NOAA FISHERIES

May 2020 CPT Report: Tanner Crab

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AFSC

May, 2020

Outline

- CPT/SSC Comments
- Analyses
- Model development
- Alternative scenarios
- Results
- Recommendations

CPT/SSC Comments

Addressed

- now using SSC-recommended model numbering
- provide retrospective analyses
- explore appropriate values for catchability

In progress

- appropriately account for apparent reduction in variance when fitting VAST estimates
- create a standard approach for creating priors on selectivity/catchability from BSFRF/NMFS side-by-side trawl data for use in the respective assessments
- add 2018 BSFRF SBS data to future analyses
- develop simplified model with no parameters hitting bounds

Not addressed

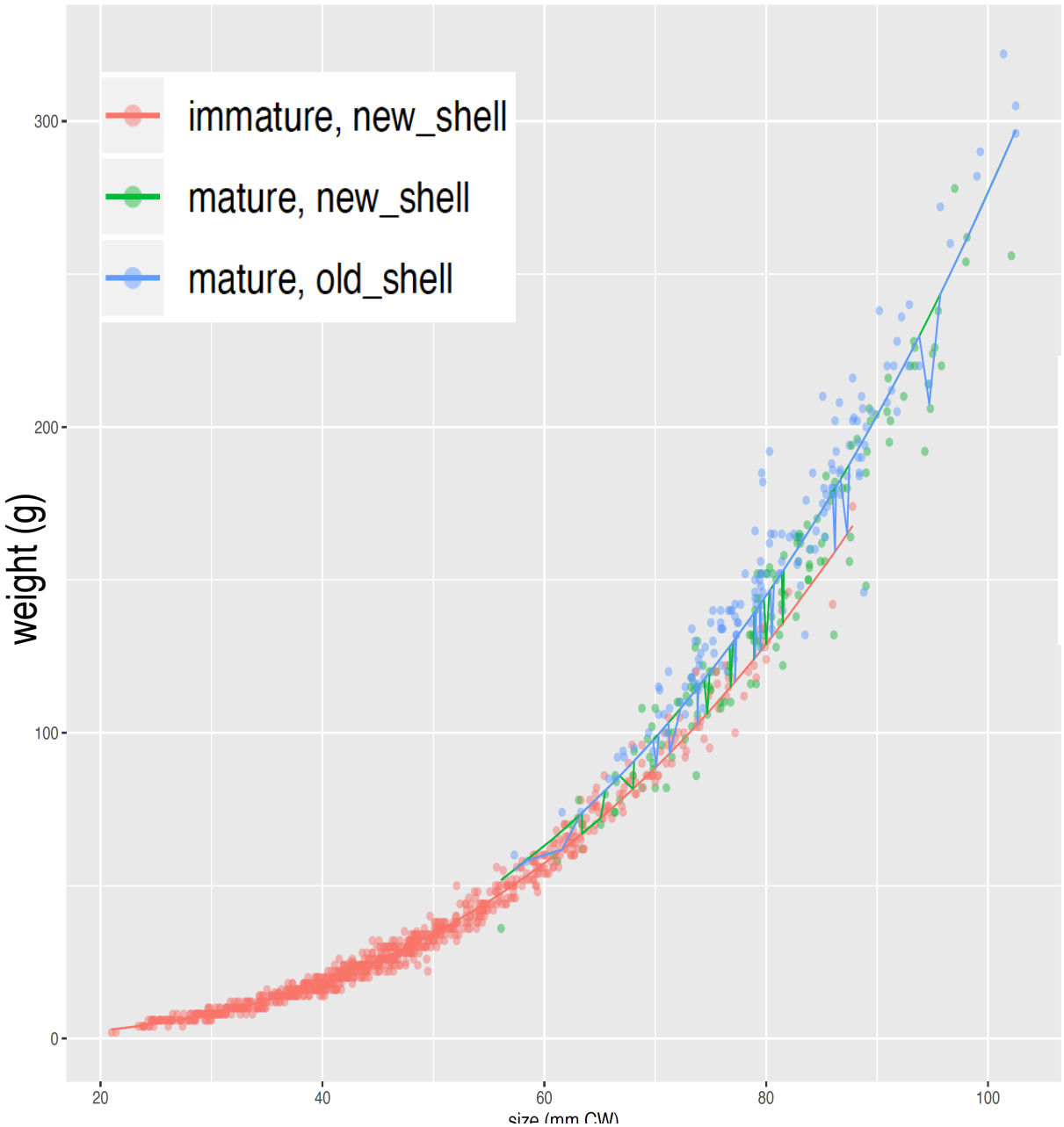
- develop a standard approach for projecting the upcoming year's biomass that does not include removing the entire OFL for stocks where recent mortality has been substantially below the OFL

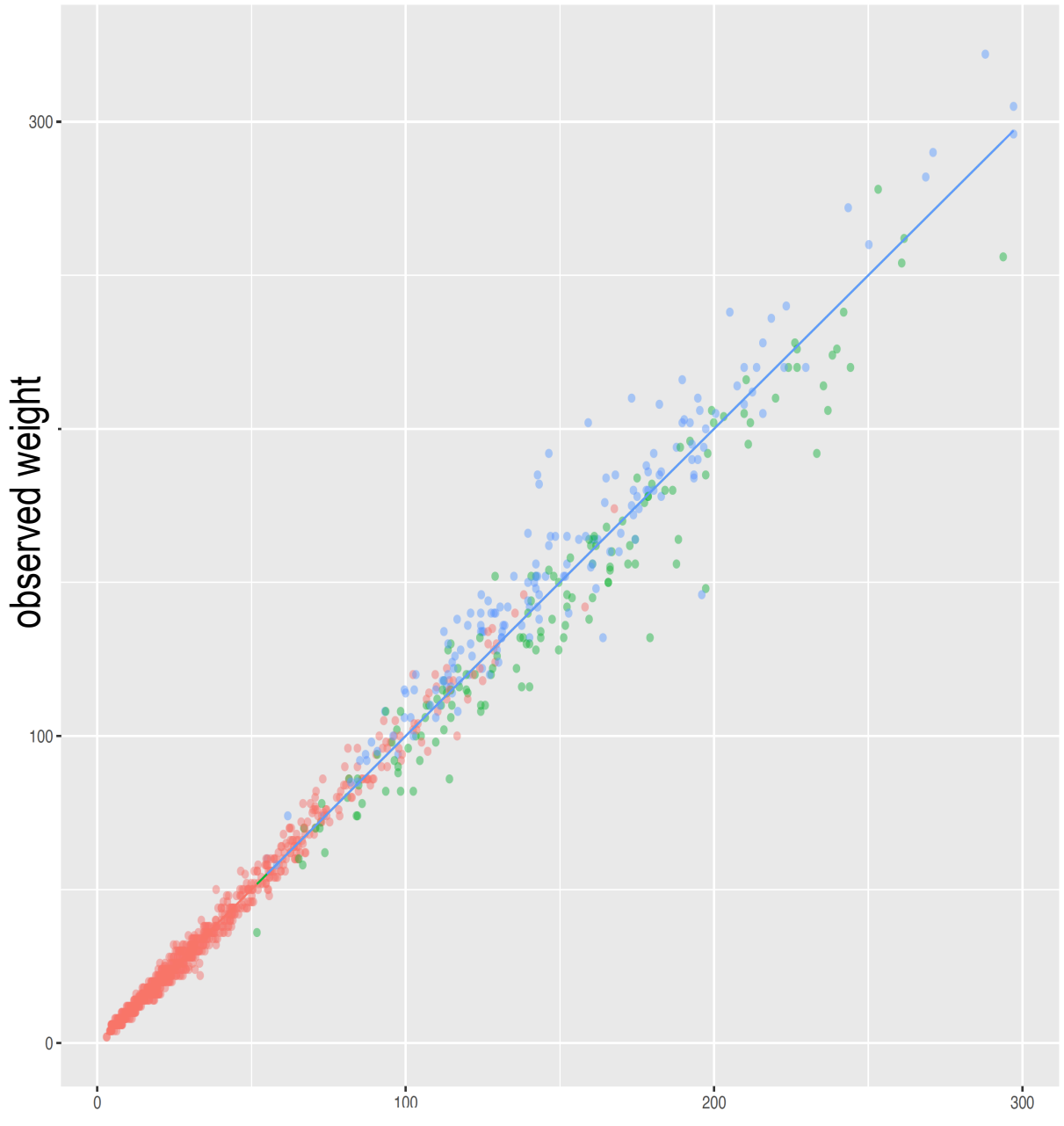
Analyses

- size-weight relationships
- revised calculations for SBS survey biomass and size compositions
- empirical availability from SBS studies
- empirical catchability from SBS studies
- VAST estimates of survey biomass

Size-weight relationships: females

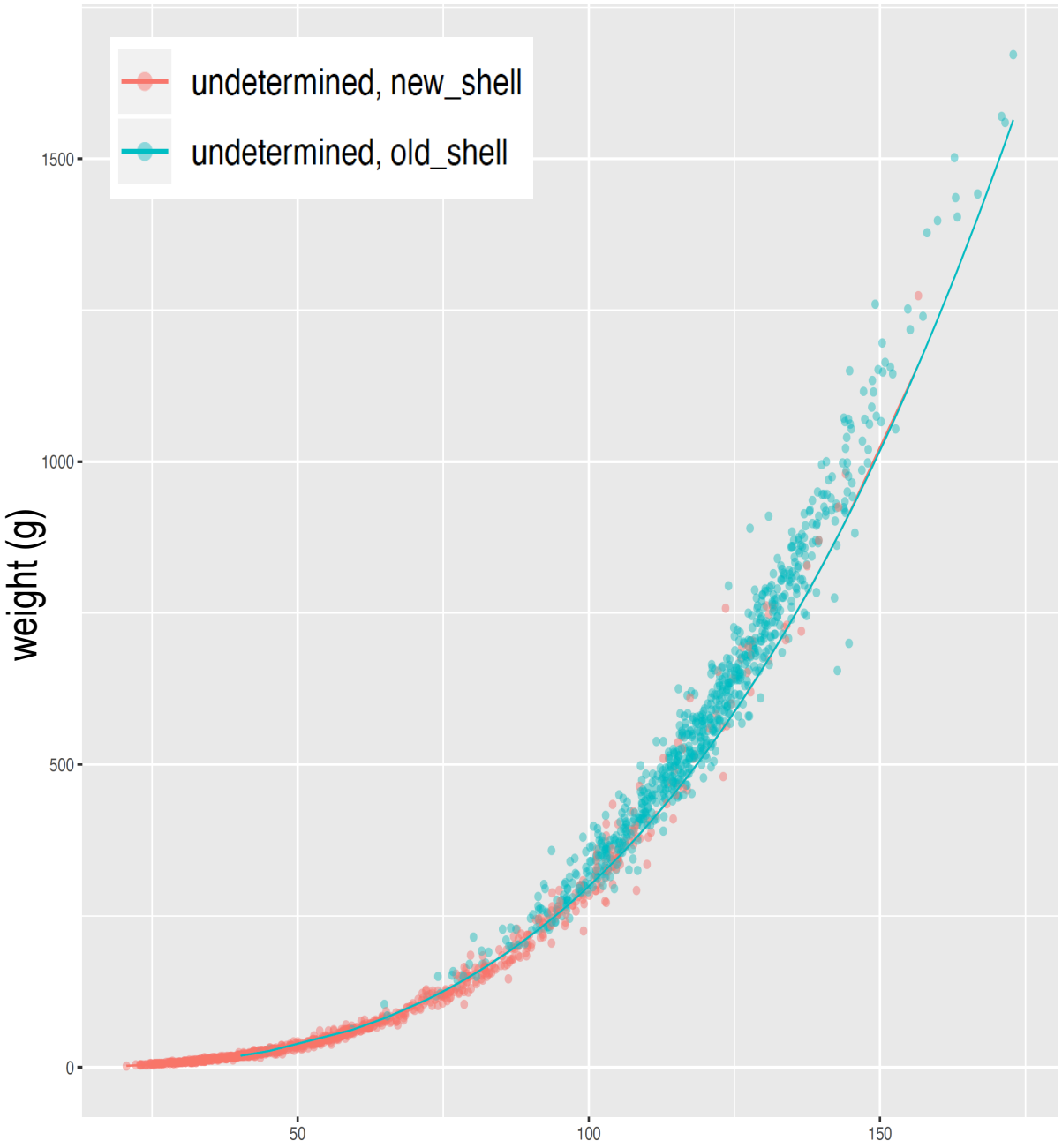
- standardized weight vs. CW relationships for females fit well
- separate regressions for immature, mature females

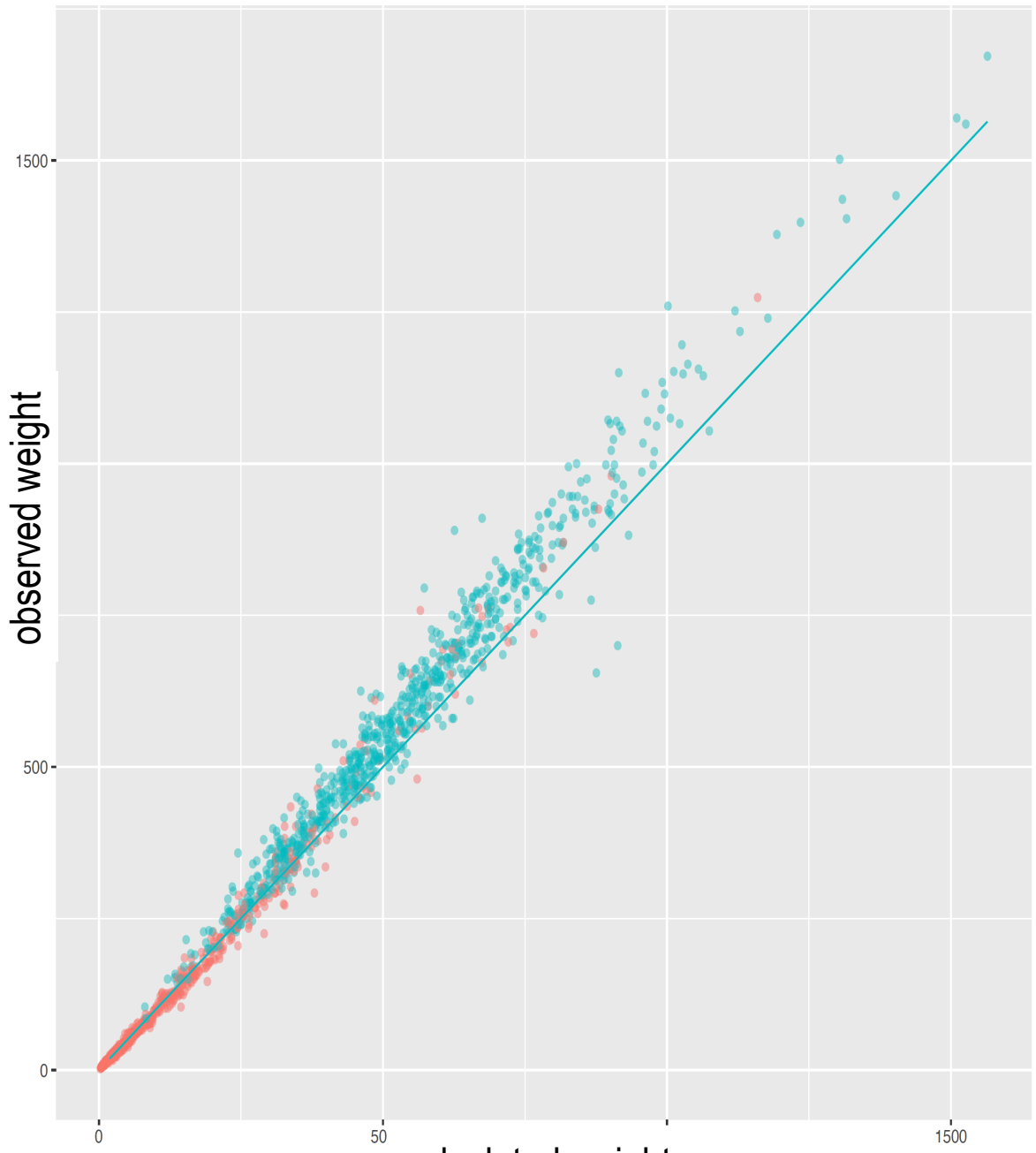




Size-weight relationships: males

- standardized weight vs. CW relationships for males underpredict weights at large sizes
- single regression for males





Model developments

- size-weight relationships
- revised calculations for SBS survey biomass and size compositions
- empirical availability from SBS studies
- empirical catchability from SBS studies
- VAST estimates of survey biomass

Model scenarios

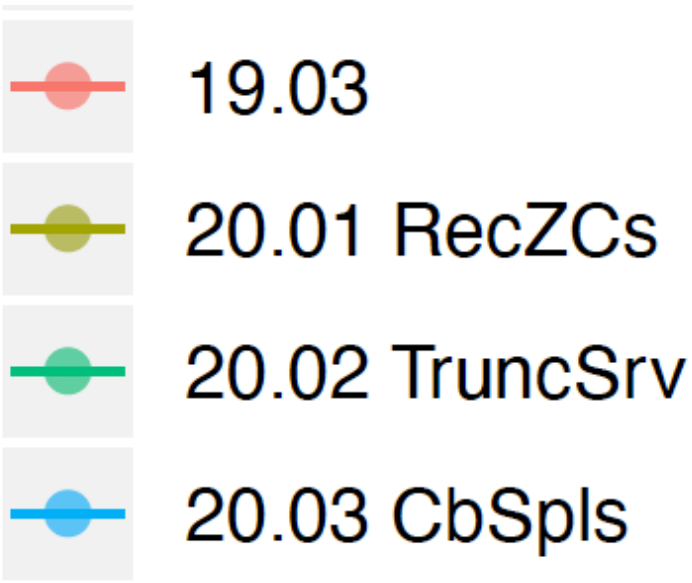
Scenario	Parameters	Progression	Description
19.03	343	--	Accepted model for the 2019 Tanner crab assessment (identified as M19F03 in Stockhausen, 2019.)
20.01 (RecZCs)	345	19.03 +	Recruitment size distribution estimated
20.02 (TruncSrv)	339	20.01 +	NMFS surveys 1982-2019 only
20.03 (CbSpls)	359	19.03 +	NMFS survey selectvity estimated using cubic splines
20.04 (VAST)	343	19.03 +	VAST estimates for NMFS surrvey abundance and biomass
20.05 (VAST+XU)	347	20.04 +	Additional survey uncertainty estimated
20.06 (SBS)	610	20.01 +	SBS NMFS and BSFRF biomass time series (revised) and size comp.s
20.07 (SBS+FACs)	345	20.01 +	SBS BSFRF biomass time series (revised) and size comp.s, with availability fixed from SBS studies
20.08 (SBS+FCCs)	339	20.01 +	sex/size-specific EBS NMFS survey catchability fixed using selectivity from SBS studies

