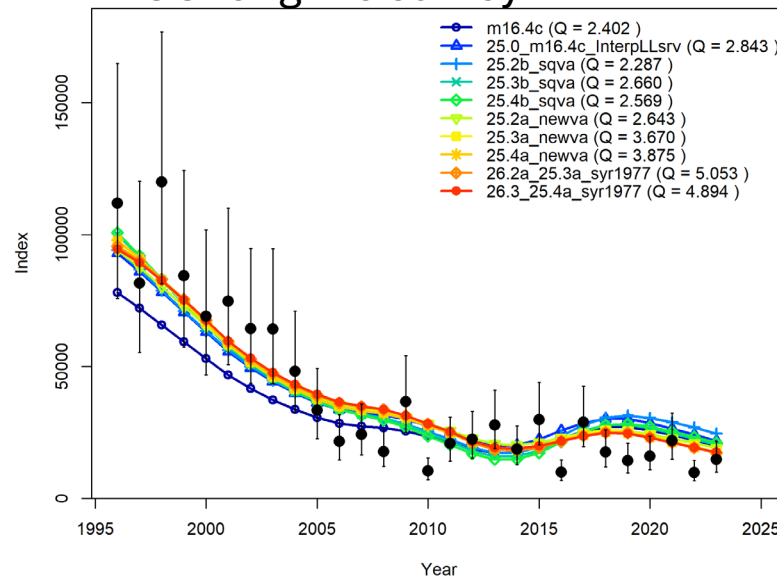


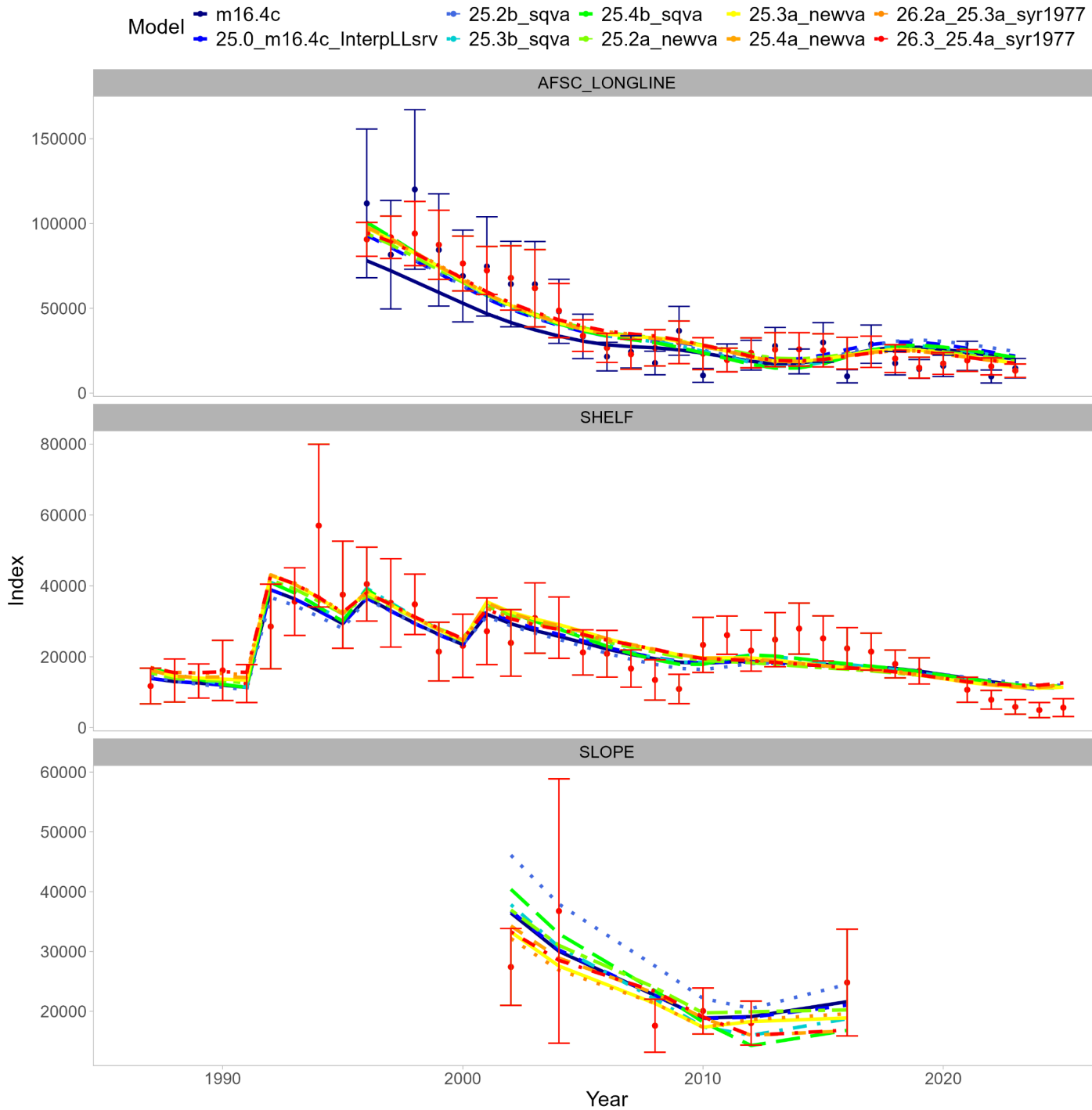
EBS slope BTS



Model	AFSC			
	Total	LL	Slope	Shelf
m16.4c	8.8	22.7	-6.0	-7.9
25.0	-23.5	-9.9	-5.7	-7.9
25.2a_newva	-27.2	-23.7	-4.4	0.9
25.3a_newva*	-37.7	-25.6	-6.5	-5.6
25.4a_newva*	-35.3	-27.3	-4.2	-3.8
25.2b_sqva	5.2	-0.6	5.3	0.5
25.3b_sqva	-29.0	-13.2	-3.4	-12.4
25.4b_sqva	-19.1	-9.2	1.5	-11.5
26.2a_25.3a_syr1977	-37.4	-26.6	-7.1	-3.7
26.3_25.4a_syr1977	-32.8	-27.4	-4.5	-0.9

AFSC longline survey





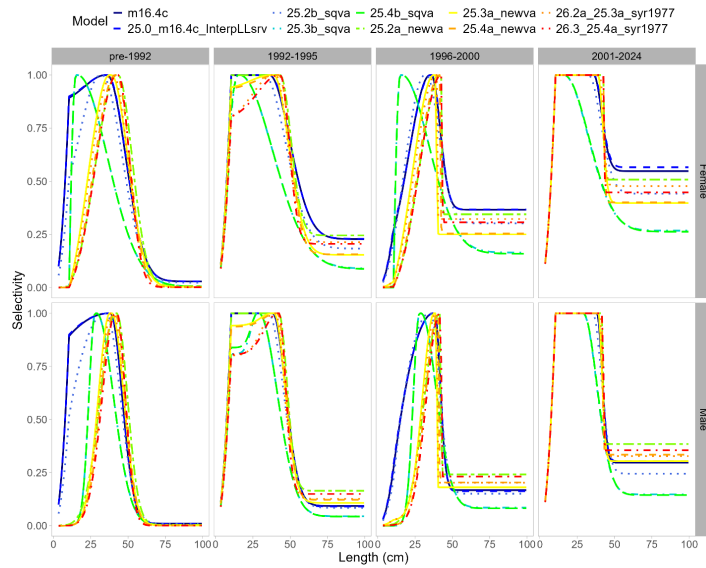


Length composition

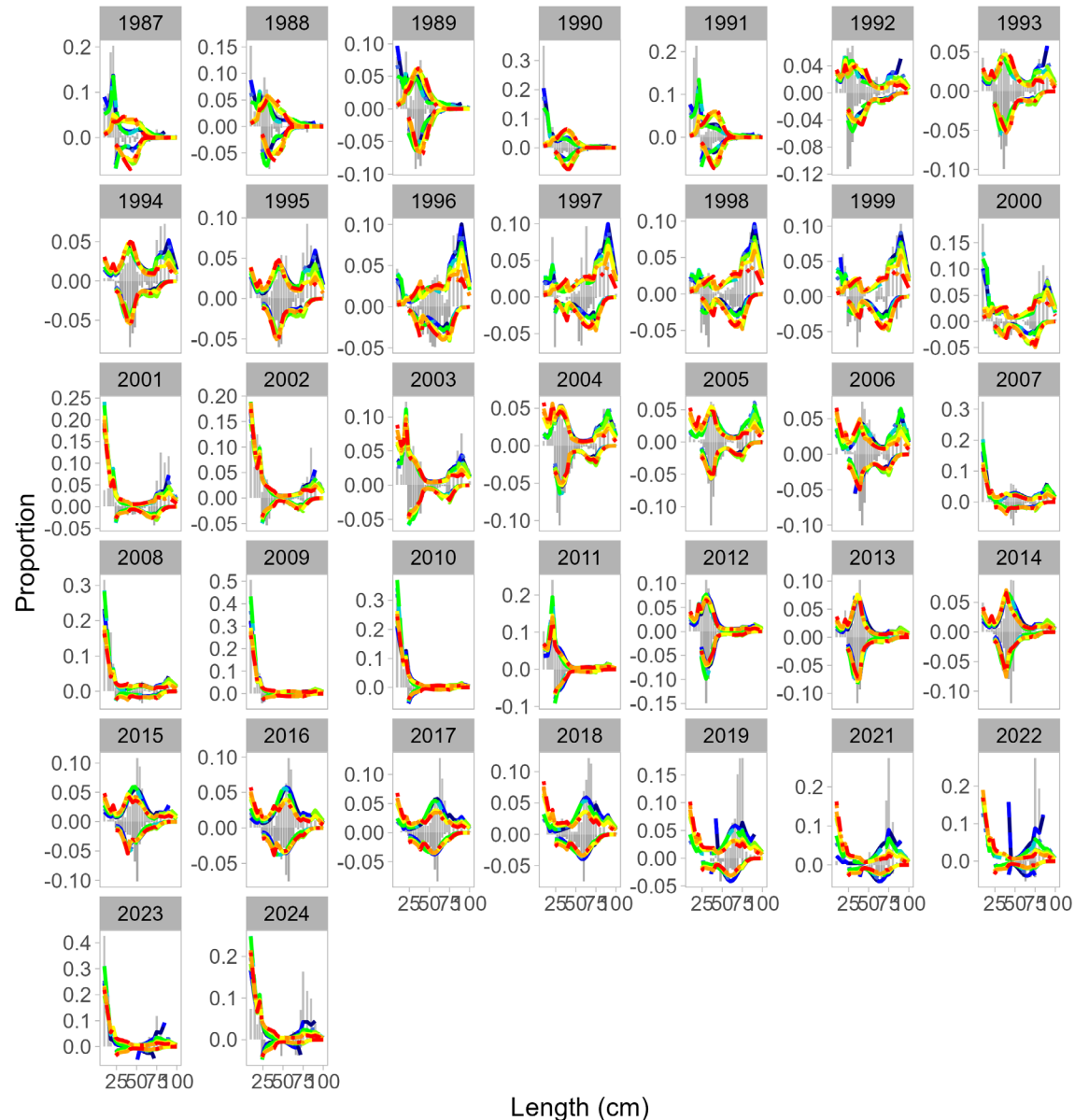
Models	Fleet				
	AFSC_LOONGLINE	SLOPE	SHELF	FshTrawl	FshLL
m16.4c	220.1	290.5	503.8	161.9	106.5
25.0_m16.4c_InterpLLsrv	221.4	290.9	508.9	161.2	106.2
25.2a_newva	85.2	51.7	90.3	102.1	160.7
25.3a_newva*	93.3	68.8	121.4	105.3	135.0
25.4a_newva*	92.3	56.6	77.4	99.9	137.6
25.2b_sqva	408.9	407.4	452.4	885.0	326.4
25.3b_sqva	410.9	401.9	431.0	883.1	323.2
25.4b_sqva	417.6	443.6	427.8	865.0	324.2
26.2a_25.3a_syr1977	104.9	73.5	131.8	110.8	134.9
26.3_25.4a_syr1977	103.8	61.3	83.4	104.6	137.8

Length composition and selectivity: Shelf BTS

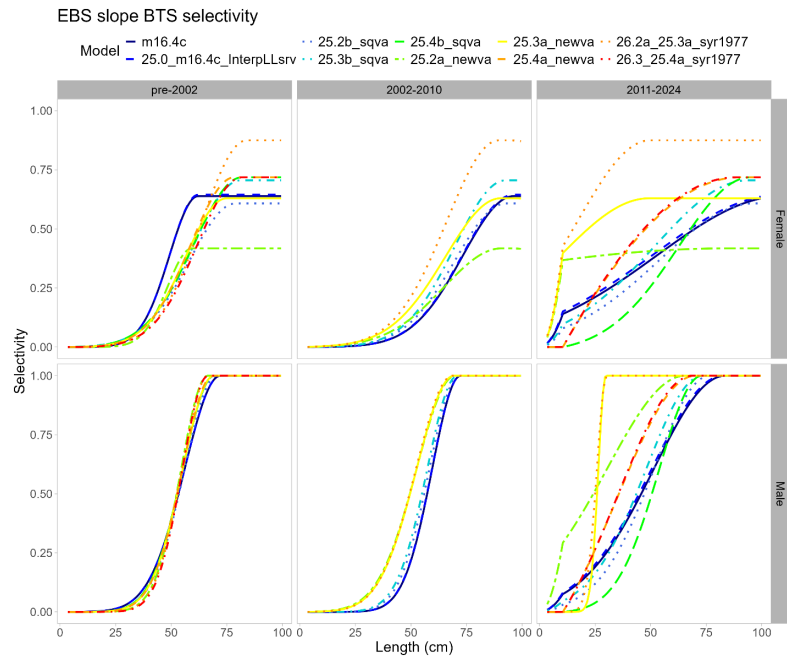
EBS shelf BTS selectivity



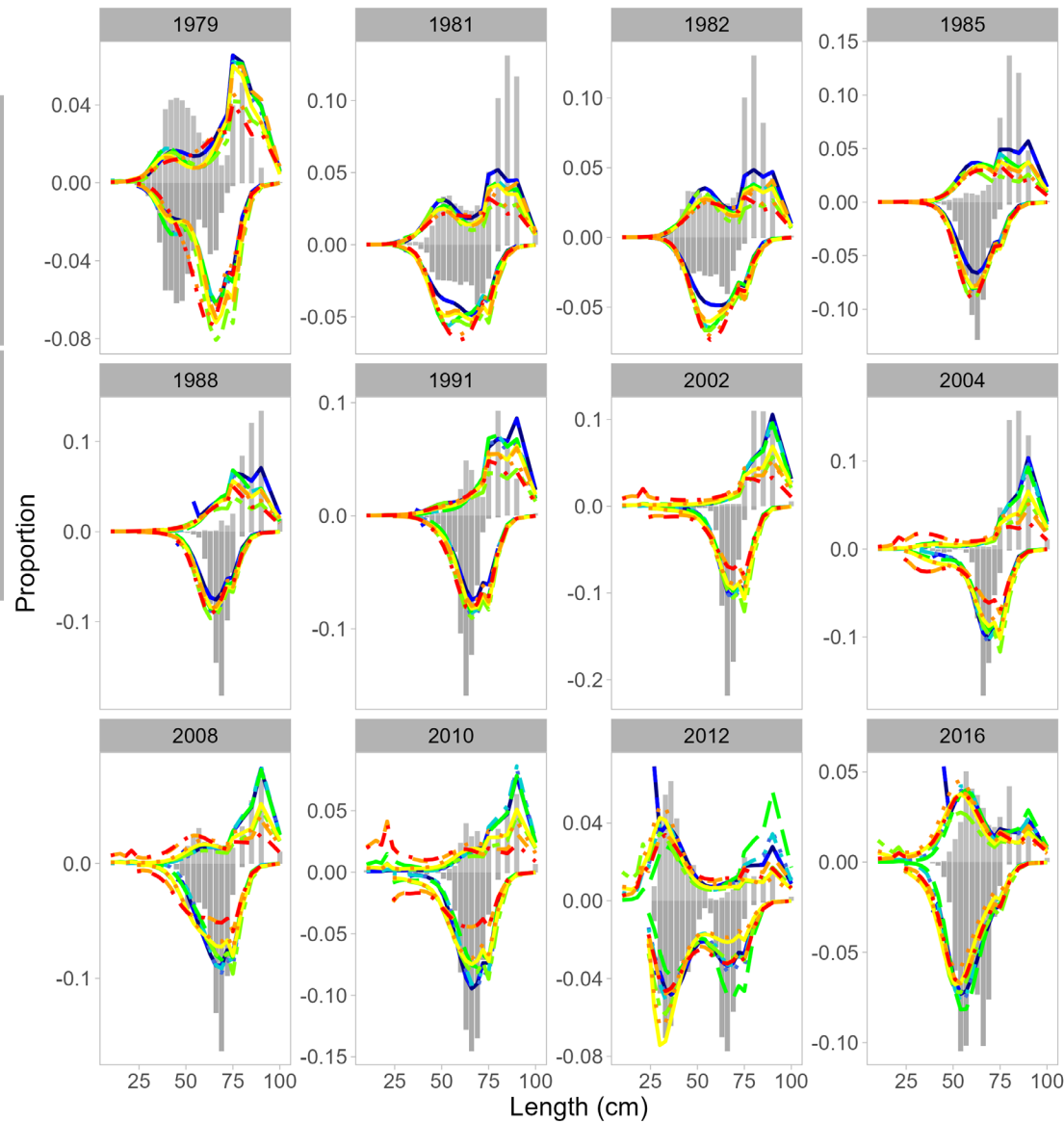
EBS shelf BTS length composition and model fit