Model scenarios

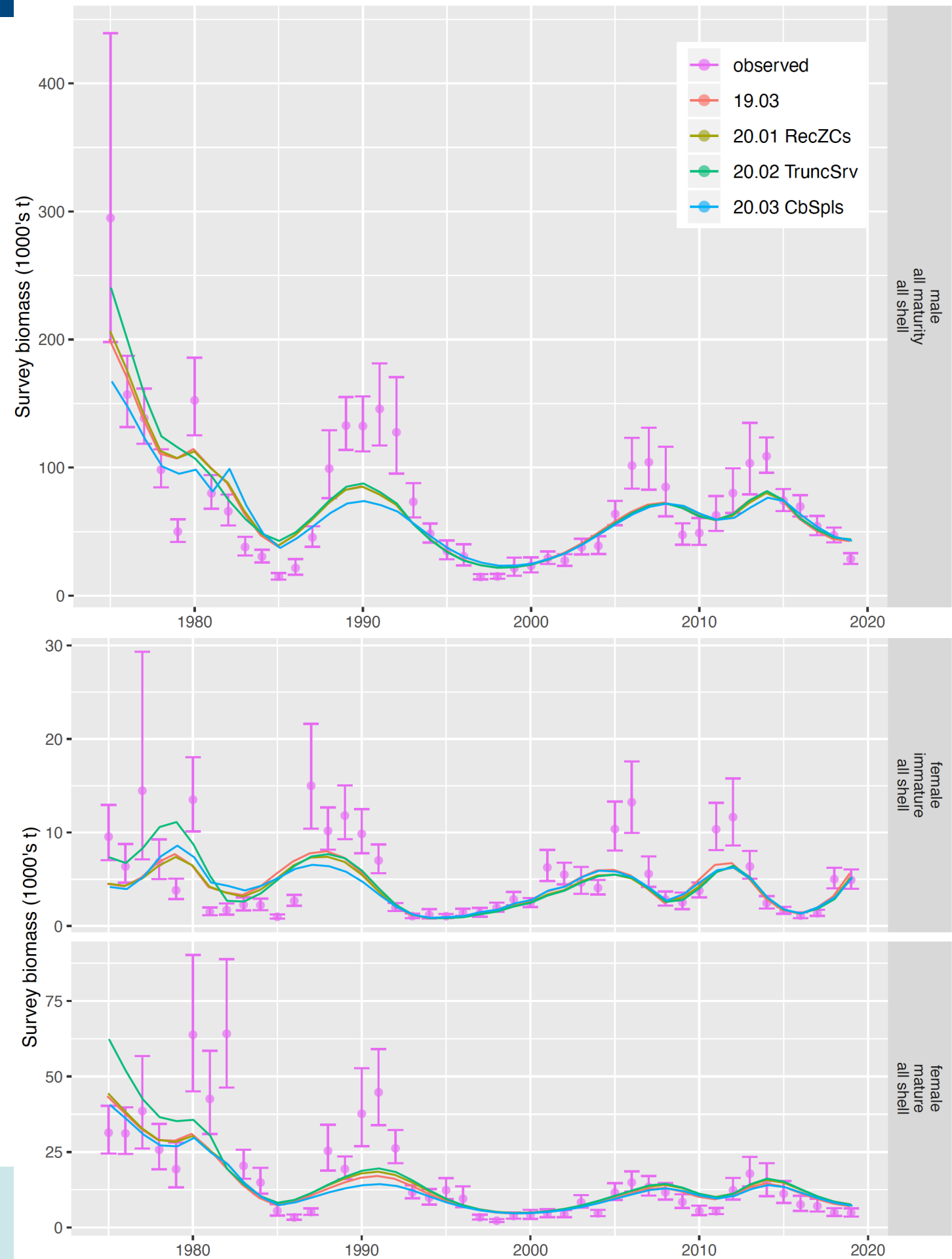
model scenario	N	objective function value	max gradient	current B (1000's t)	Fmsy	Bmsy (1000's t)	MSY (1000's t)	unfished B (1000's t)	average recruitment (millions)
19.03	343	3228.46	1.35E-04	82.6	1.18	41.6	19.5	119.0	393.8
20.01 (RecZCs)	345	3202.35	5.38E-03	84.1	1.24	42.1	19.8	120.4	473.3
20.02 (TruncSrv)	339	3227.47	9.96E-05	71.3	0.90	37.2	16.5	106.4	336.5
20.03 (CbSpls)	359	2975.18	2.59E-04	185.3	2.54	82.2	40.1	234.8	988.2
20.04 (VAST)	343	4069.76	9.62E-04	50.2	1.12	29.2	15.1	83.3	295.7
20.05 (VAST+XU)	347	2783.07	3.68E-04	67.2	1.42	47.2	19.1	134.7	407.4
20.06 (SBS)	610	3469.14	3.08E-04	58.9	1.03	35.1	15.8	100.2	326.4
20.07 (SBS+FACs)	345	3349.33	7.22E-04	68.7	0.96	36.8	16.8	105.0	366.3
20.08 (SBS+FCCs)	339	3229.69	1.22E-04	57.6	0.87	32.0	14.0	91.4	266.2

Scenarios

19.03, 20.01, 20.02, 20.03



Fits to Survey Biomass



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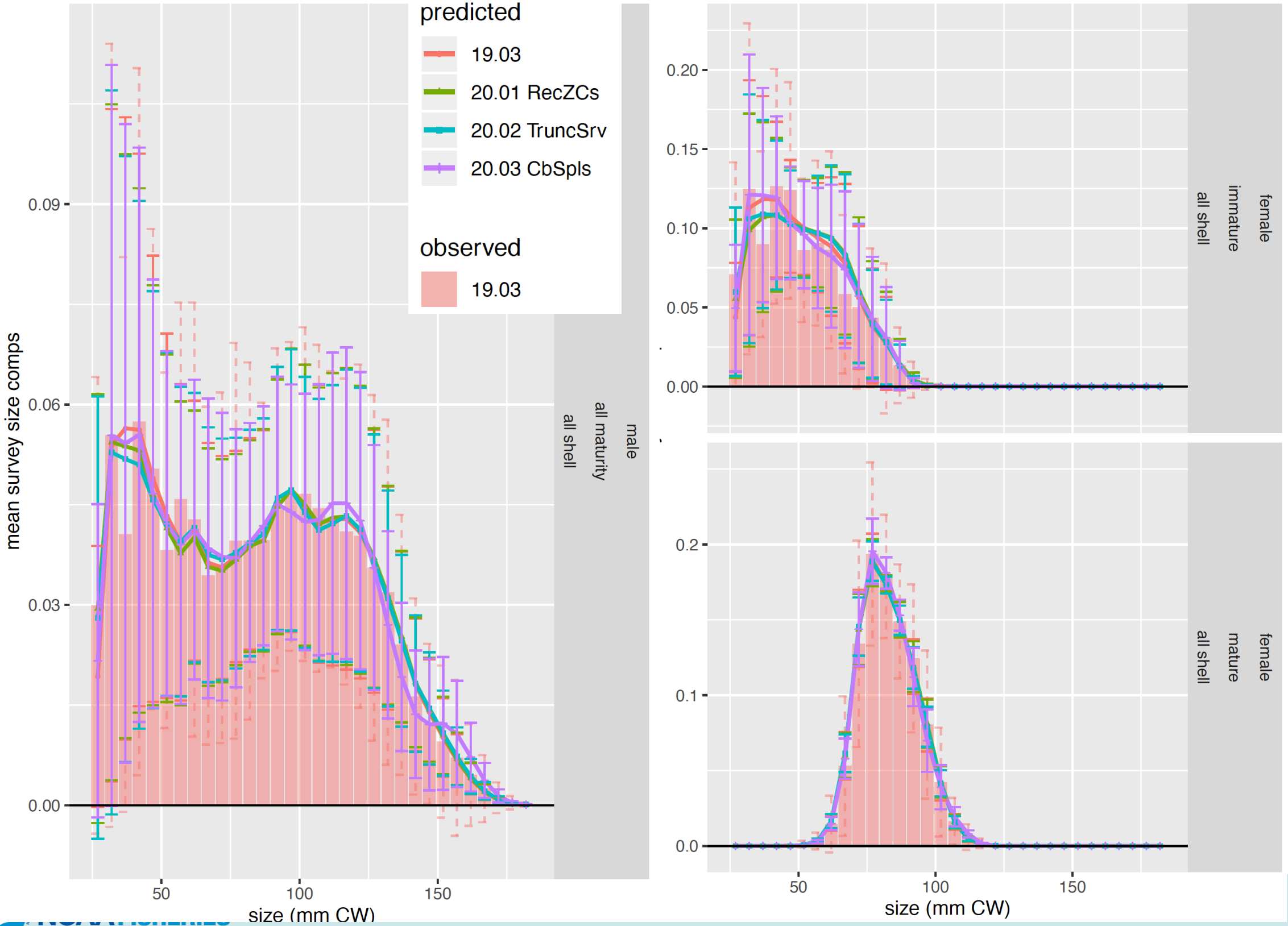
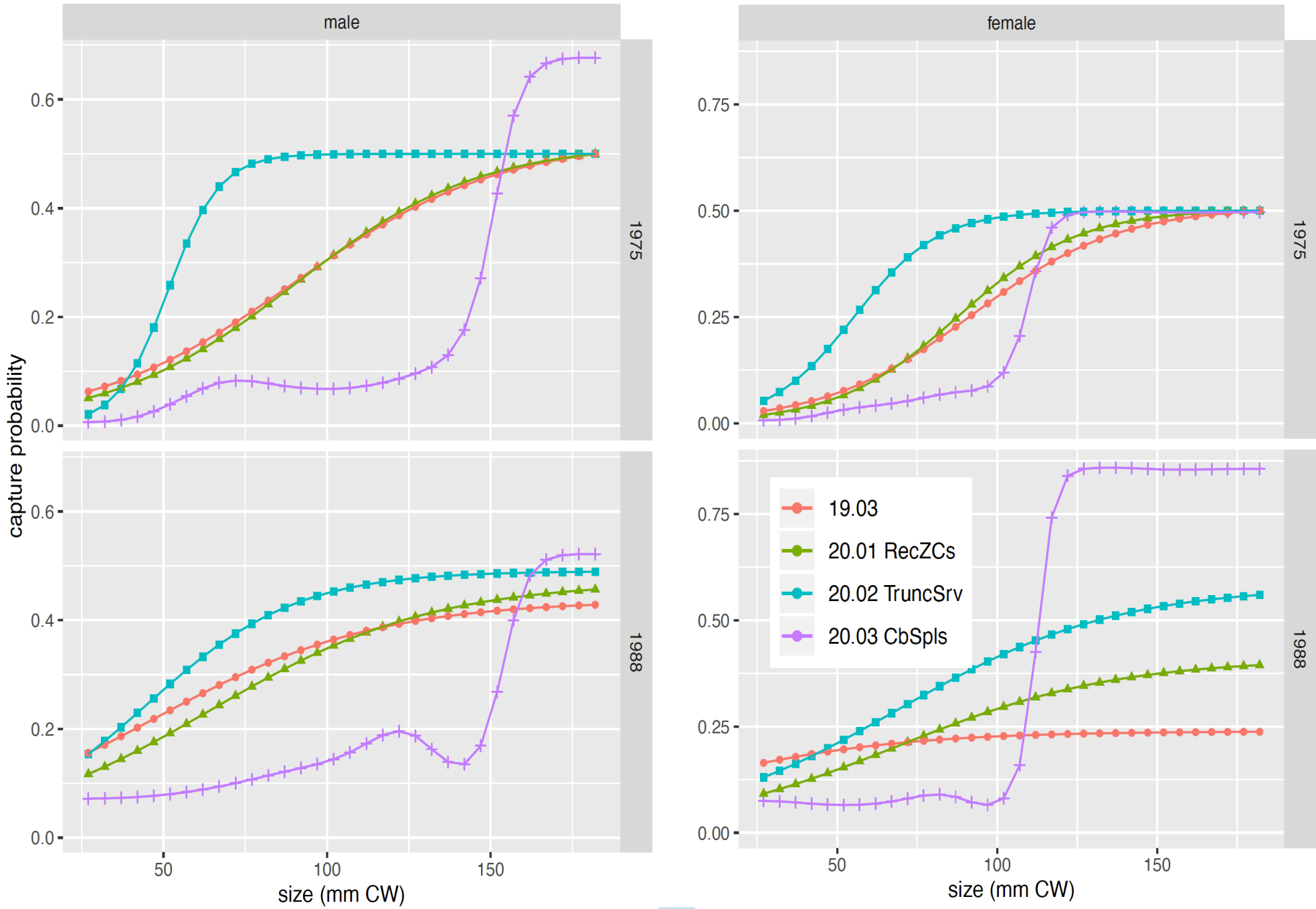
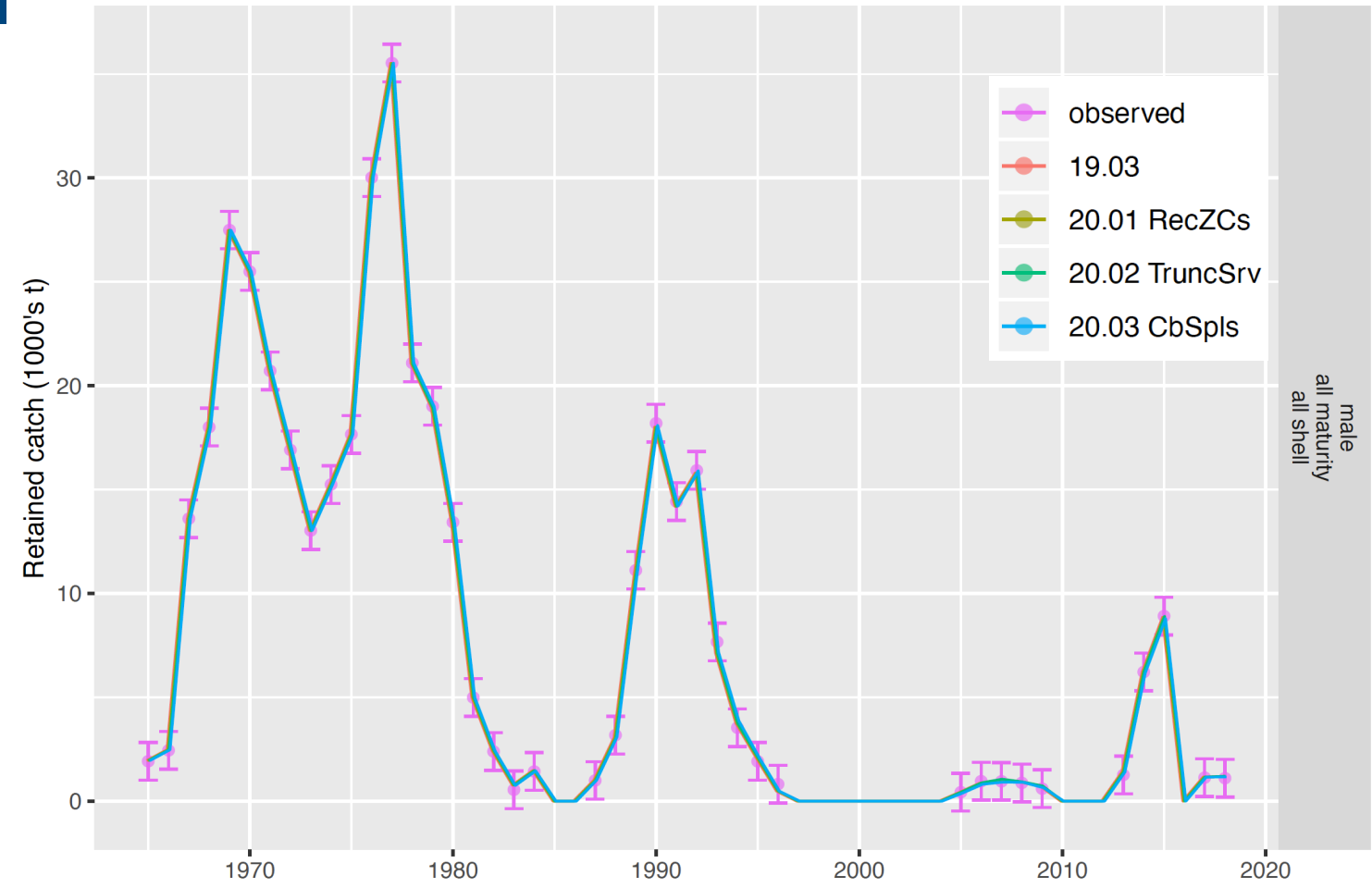
Fits to Mean Survey Size Compositions