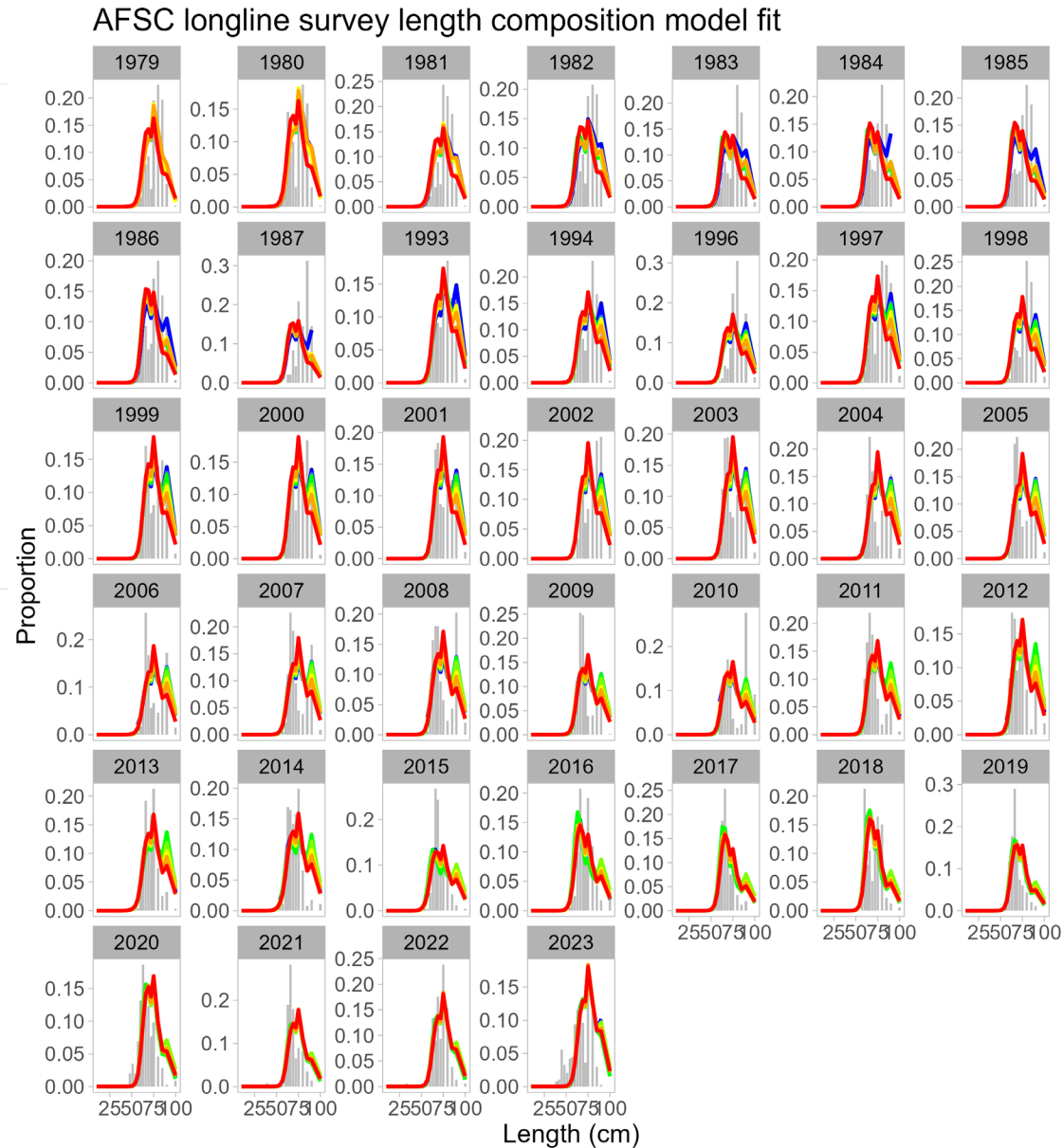
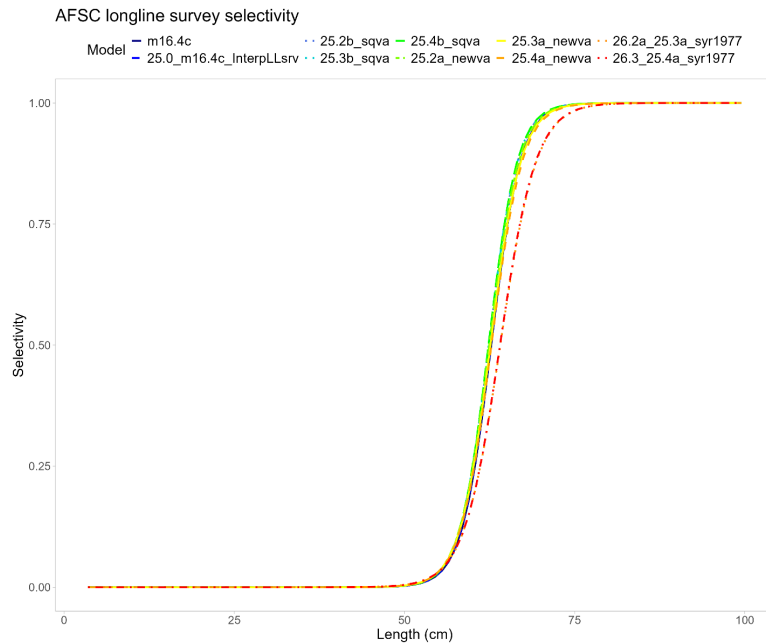
Length composition and selectivity: Slope BTS



EBS slope BTS length composition and model fit

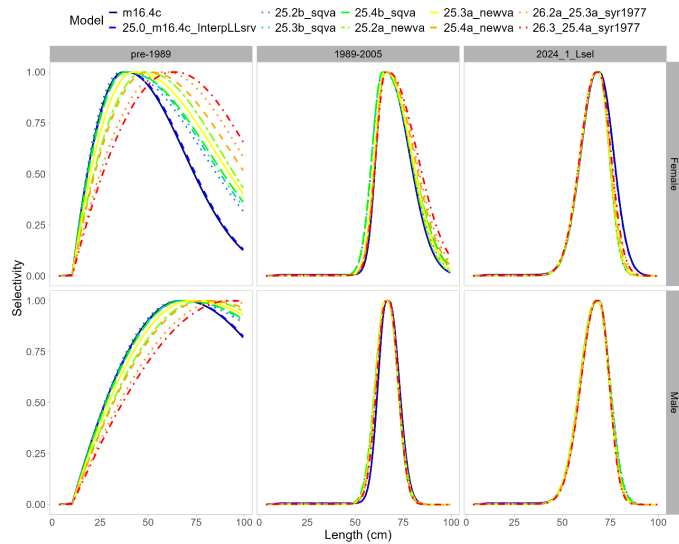


Length composition and selectivity: LL survey

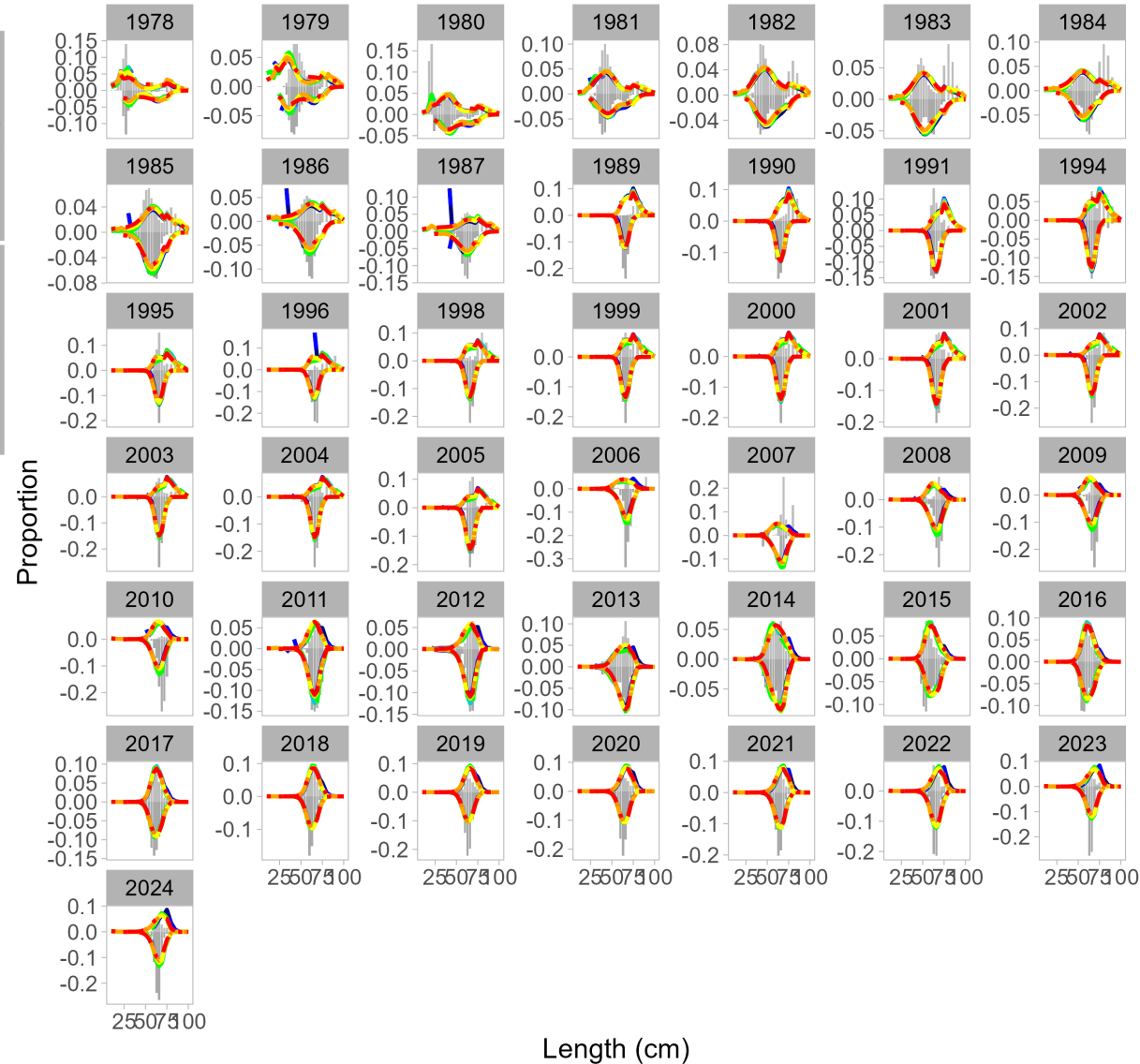


Length composition and selectivity: Trawl

Trawl fishery selectivity

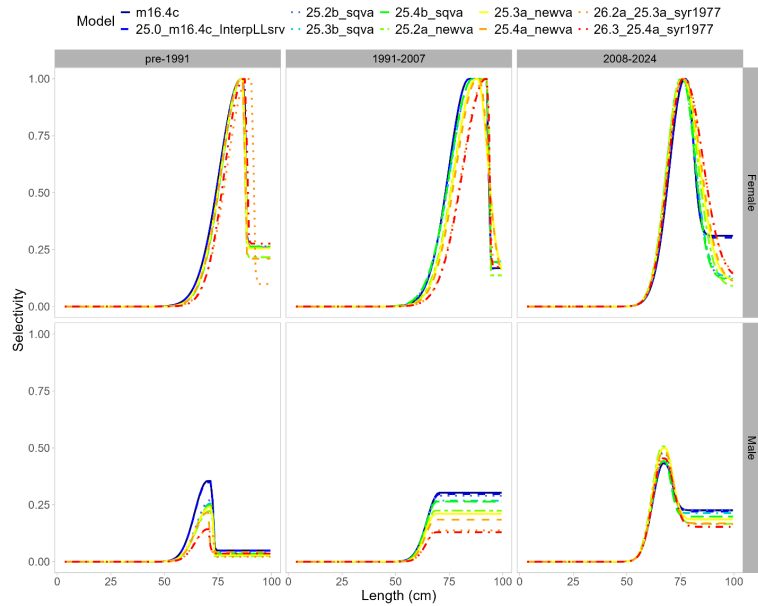


Trawl gear length composition and model fit