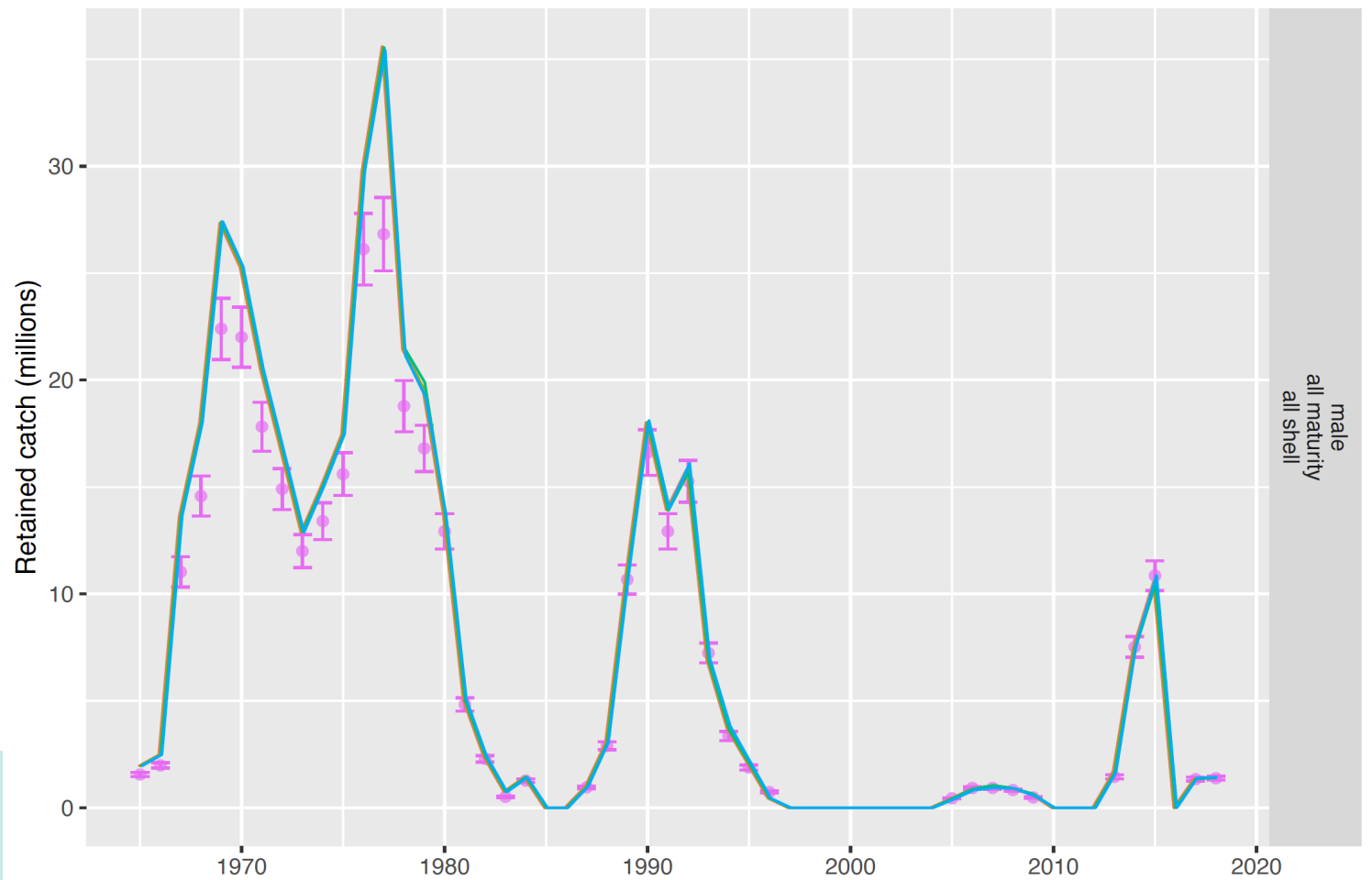


Estimated Survey Catchabilities



Fits to Retained Catch





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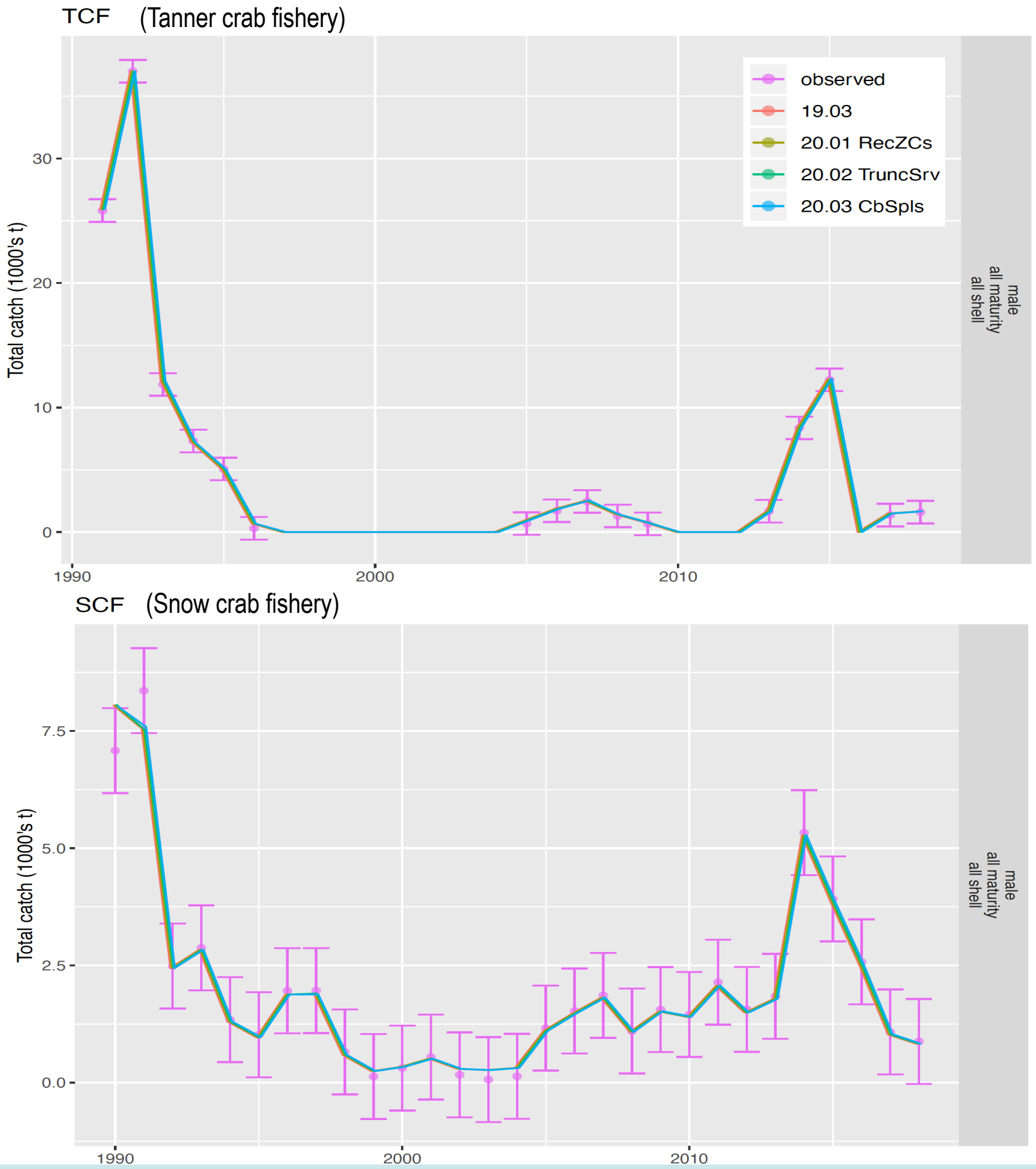
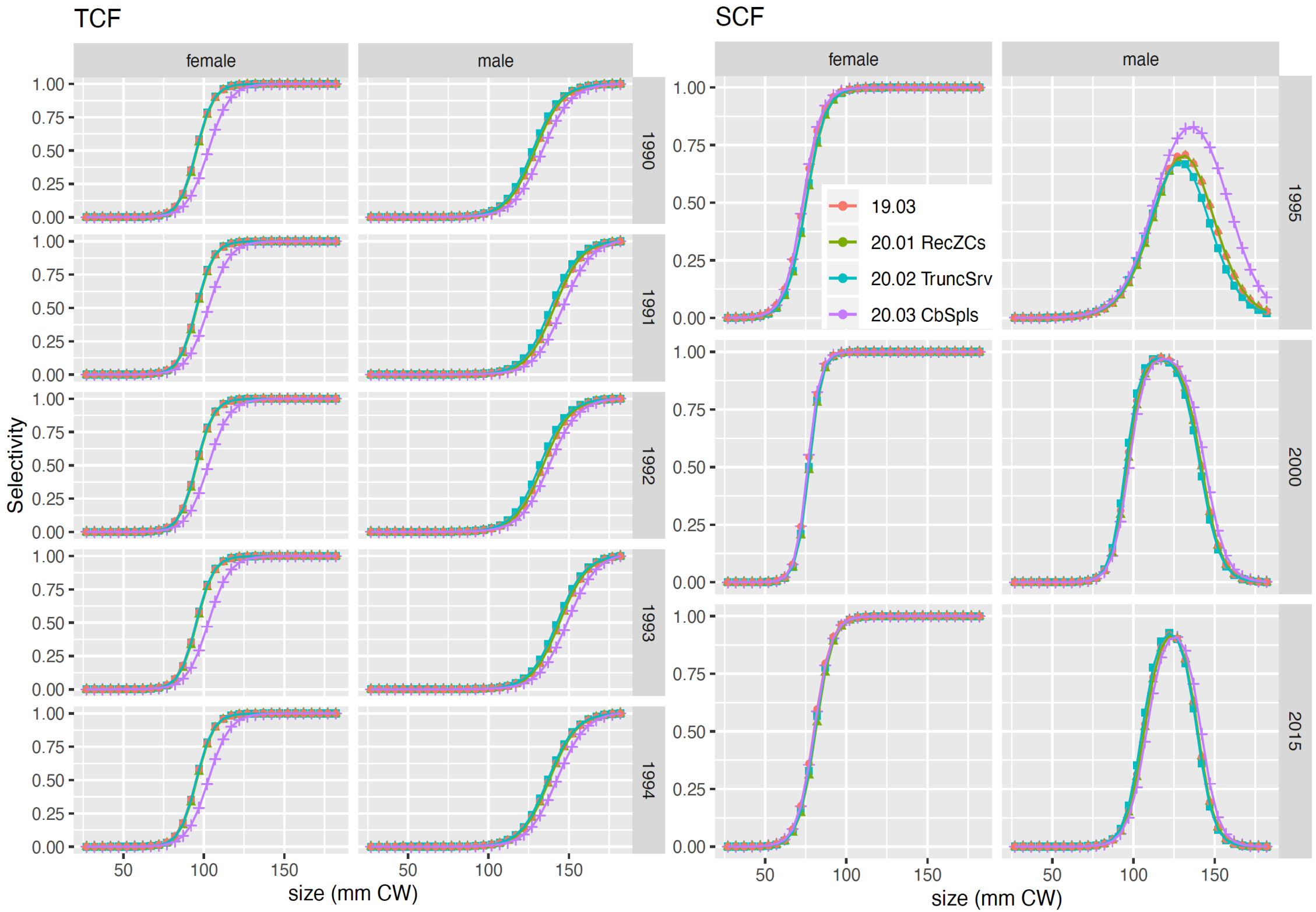
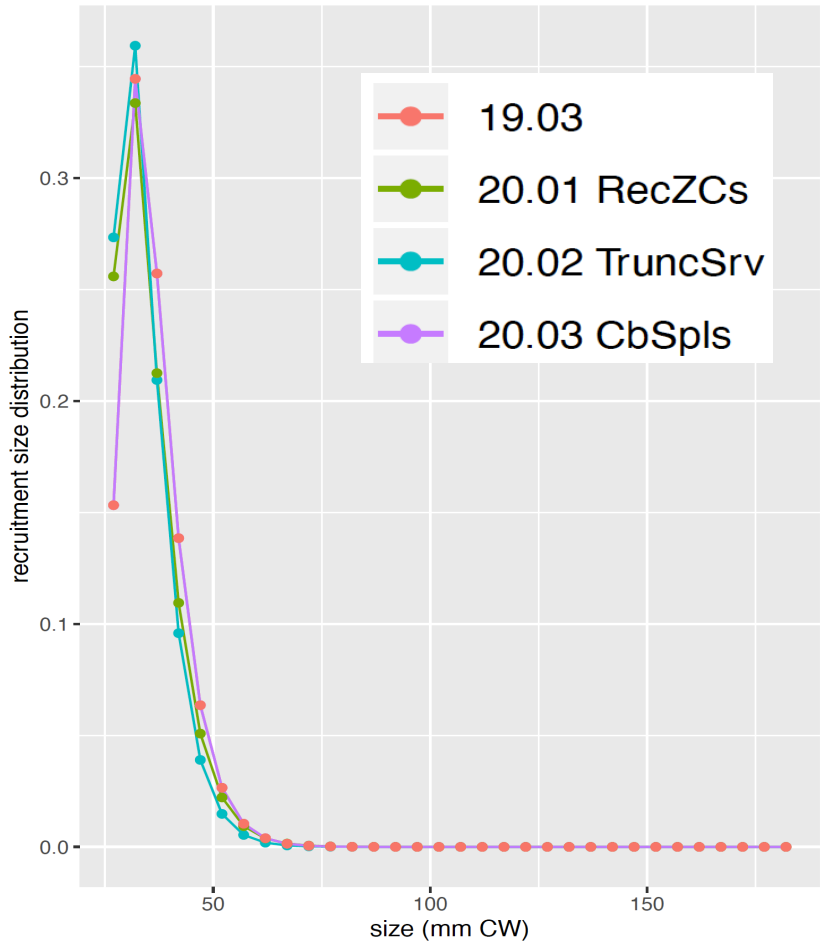
Fits to Total Catch