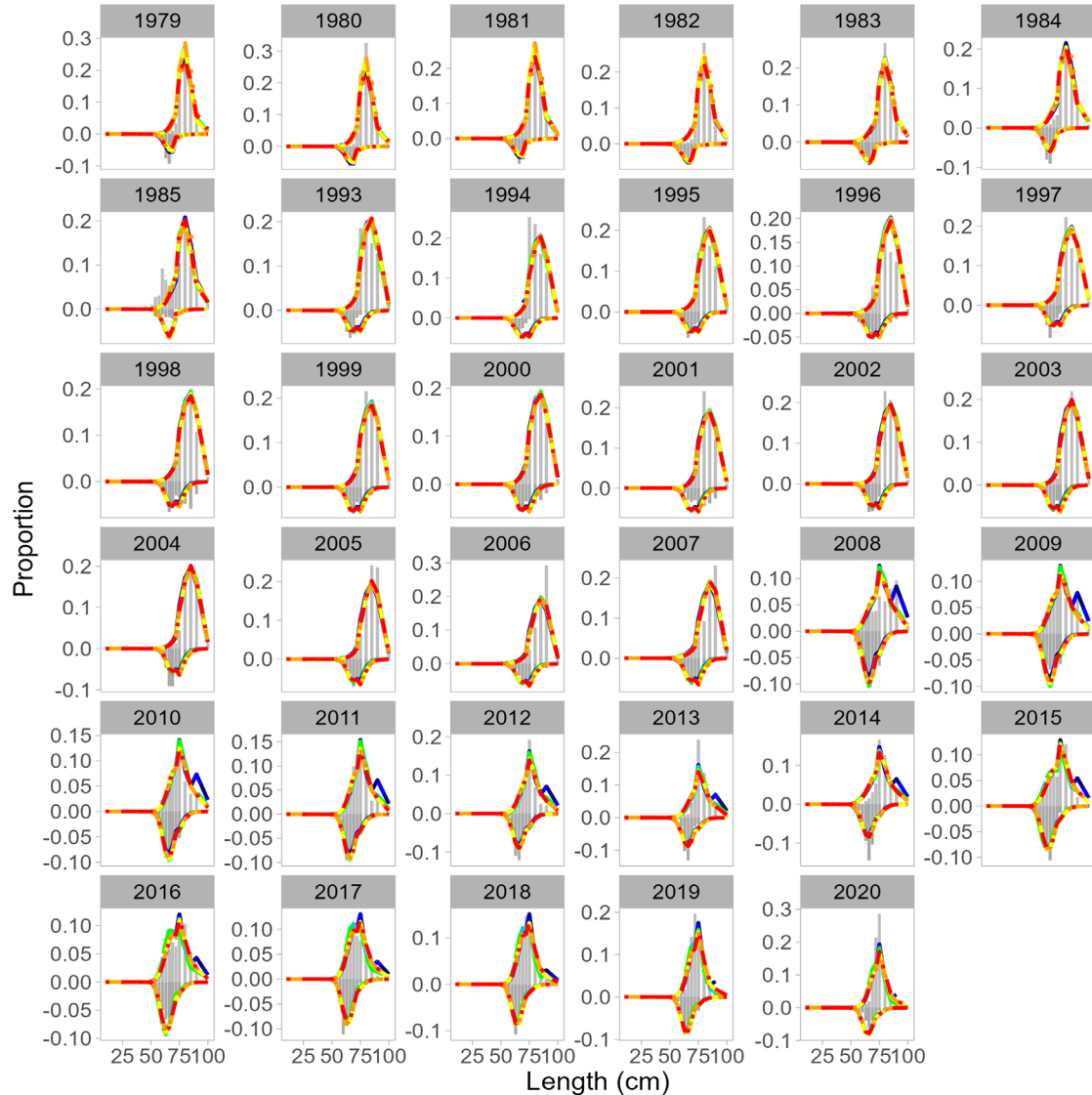


Length composition and selectivity: Fixed gear

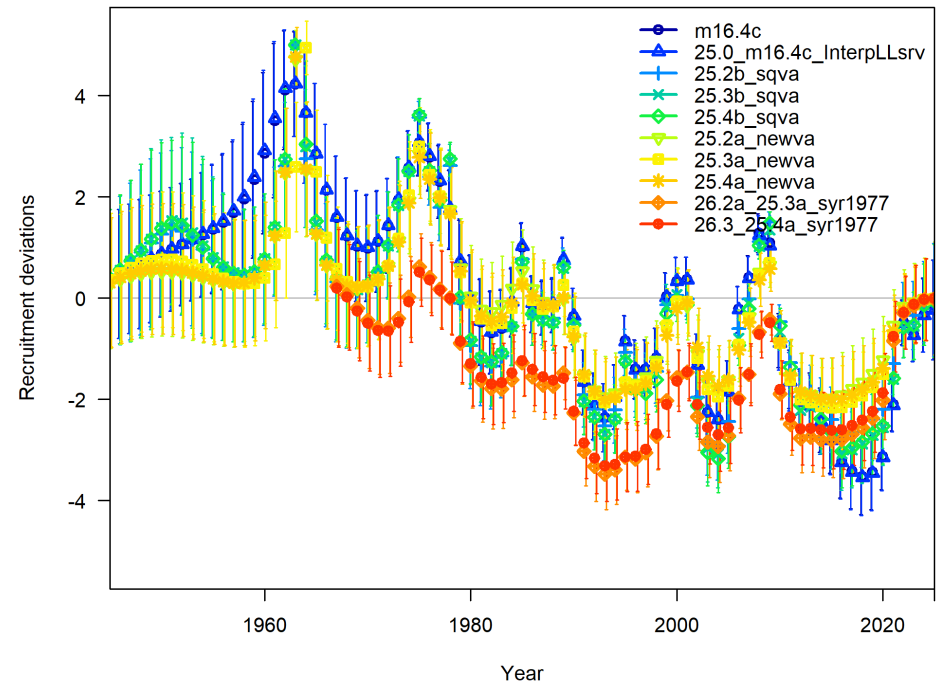
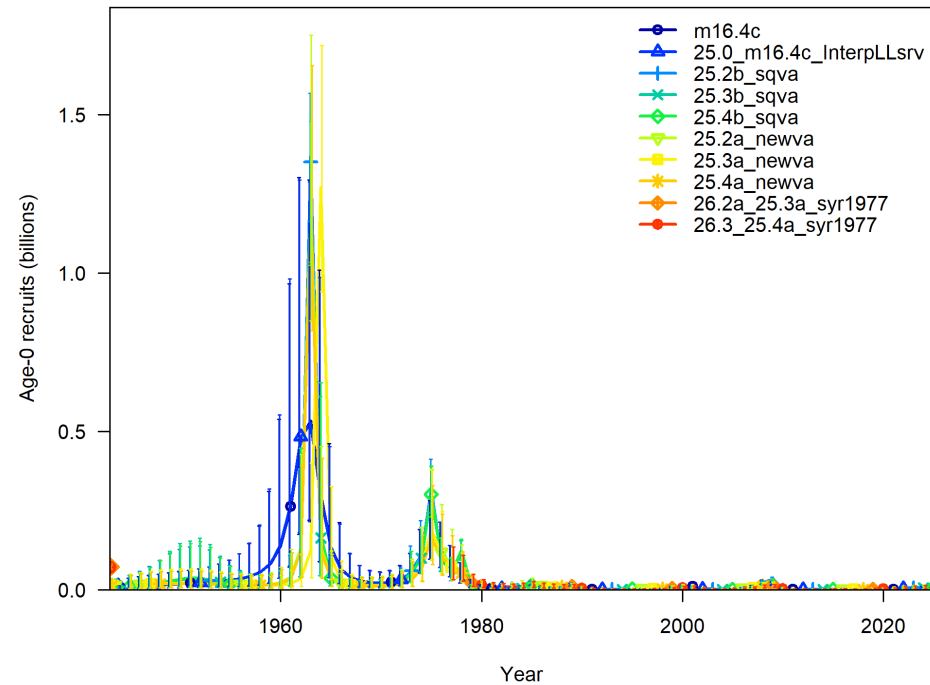
Fixed gear fishery selectivity



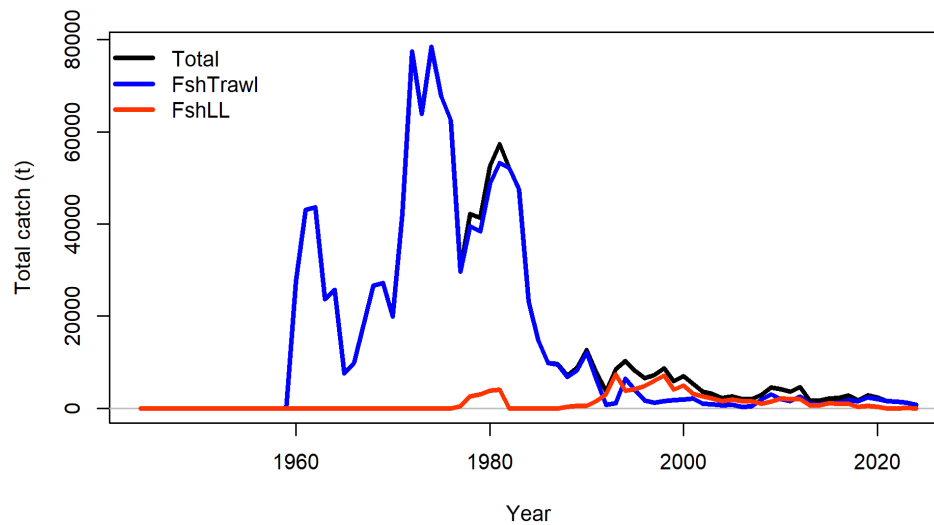
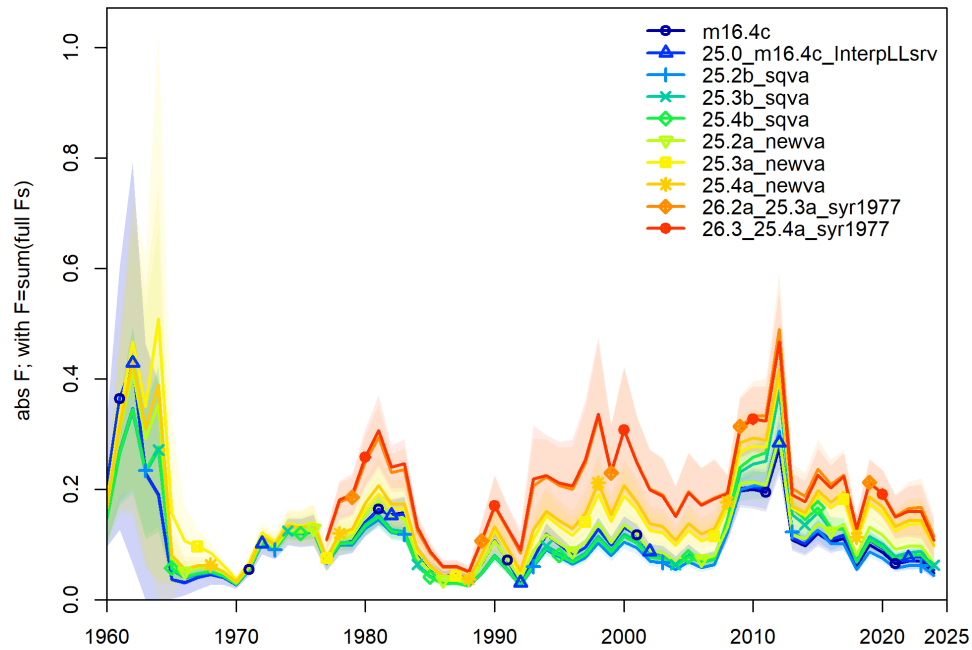
Fixed gear length composition and model fit