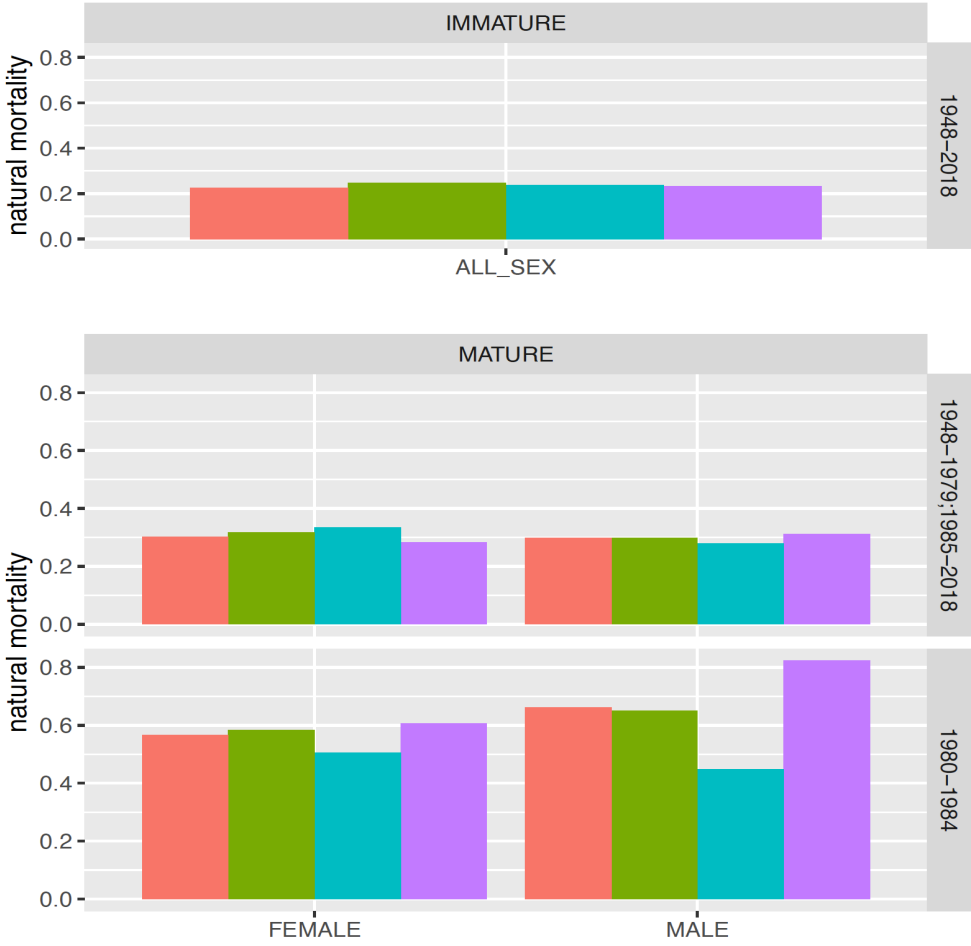


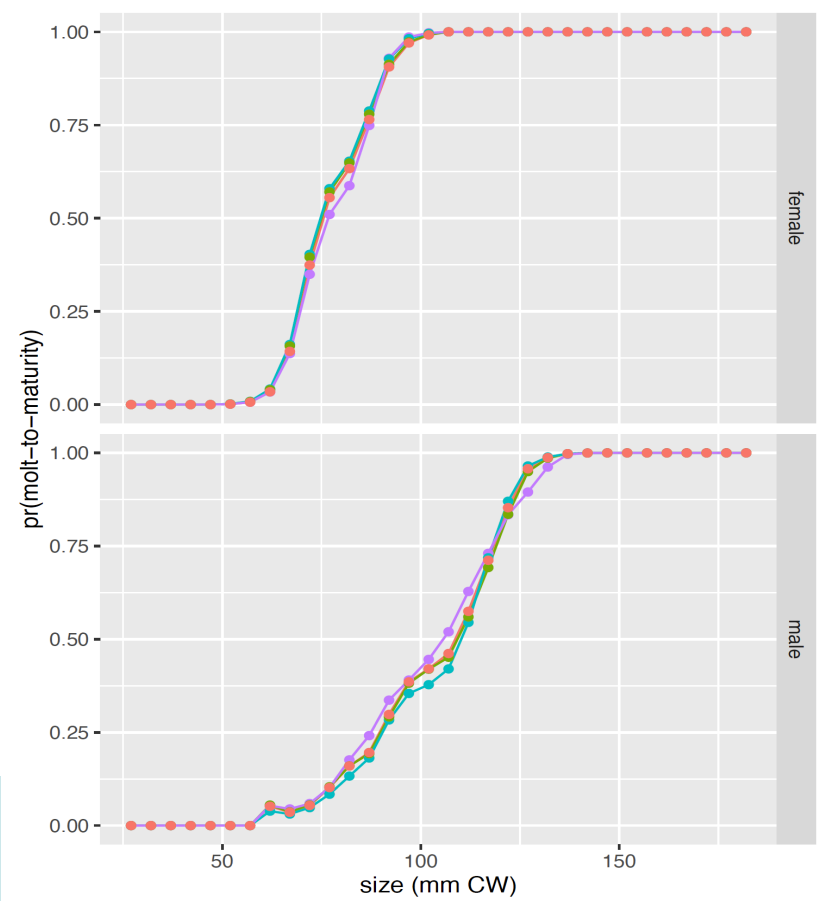
Estimated Fishery Catchabilities

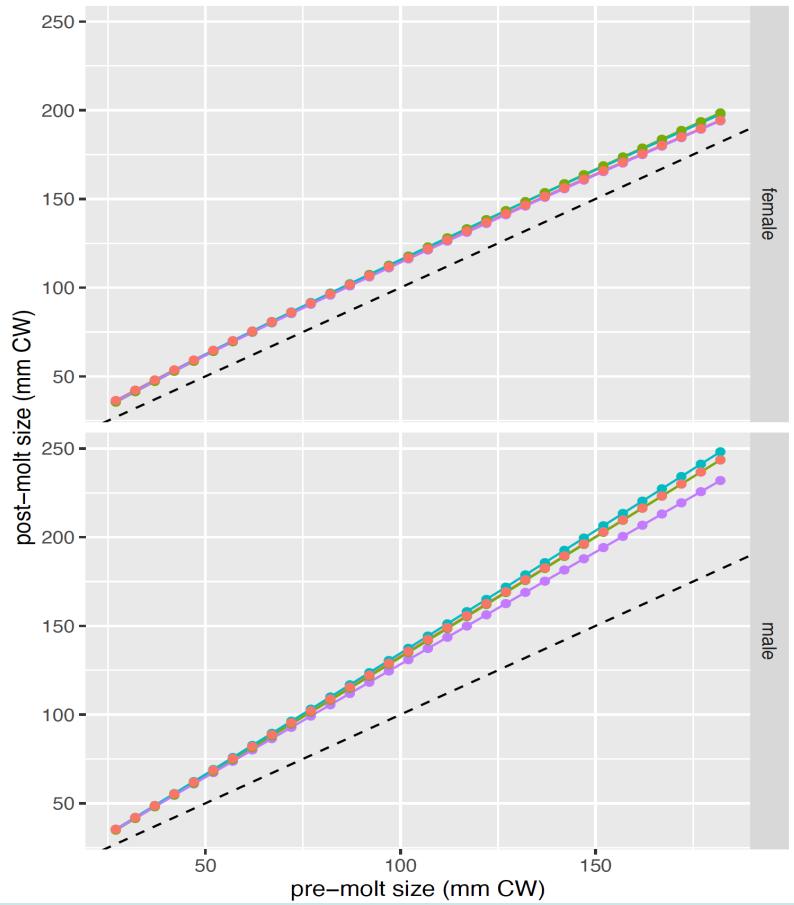


Estimated Population Processes









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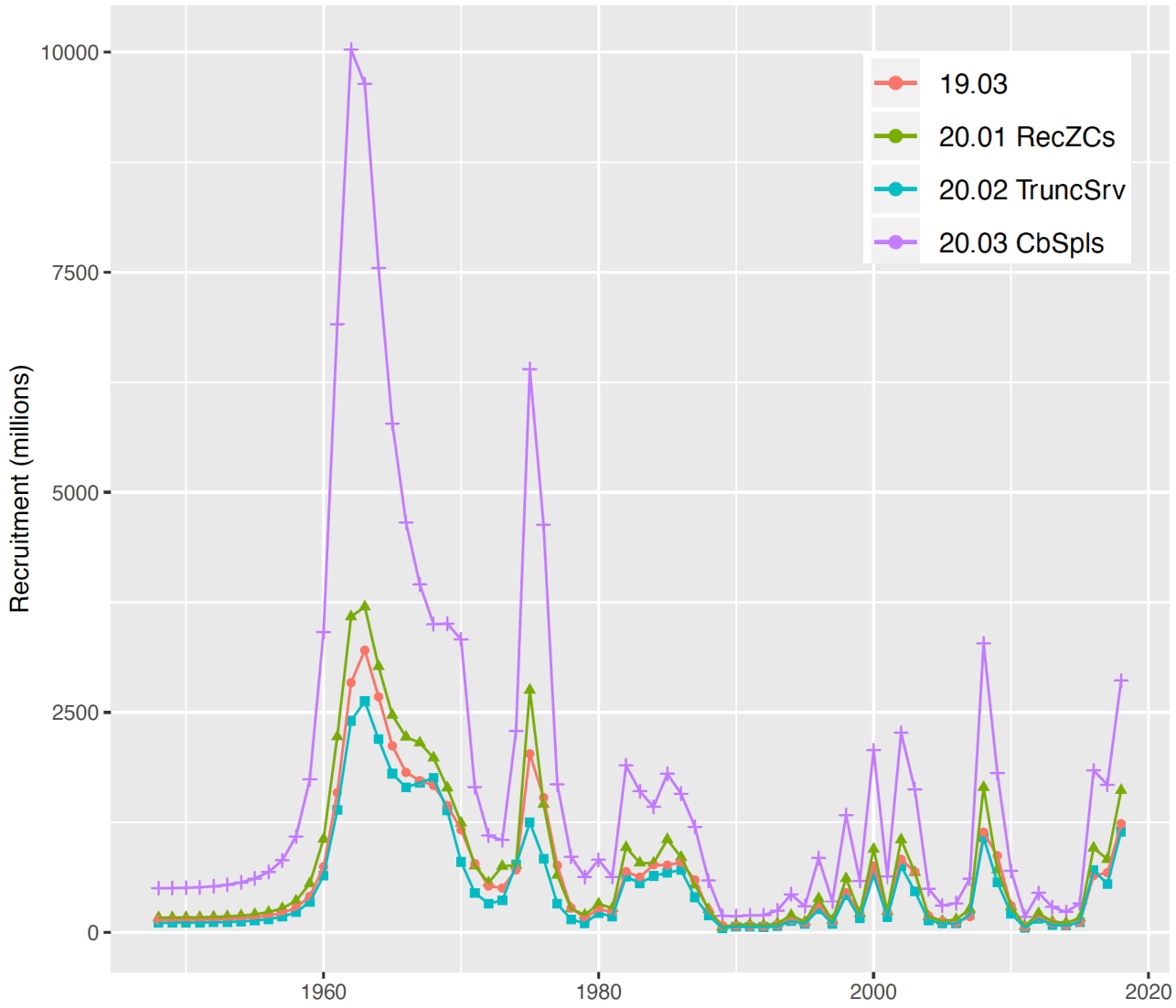
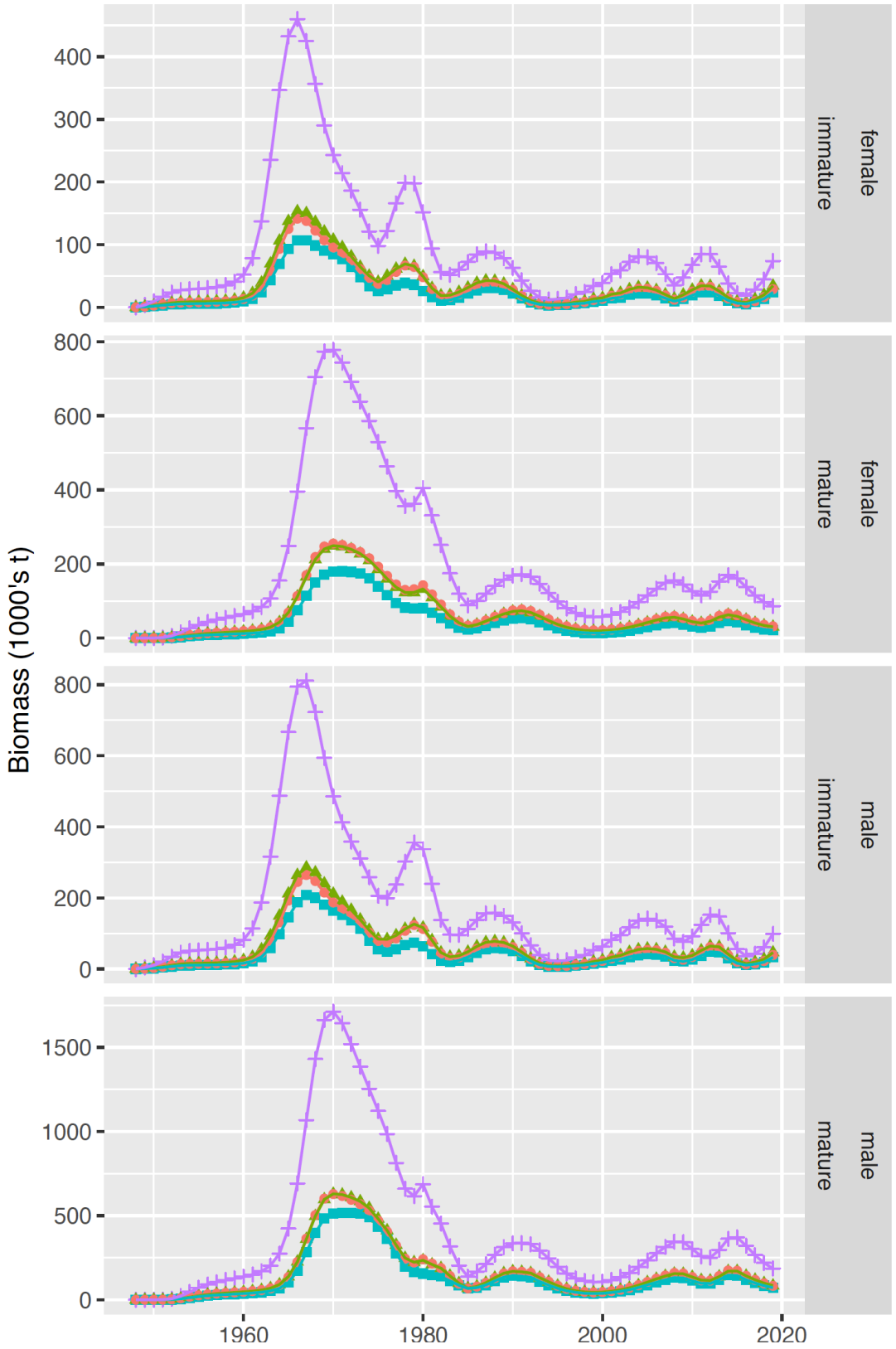
Estimated Population Time Series

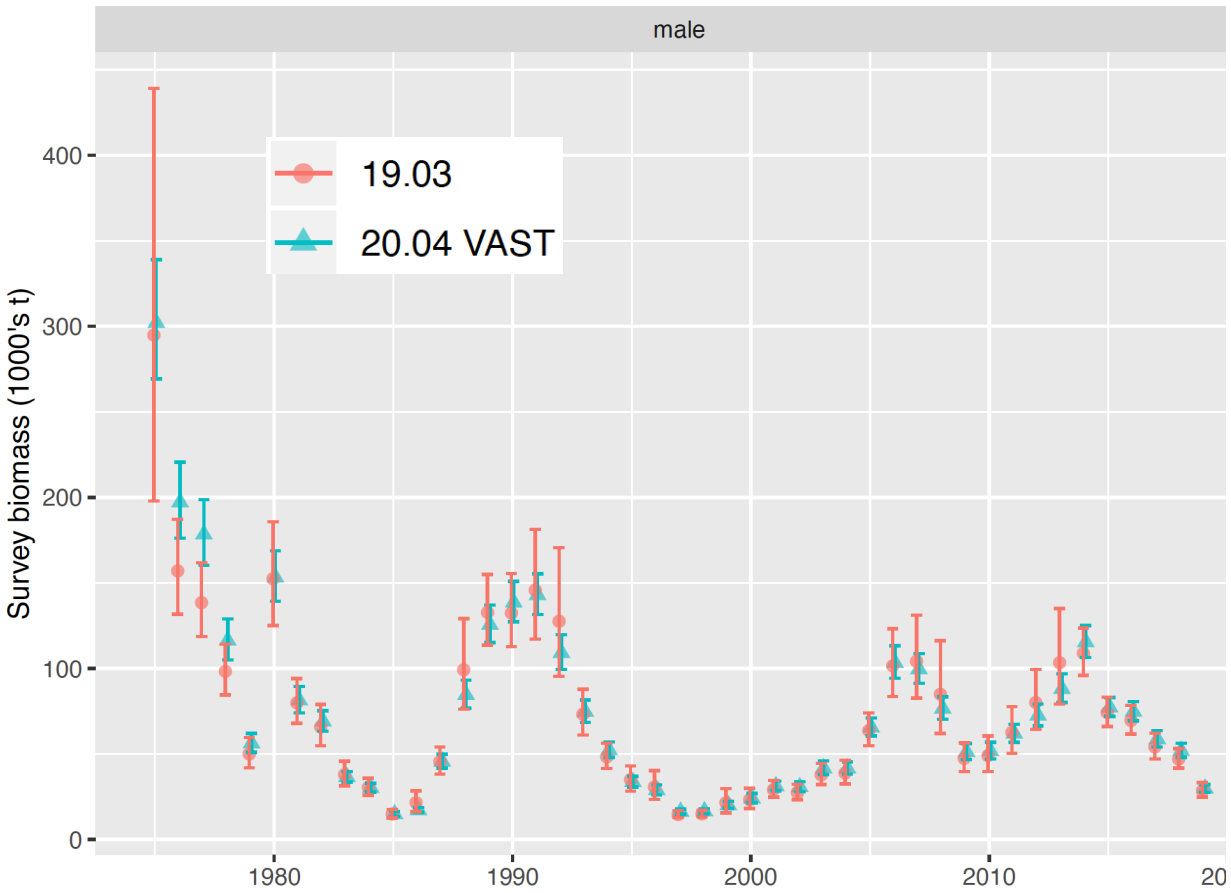


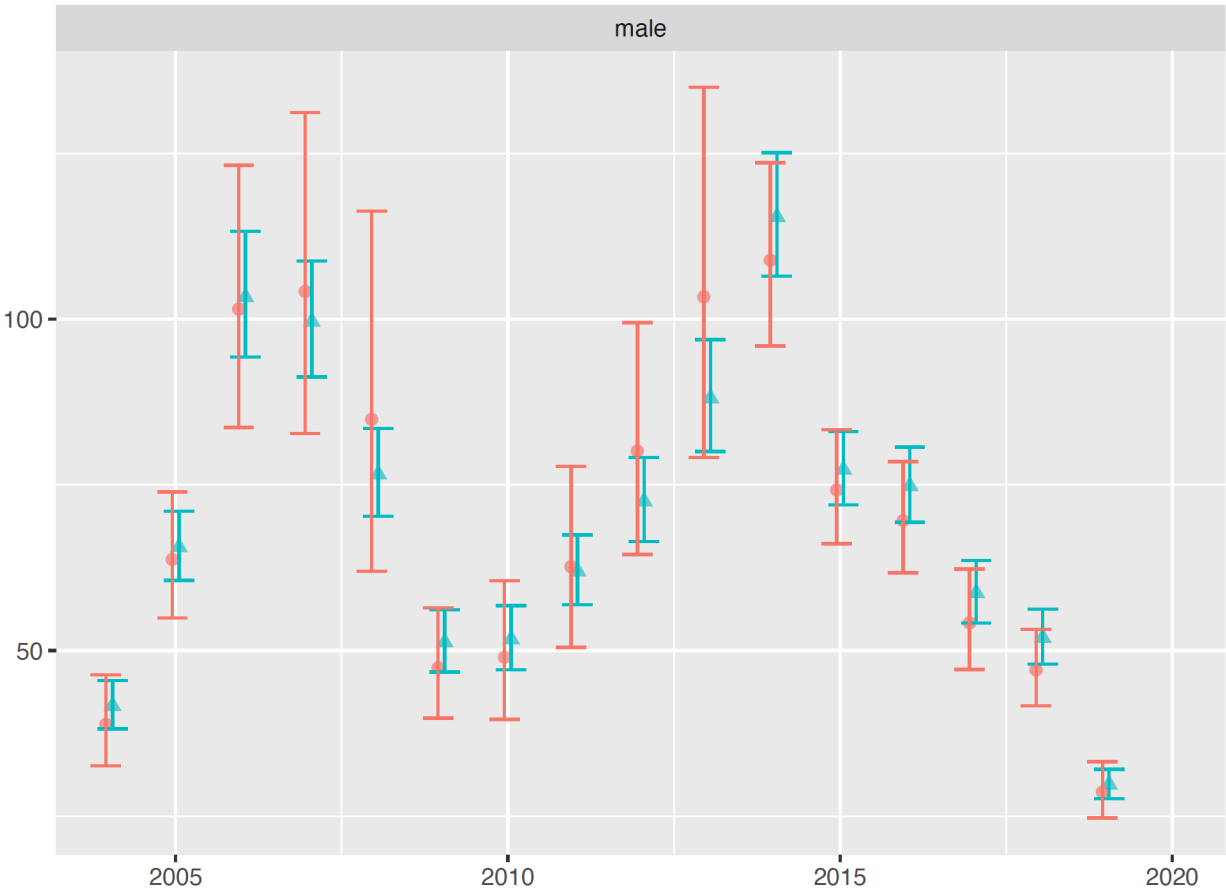


Models fitting VAST survey biomass

20.04, 20.05

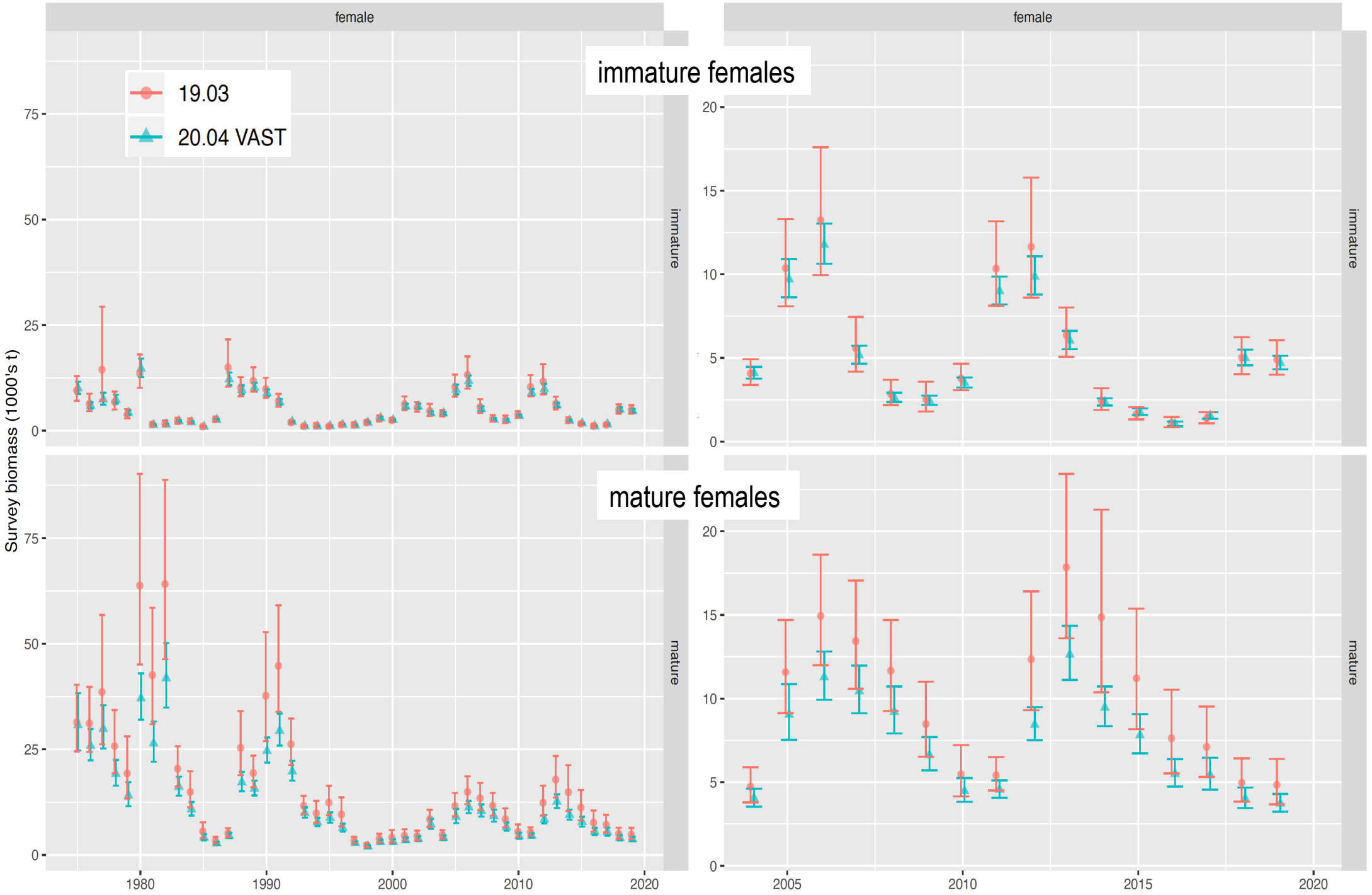
VAST survey biomass: males





- VAST estimates rather consistently slightly higher than design-based
- VAST estimates exhibit smaller uncertainty

VAST survey biomass: females



- VAST estimates rather consistently slightly lower than design-based
- VAST estimates exhibit smaller uncertainty

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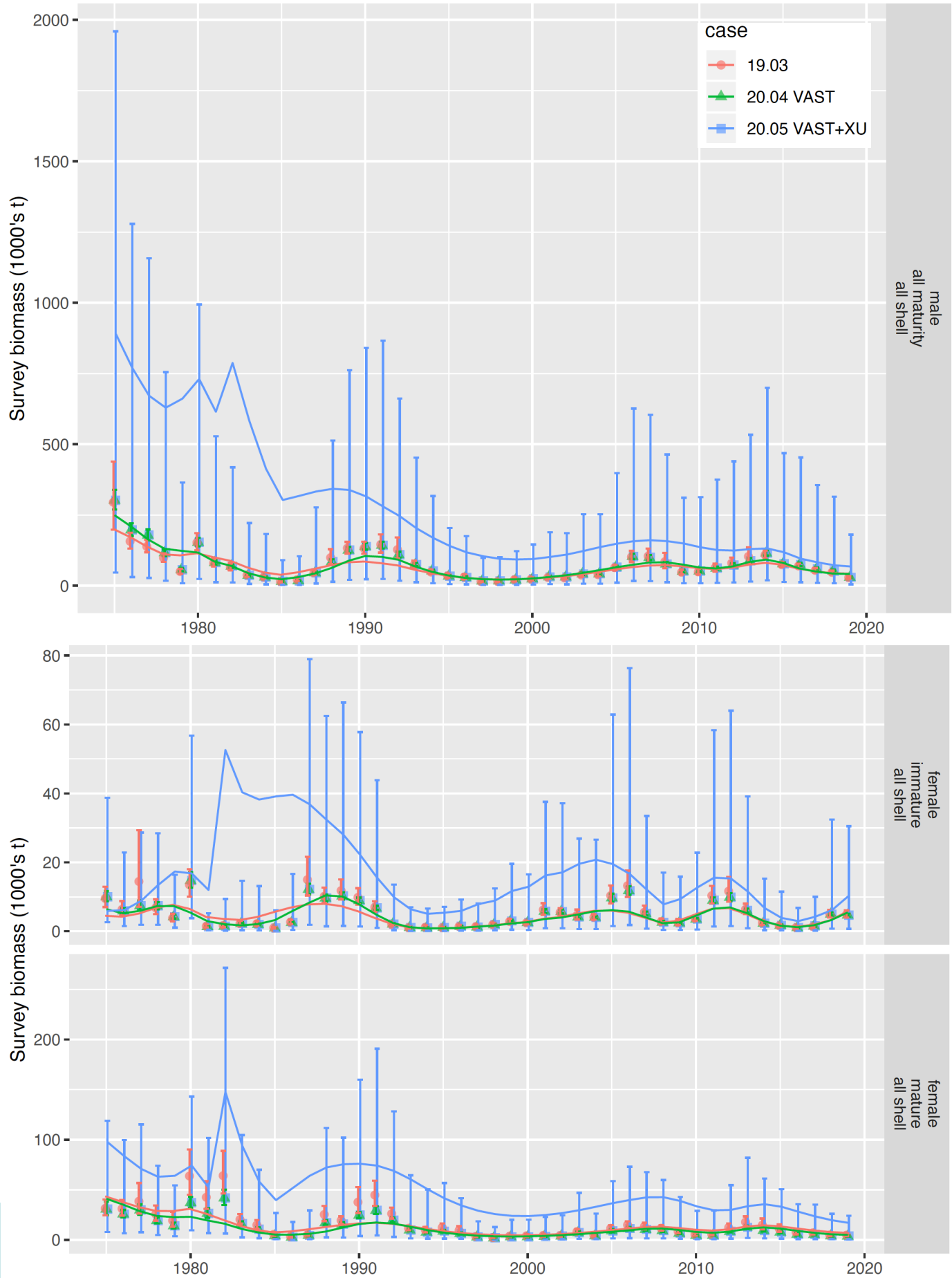
Fits to Survey Biomass



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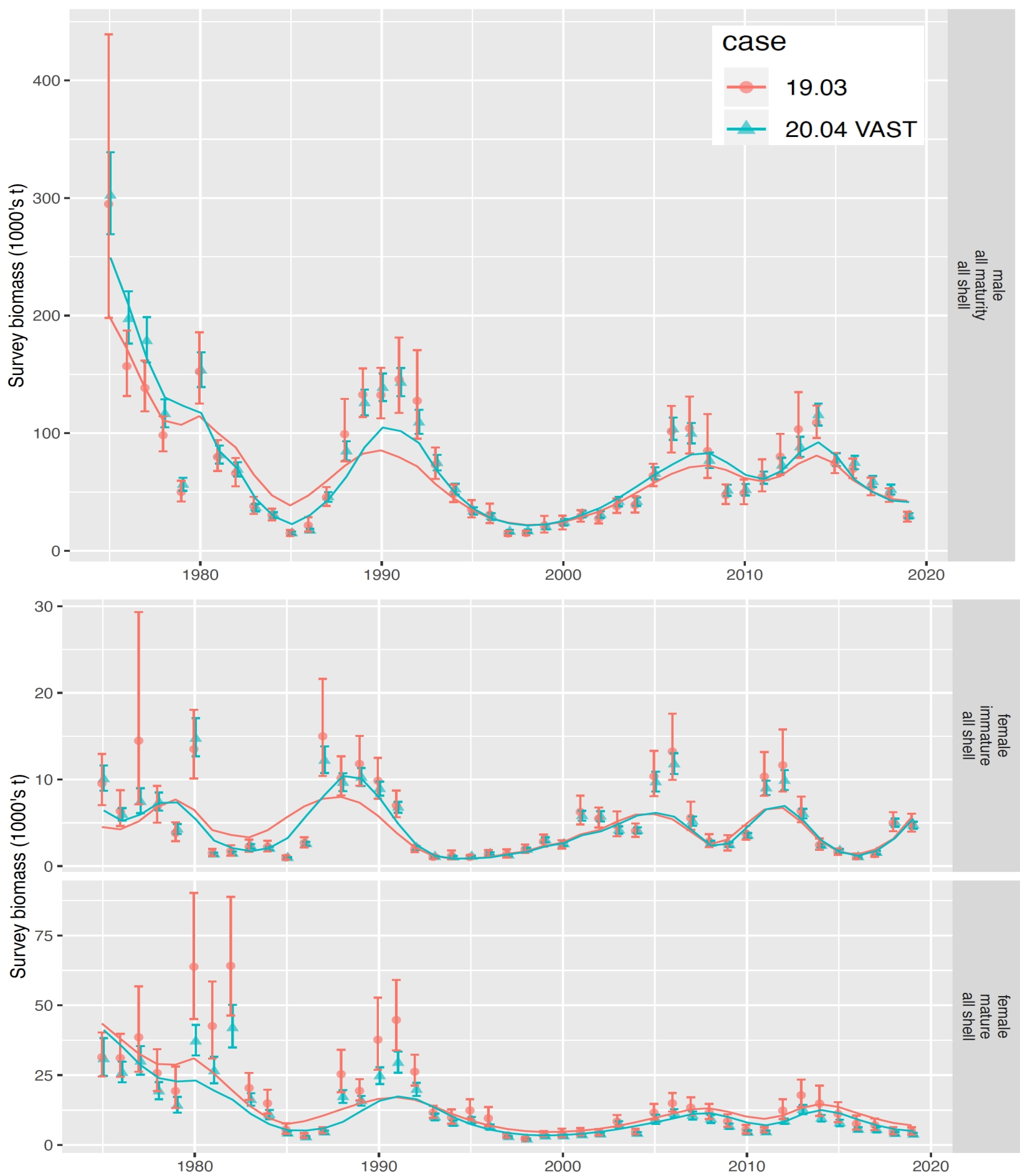
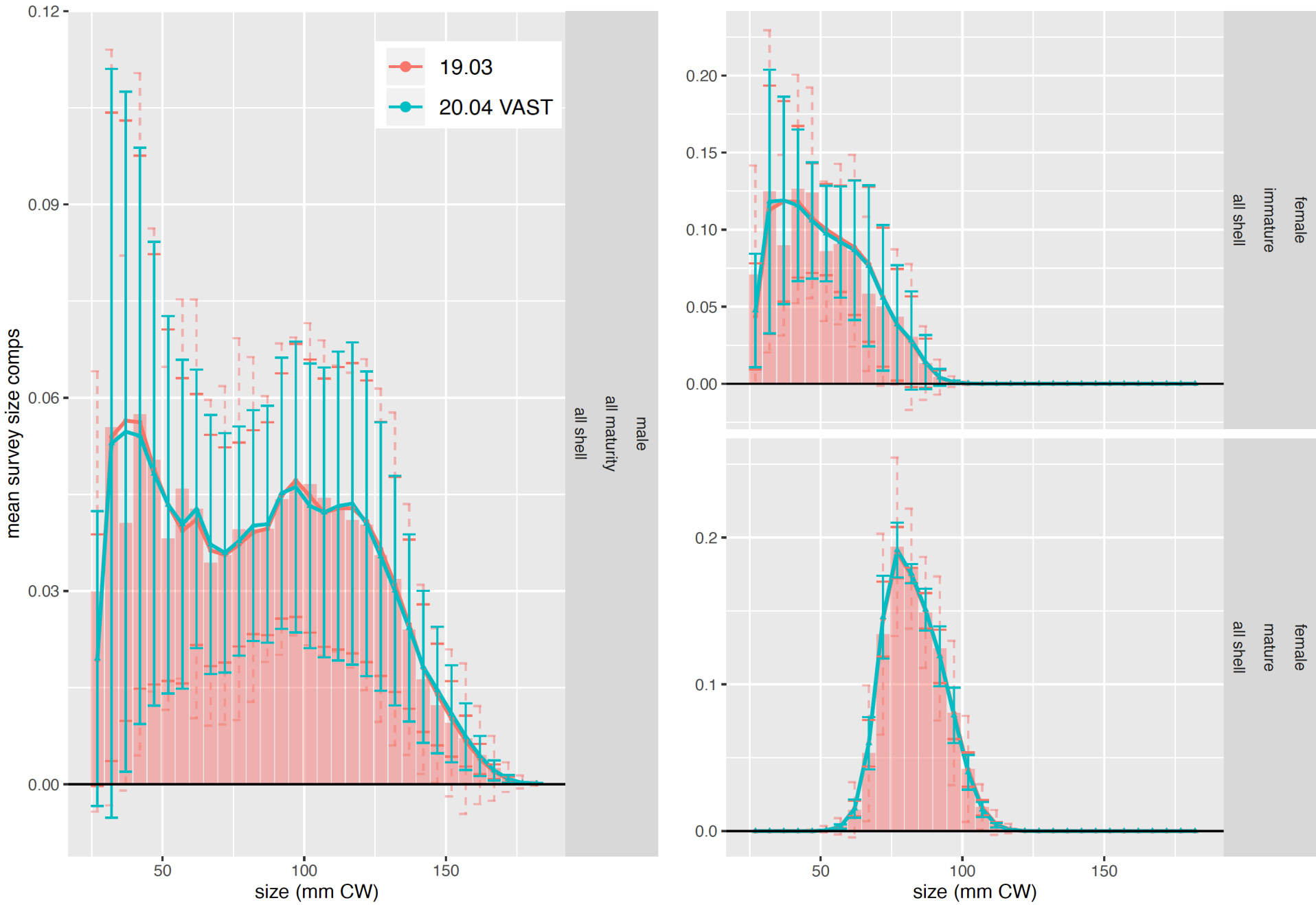
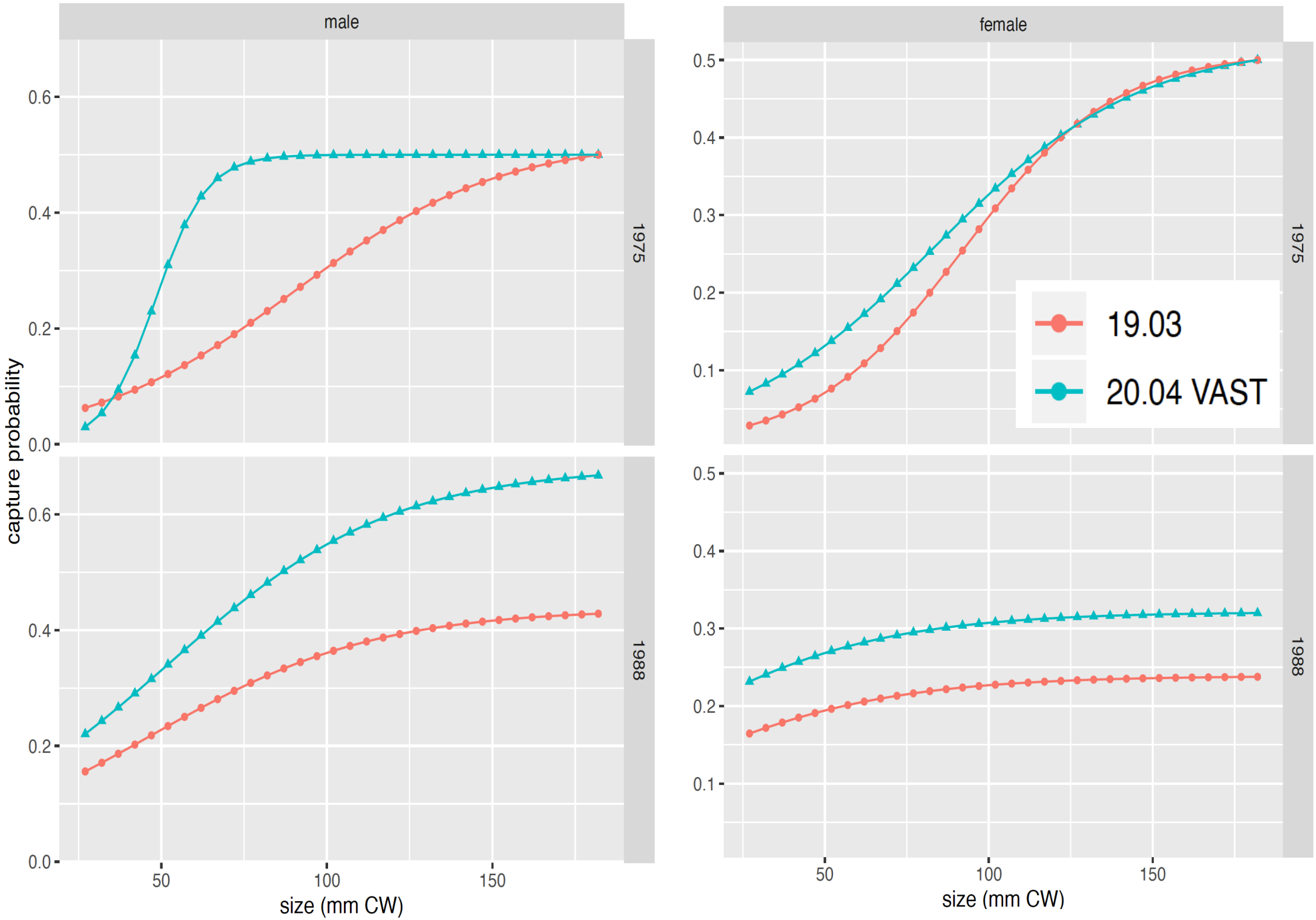
Fits to Survey Biomass (again)