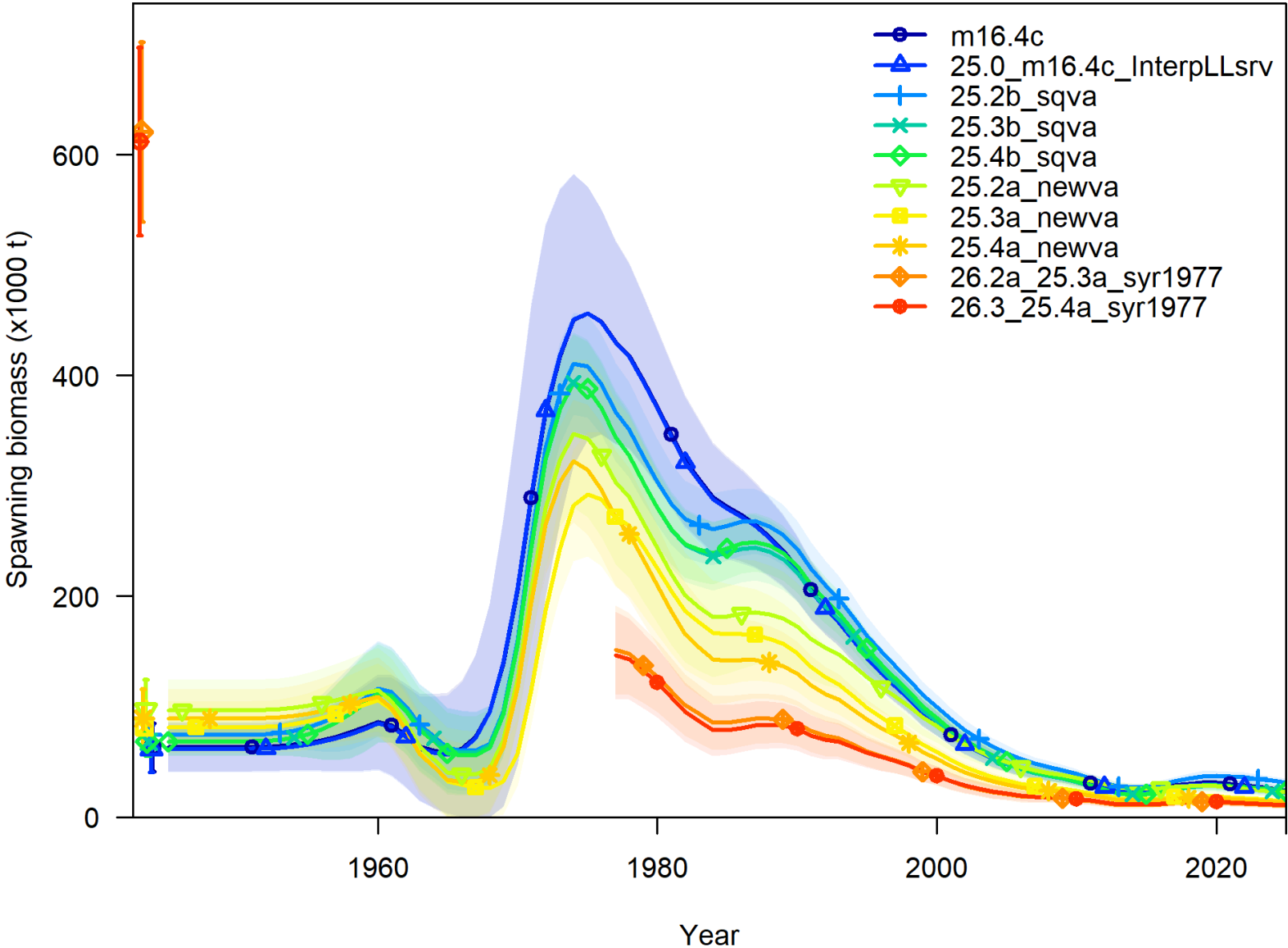
Recruitment



SSB and fishing mortality

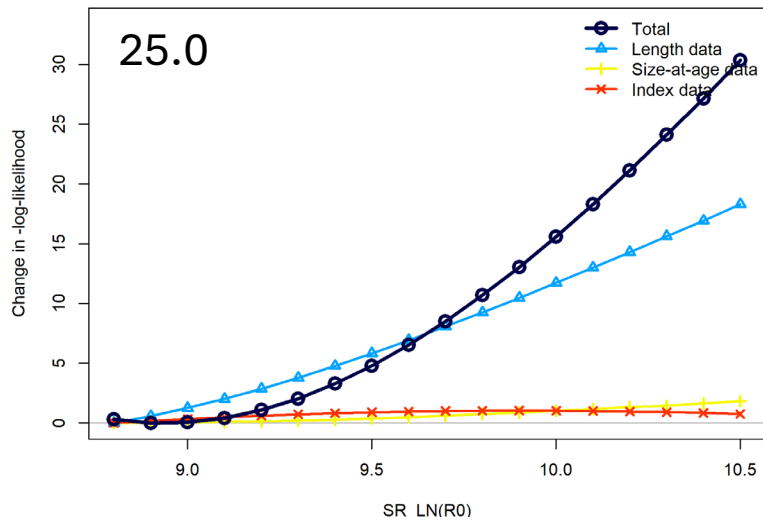


SSB and fishing mortality

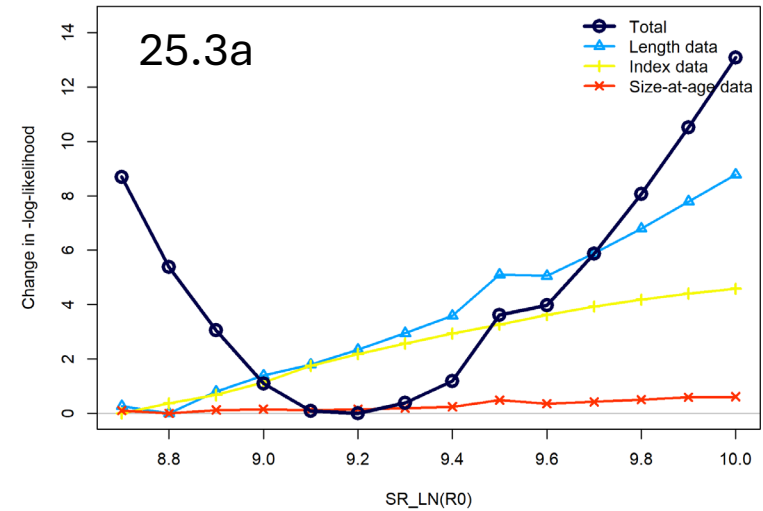


R0 profiles

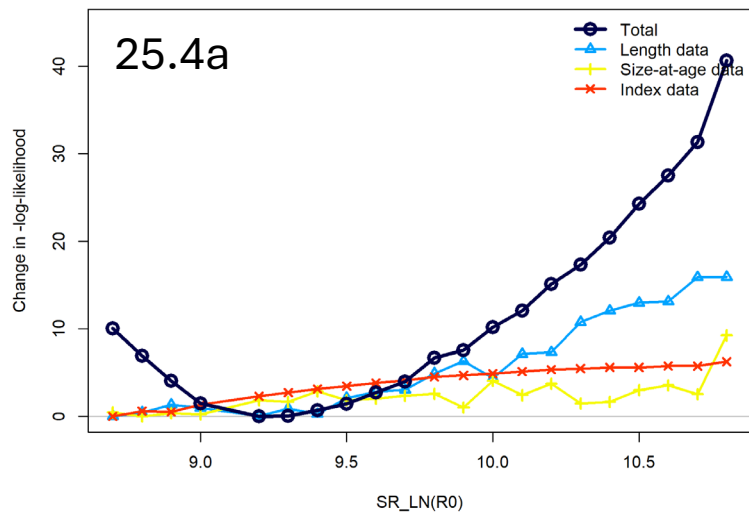
Changes in model likelihoods by data source



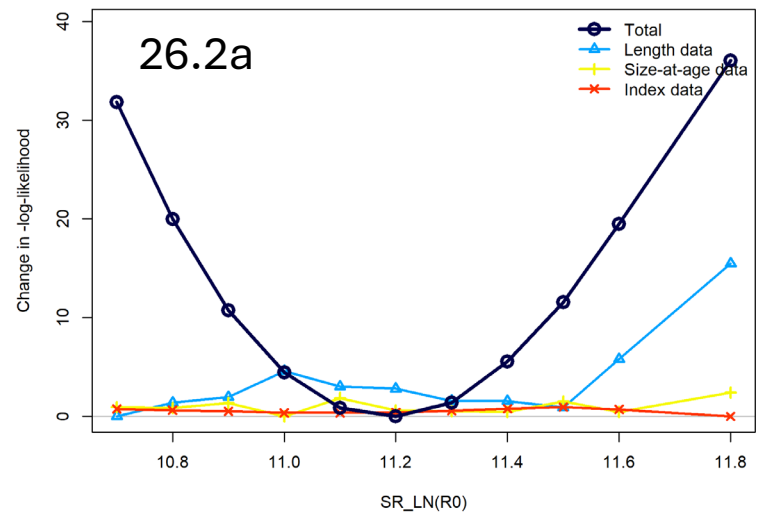
Changes in model likelihoods by data source