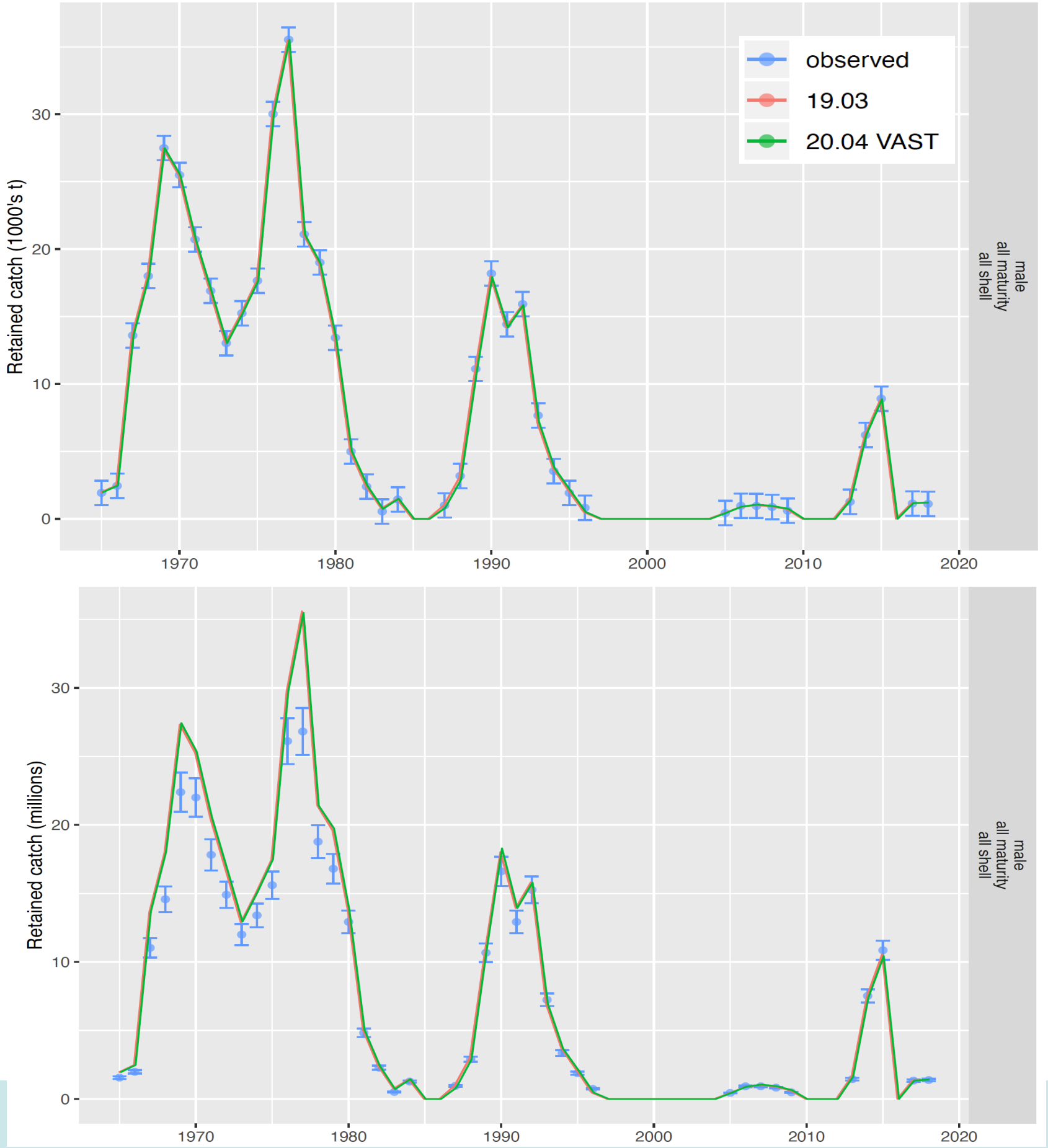
Fits to Mean Survey Size Compositions



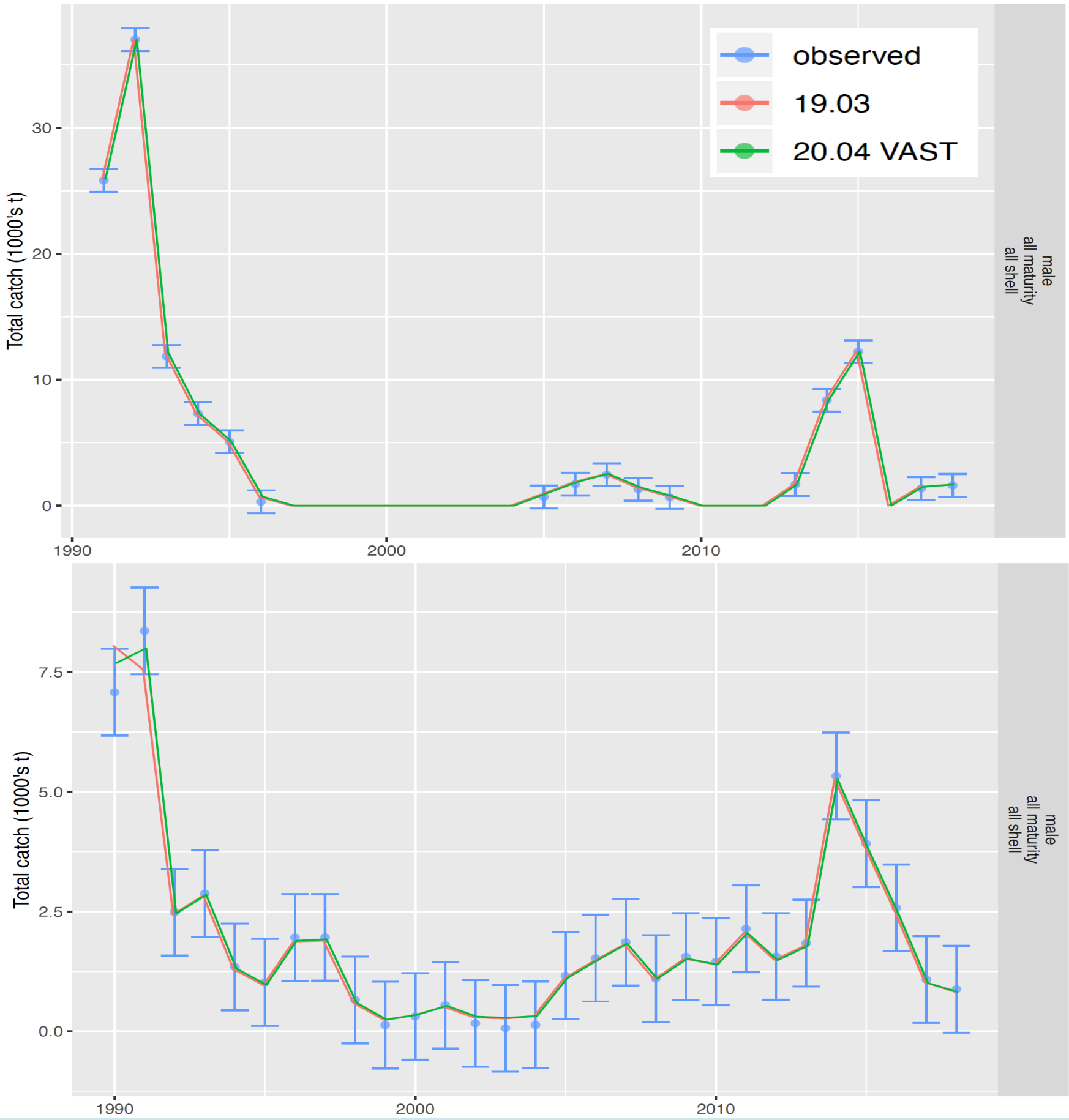
Estimated Survey Catchabilities



Fits to Retained Catch



Fits to Total Catch



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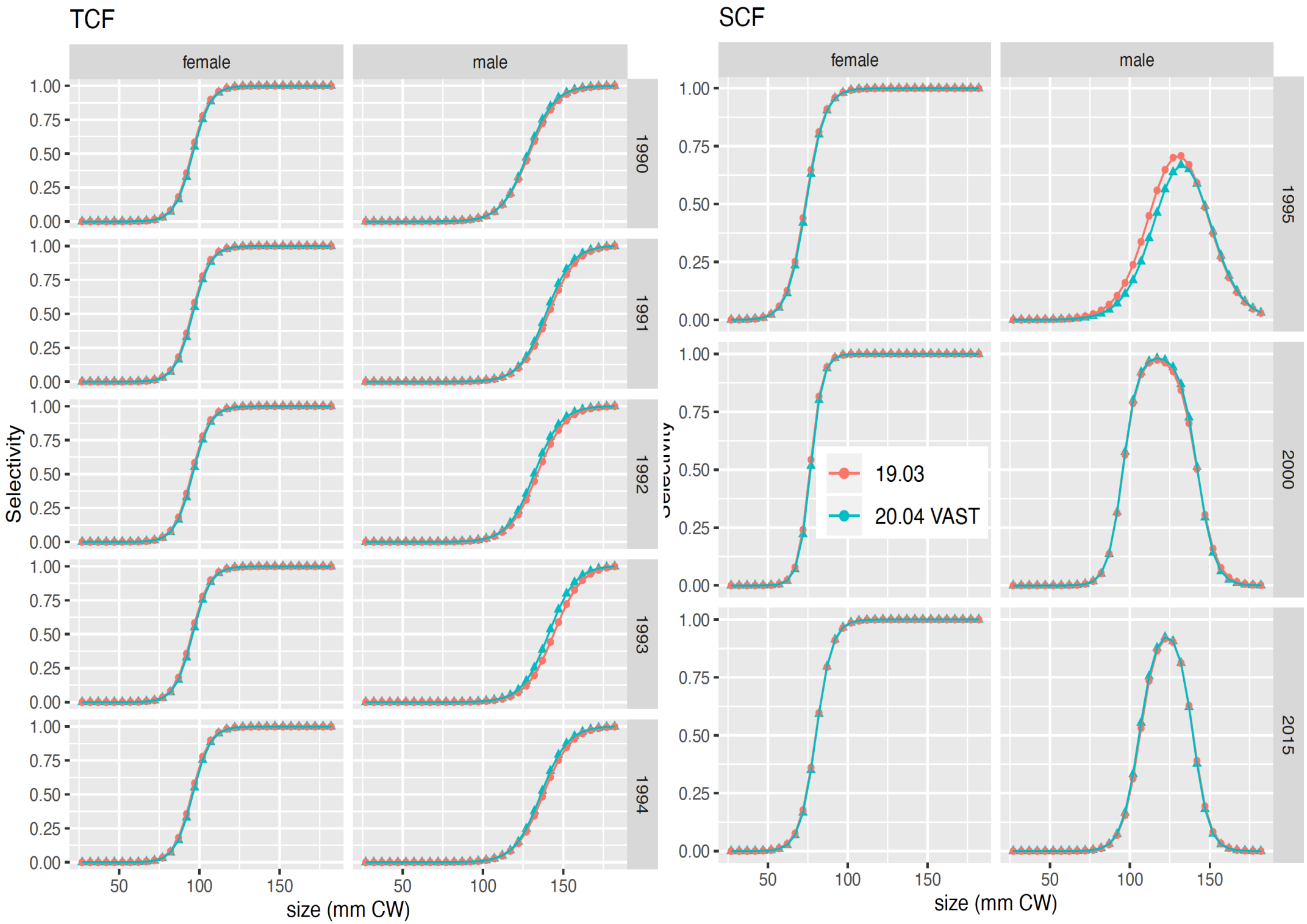
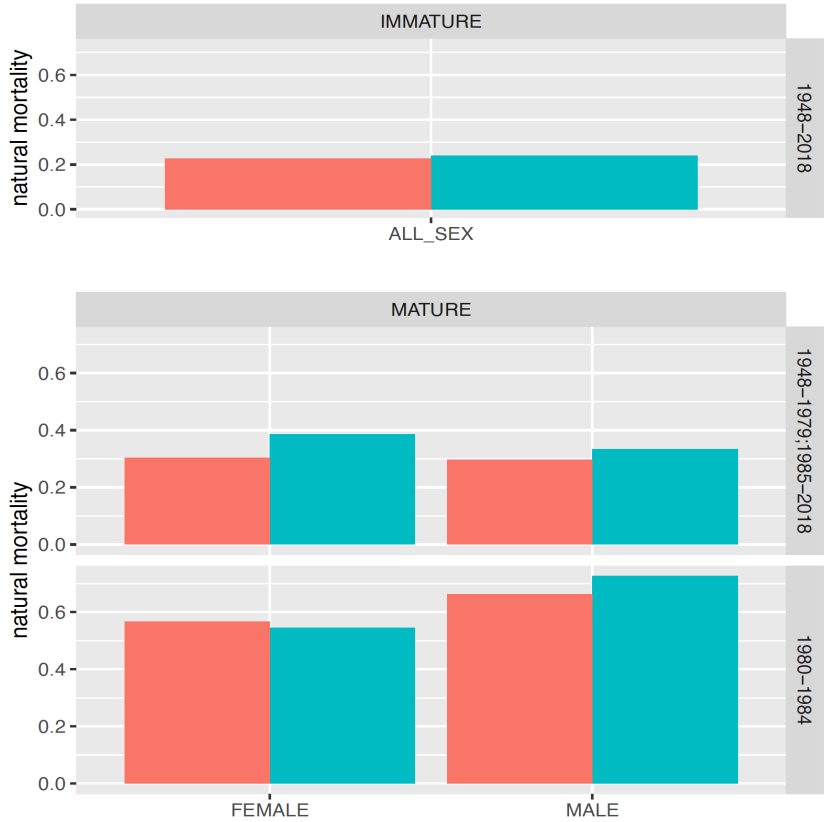
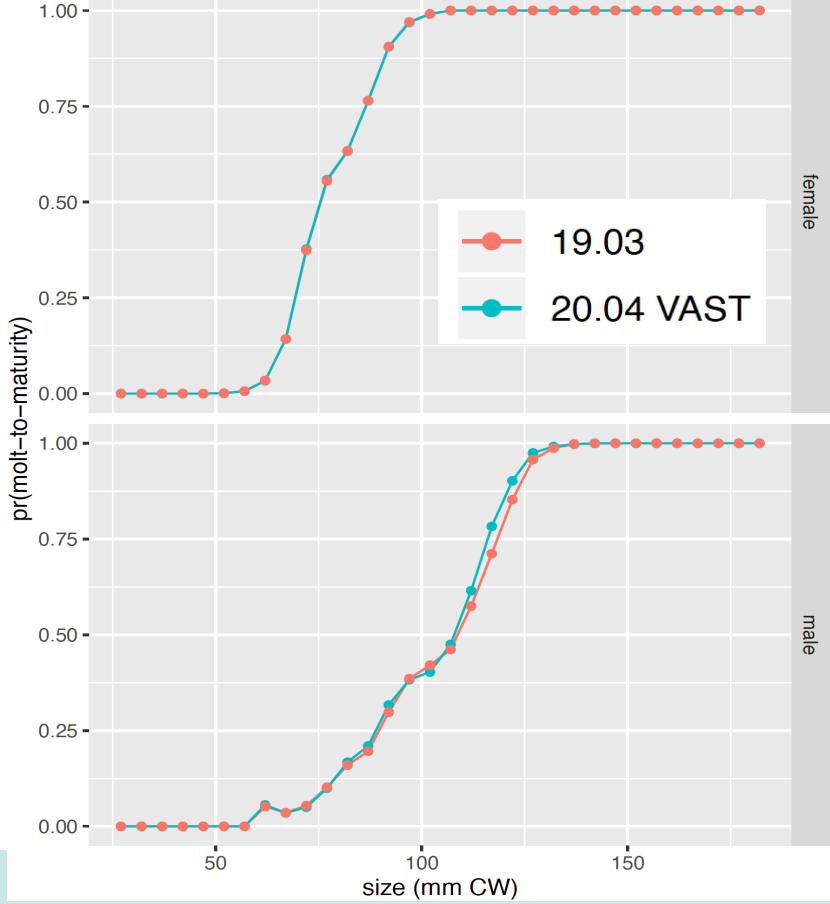
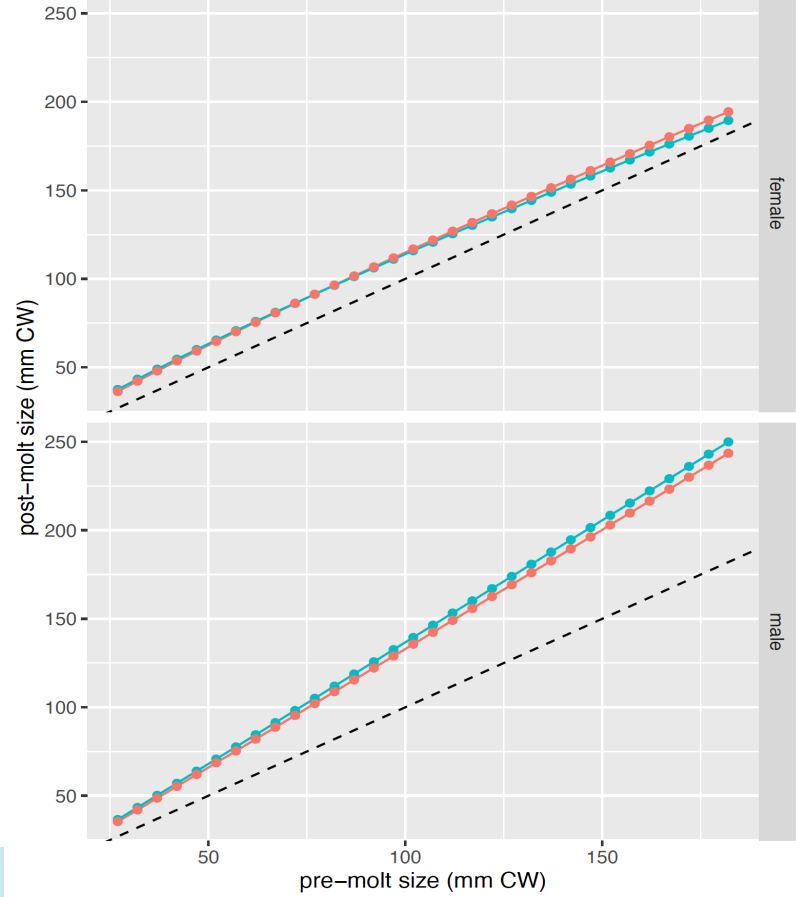
Estimated Fishery Catchabilities