Changes in model likelihoods by data source

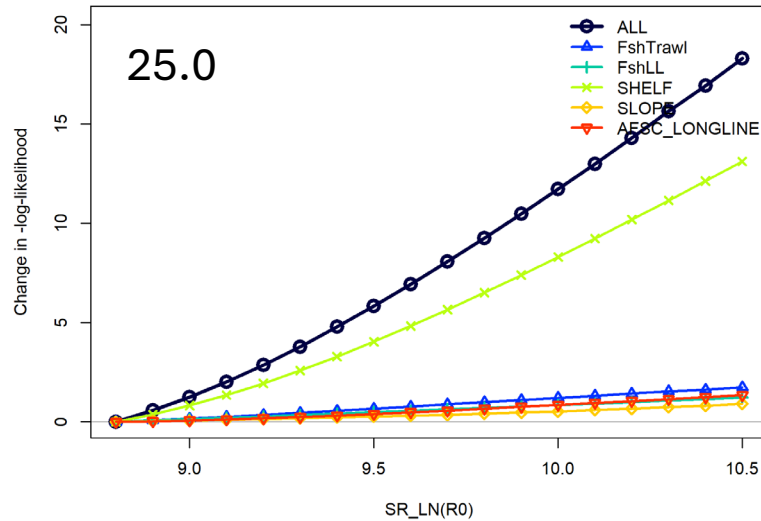


Changes in model likelihoods by data source

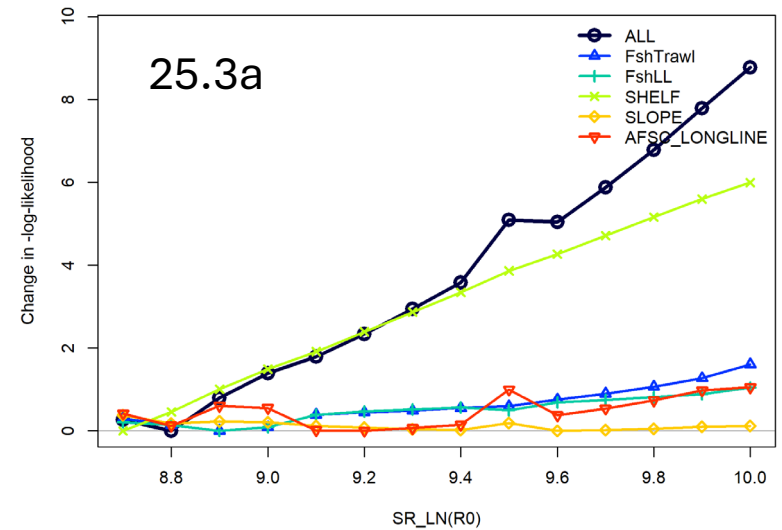


R0 profiles

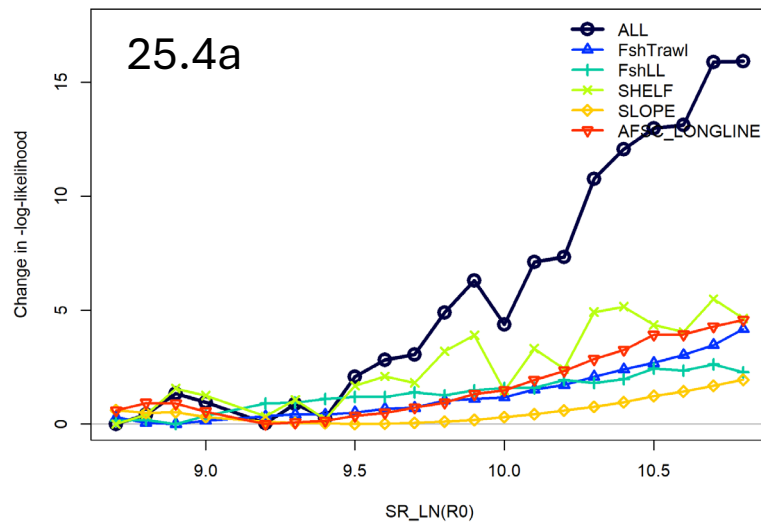
Changes in length-composition likelihoods by fleet



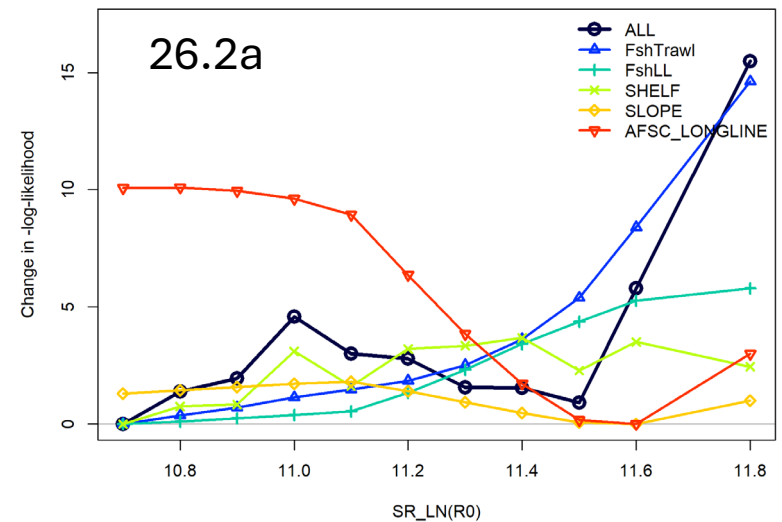
Changes in length-composition likelihoods by fleet



Changes in length-composition likelihoods by fleet



Changes in length-composition likelihoods by fleet

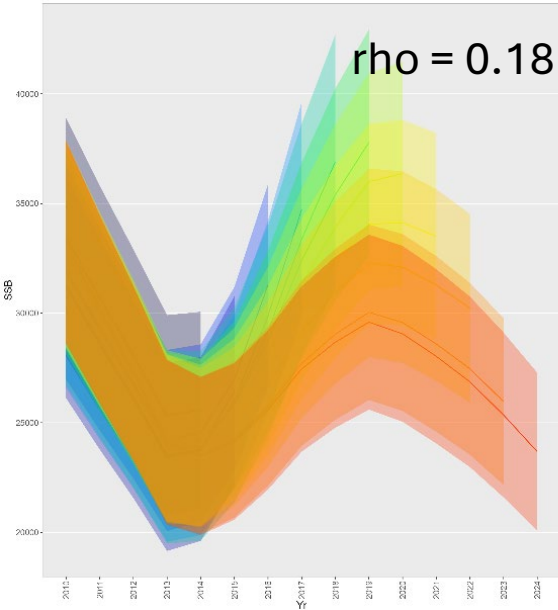


Retrospectives

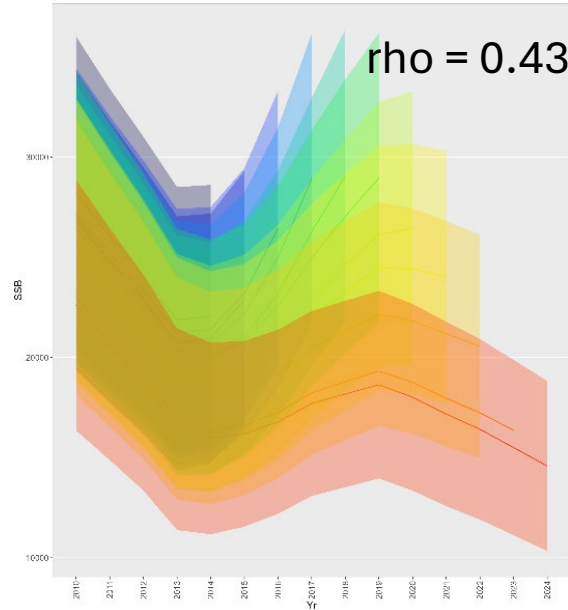
model	SSB	Rec	F
16.4c	0.14	11.49	-0.20
25.0	0.18	18.78	-0.24
25.2a	0.14	3.74	-0.27
25.2b	0.08	8.61	-0.18
25.3a*	0.43	4.65	-0.36
25.3b	0.16	12.06	-0.22
25.4a*	0.32	4.43	-0.32
25.4b	0.20	12.21	-0.24

Retrospectives

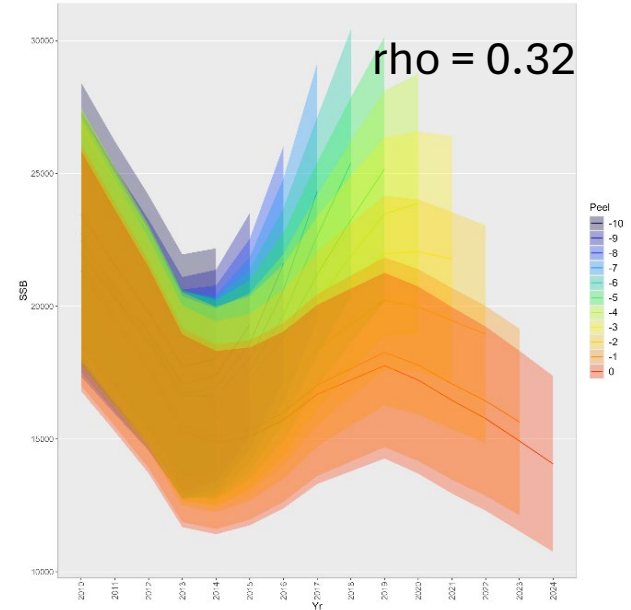
25.0



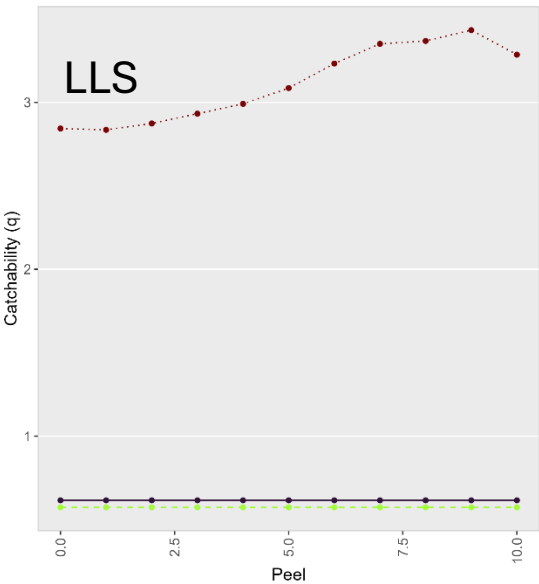
25.3a



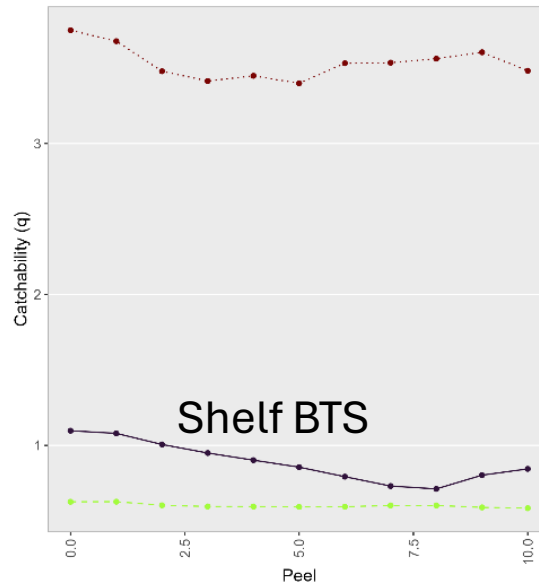
25.4a



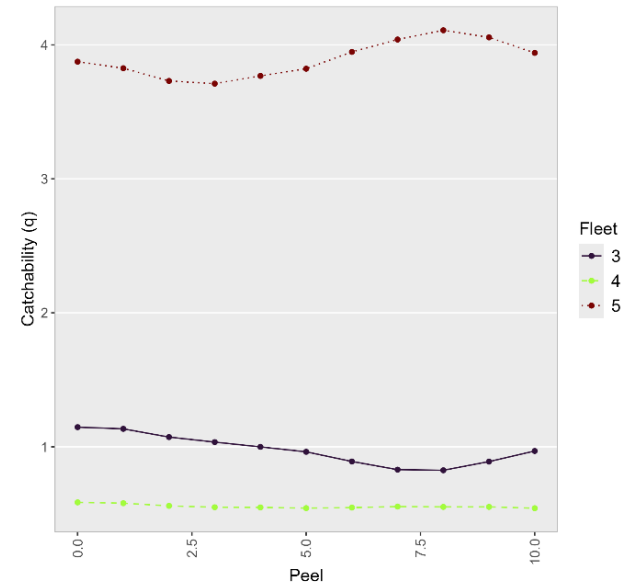
Survey catchability



Survey catchability



Survey catchability



Summary

- Data weighting and profiles show that there are several data conflicts in the model
- Recommend bringing forward models 25.0, 25.3a and 25.4a in November
 - Advantage is that they incorporate decision making following best practices
 - Strong retrospective pattern is recognized

Future steps

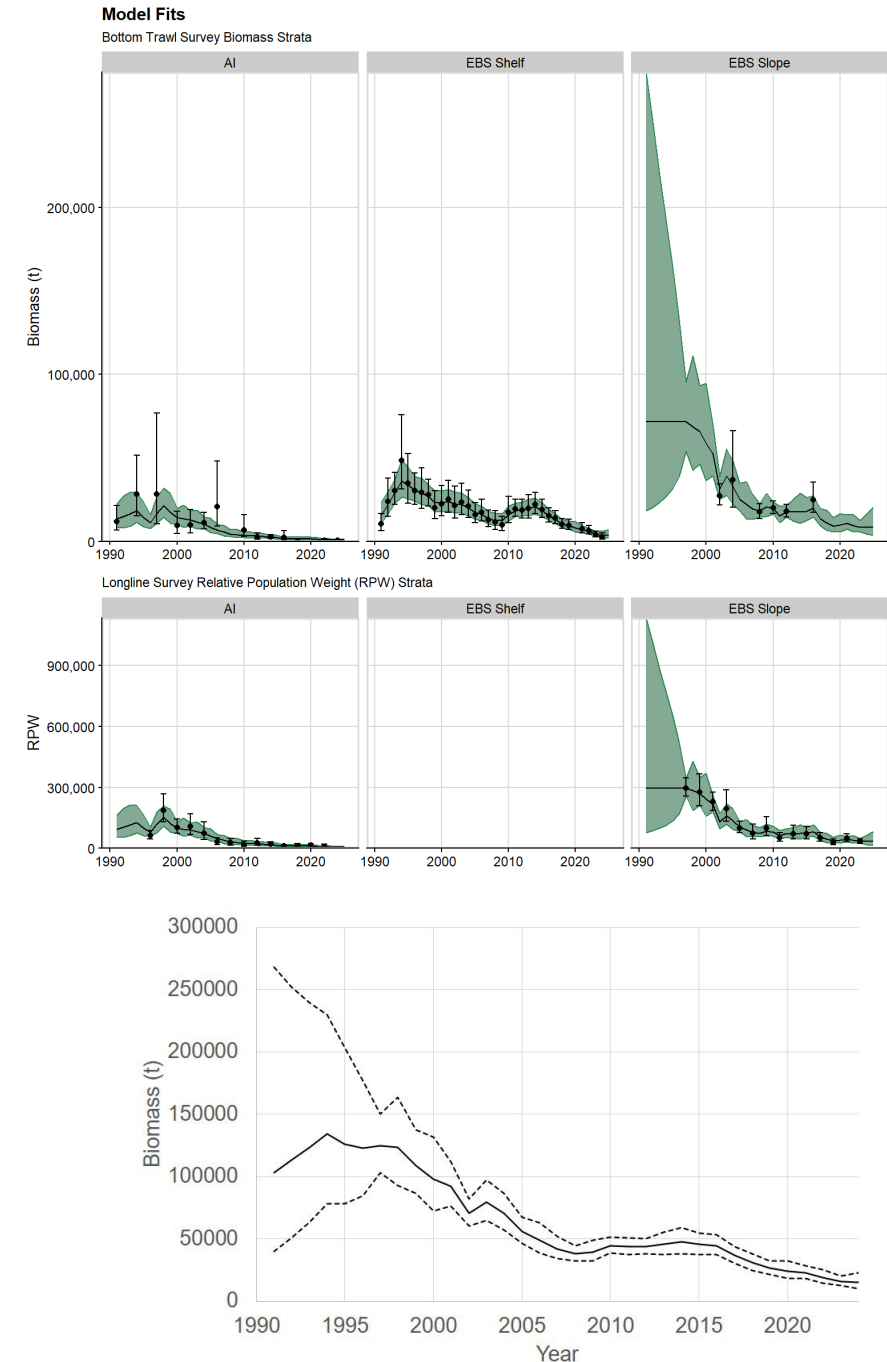
- Model is lacking age data
 - Age data available from the shelf bottom trawl survey and slope bottom trawl survey
 - Age and Growth Program are ageing a single year of fishery otoliths – can we develop informative age distributions from the fishery
 - Can this stabilize the model? Better inform recruitment? Alleviate data conflict?
 - Several years before it will be available for use in model given ageing priorities and staff time
 - We do not have otoliths from longline survey
 - Will submit a request - number of samples could be limited
 - Do we conduct update assessments until age data are available?

Future steps

- Do we explore other management options (e.g., tier 4)?
 - Limitation: fairly old maturity ogive (same for assessment model)
 - Plan team requested a tier 5 model
 - We fit the survey data with the REMA model
 - Next slide

Tier 5

- REMA model
 - Estimated parameters:
 - 2 scaling terms
 - 2 process error terms
 - Fit to:
 - AFSC longline RPWs (BS and AI)
 - AI BTS
 - EBS shelf BTS
 - EBS slope BTS
 - Diagnostics (in report) indicate reasonable performance



Future steps

- Ecosystem and Socioeconomic Profile (ESP)
 - Initiated this year
 - Obtain a more comprehensive view of the various data sources (used in the assessment model and those not used)
 - Initially will help inform risk tables