Estimated Population Processes







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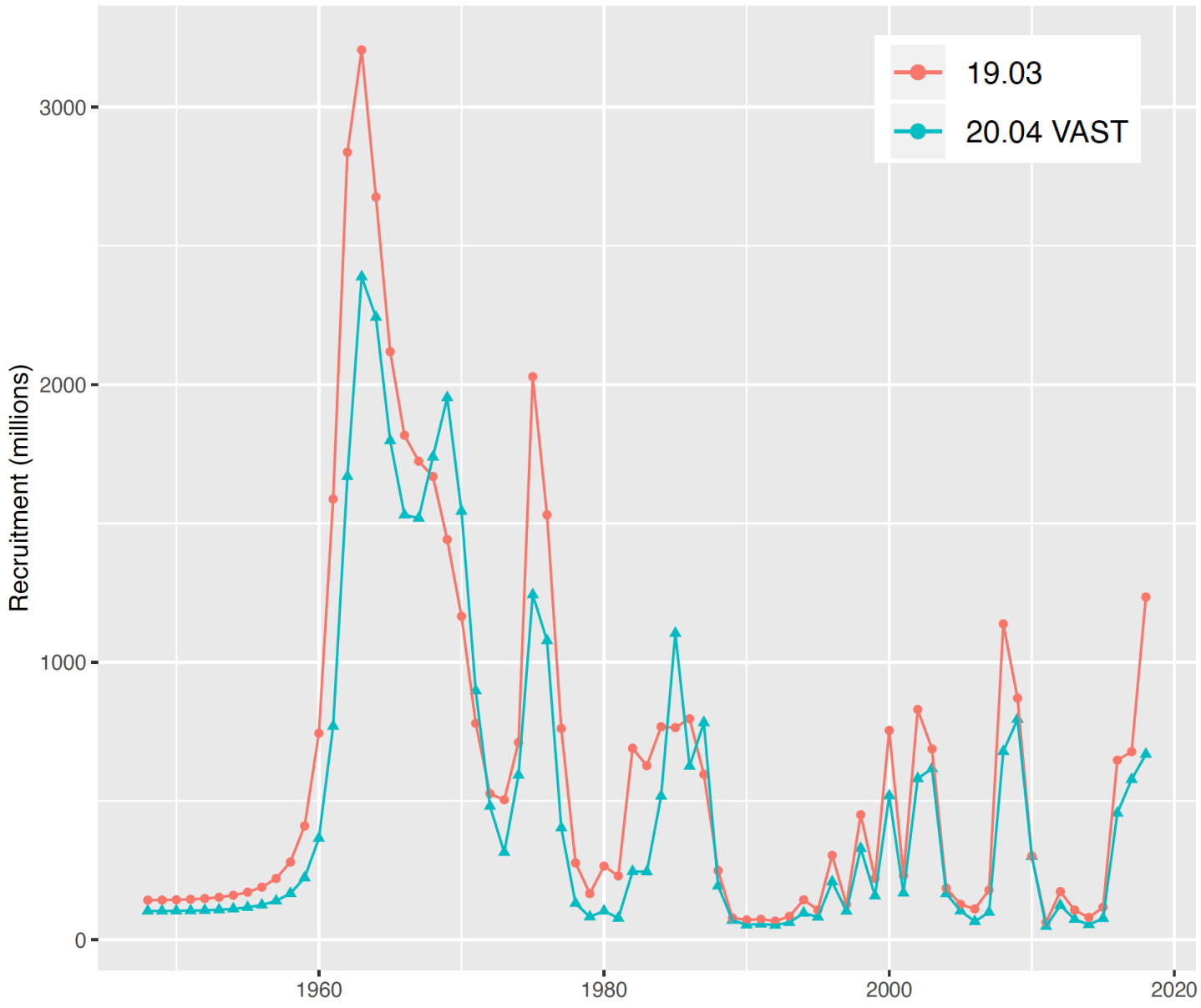
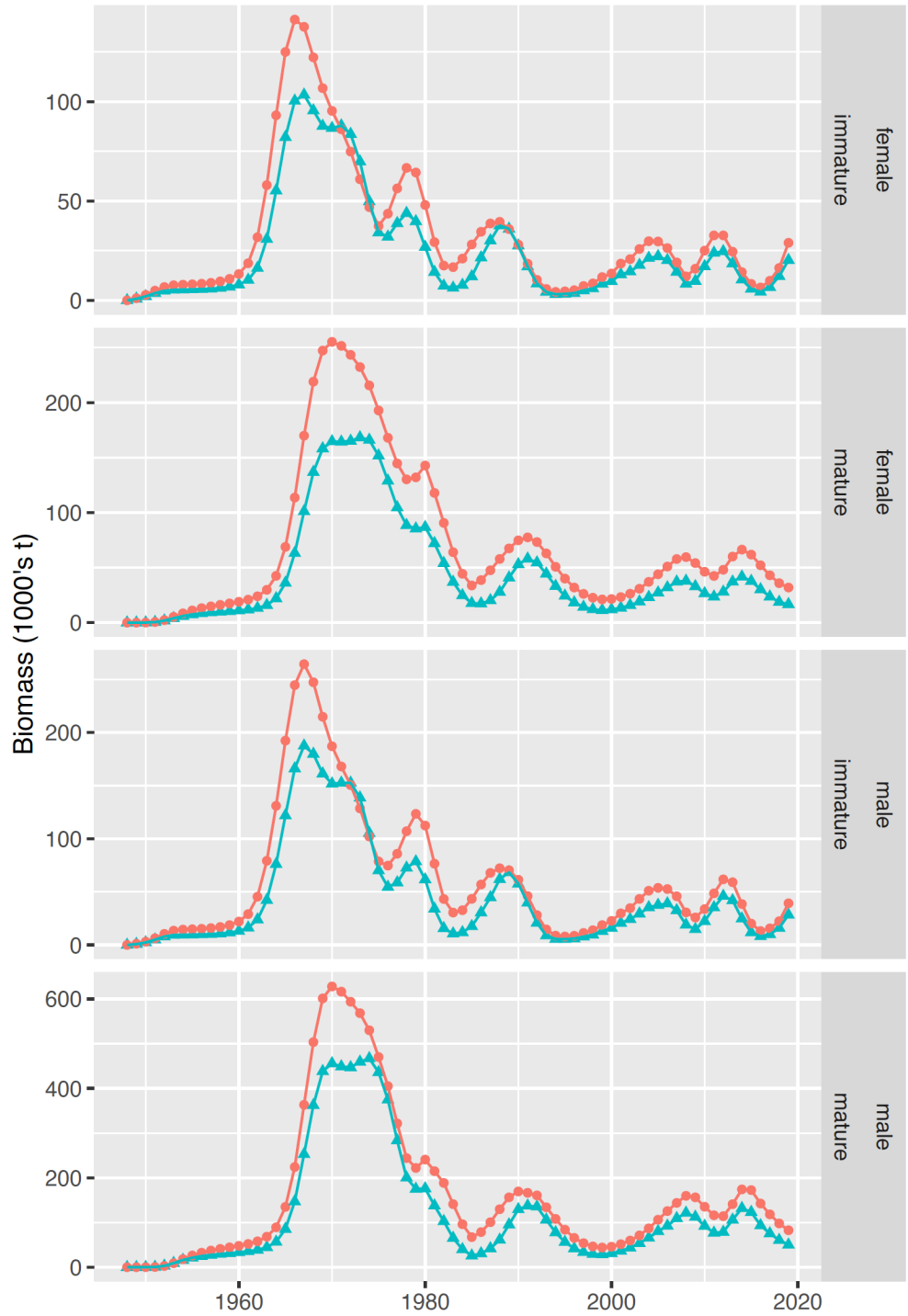
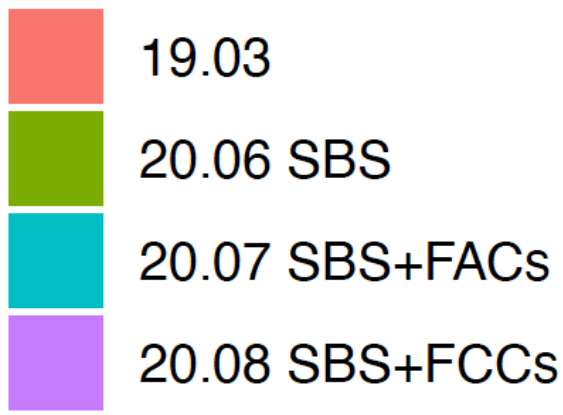
Estimated Population Time Series



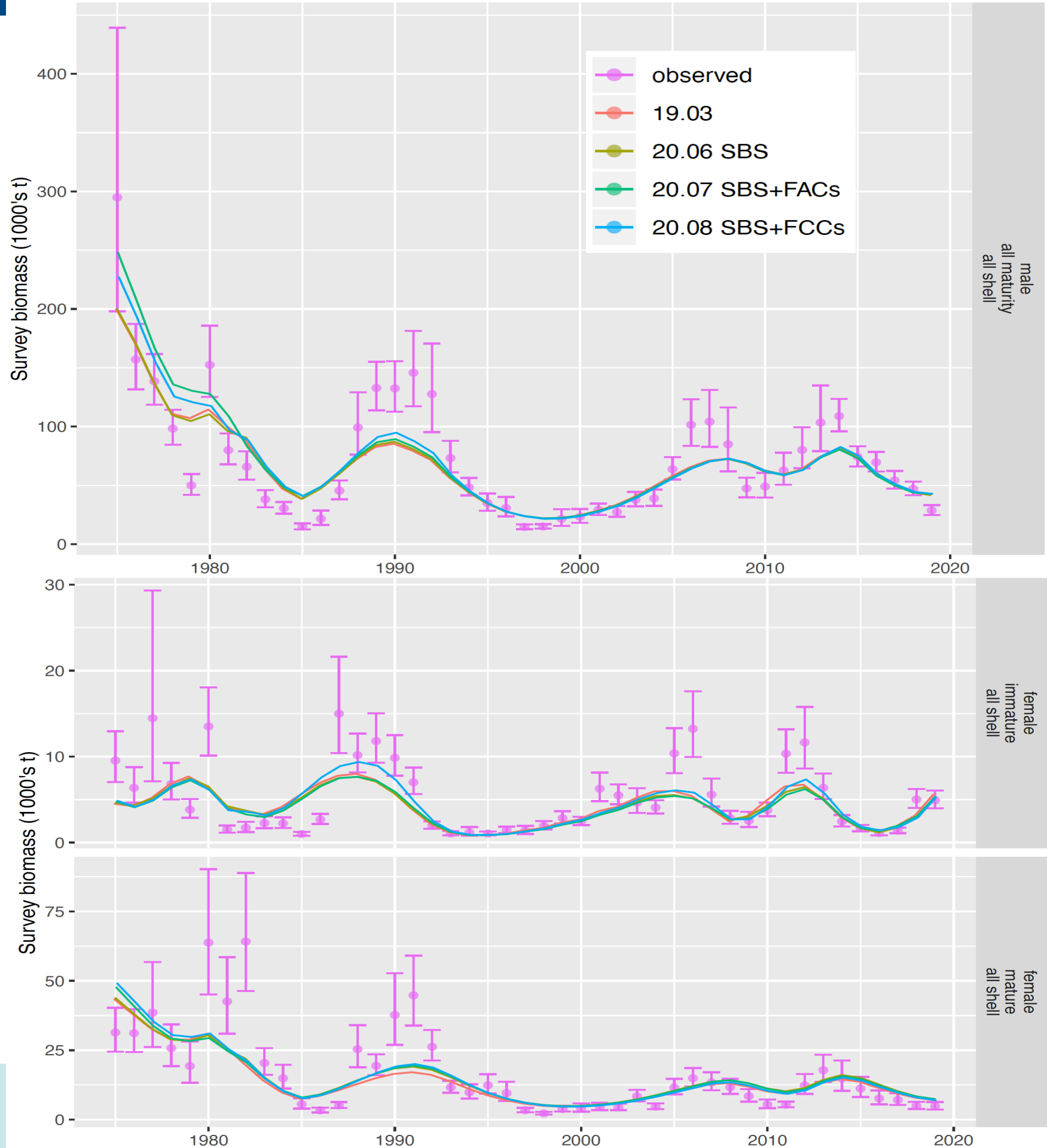


Models incorporating SBS Data

20.06, 20.07, 20.08



Fits to NMFS EBS Survey Biomass



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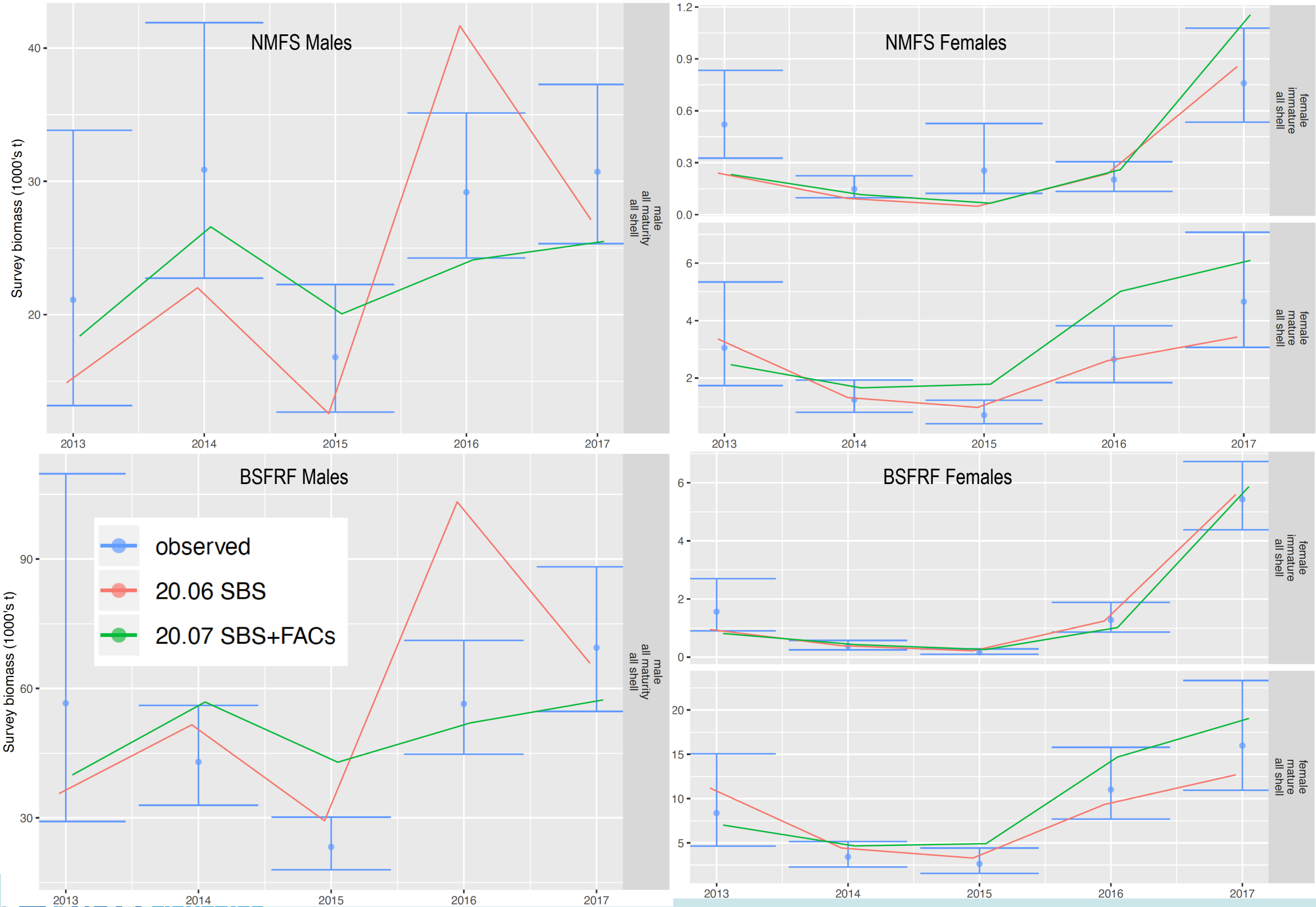
Fits to SBS Survey Biomass



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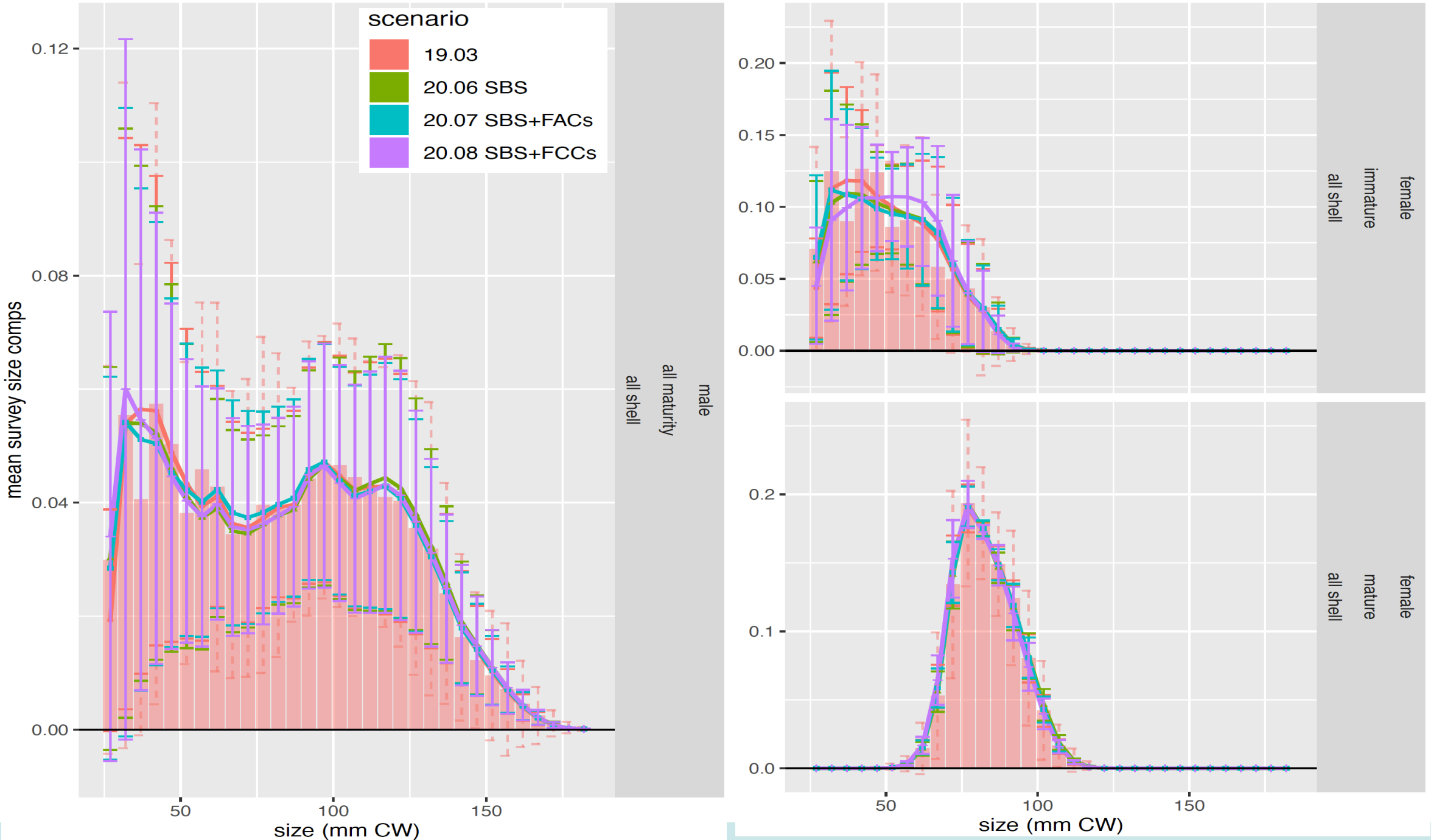
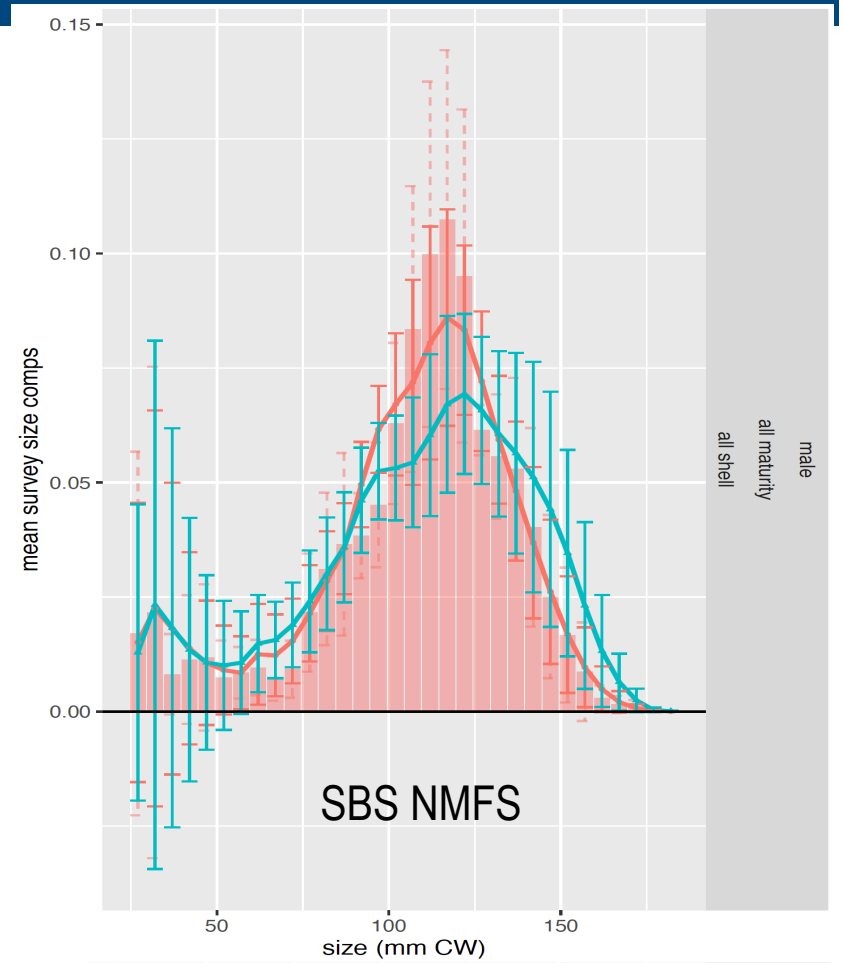
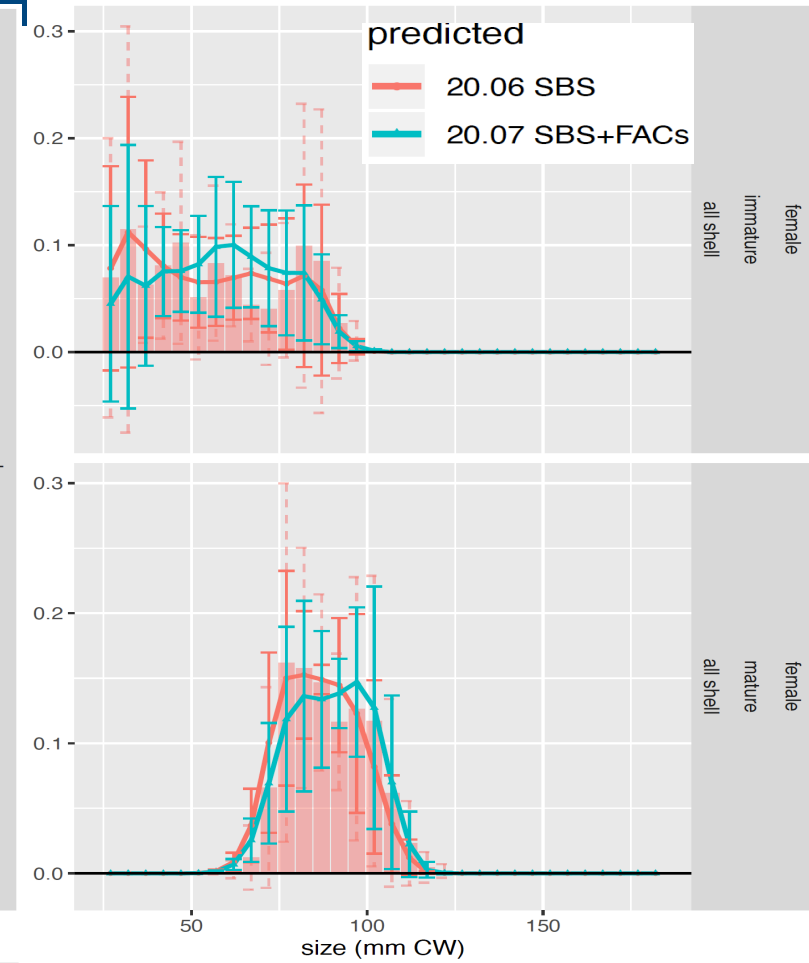
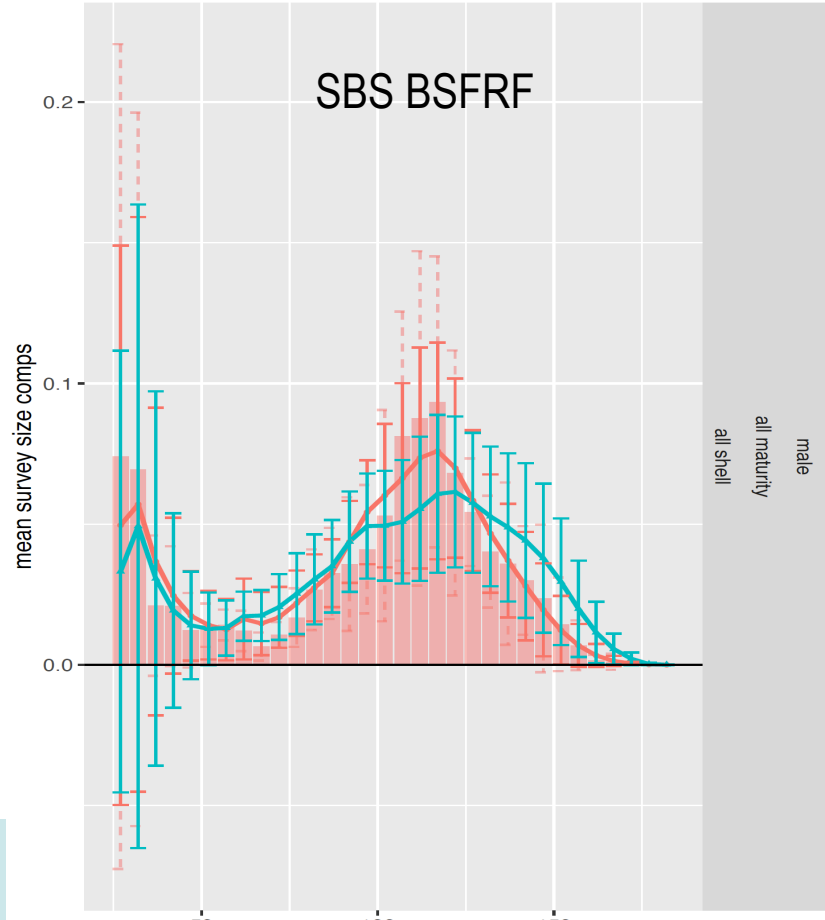
Fits to Mean Survey Size Compositions

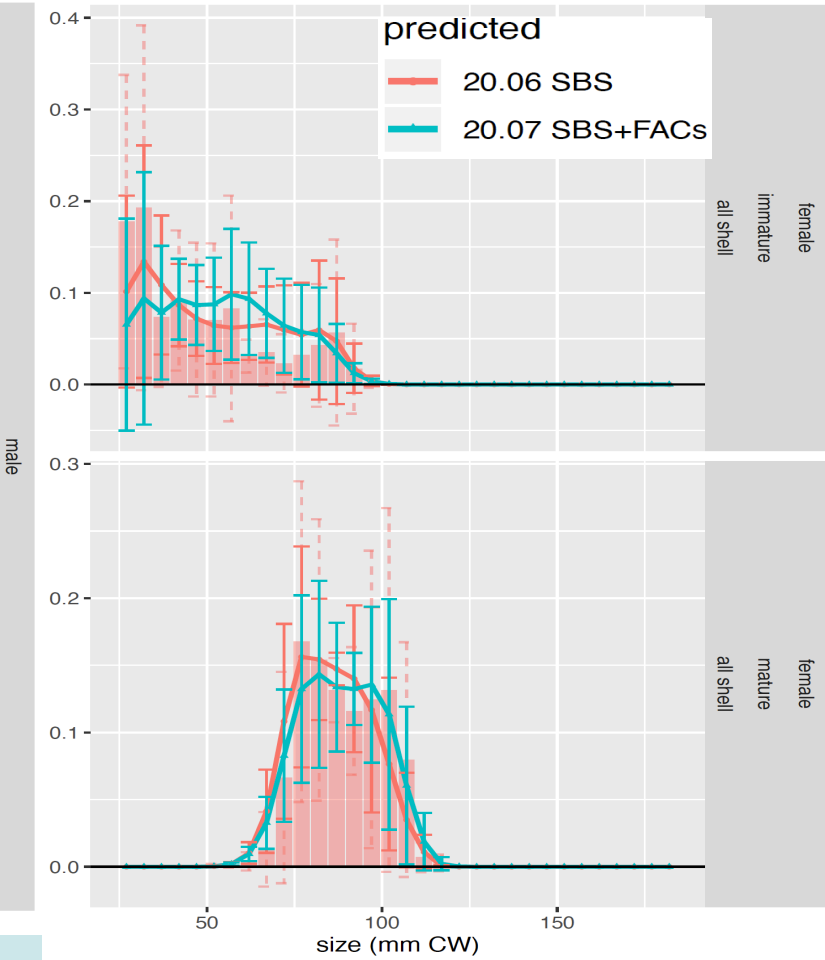


Fits to Mean Survey Size Compositions









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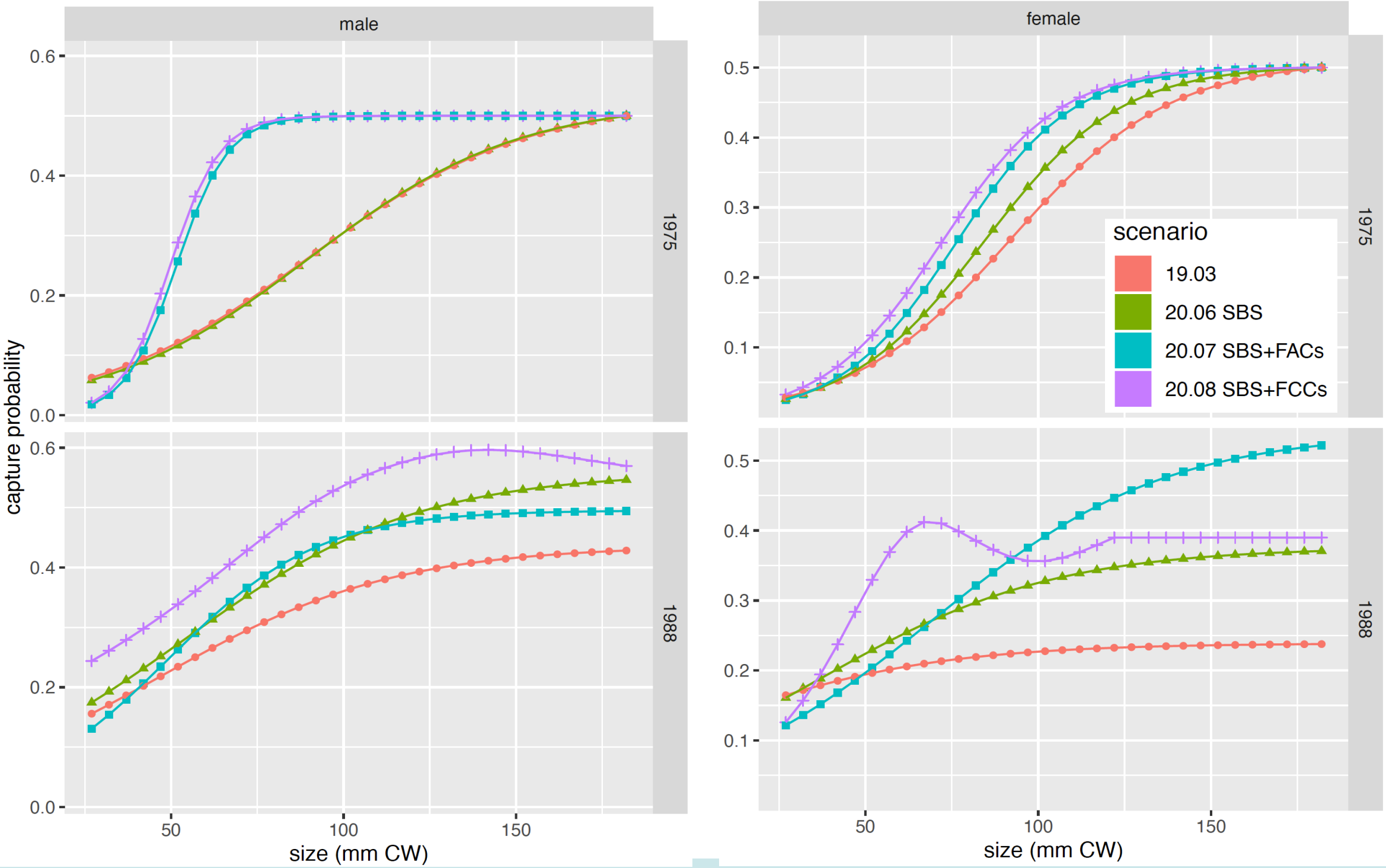
Estimated NMFS EBS Survey Catchabilities



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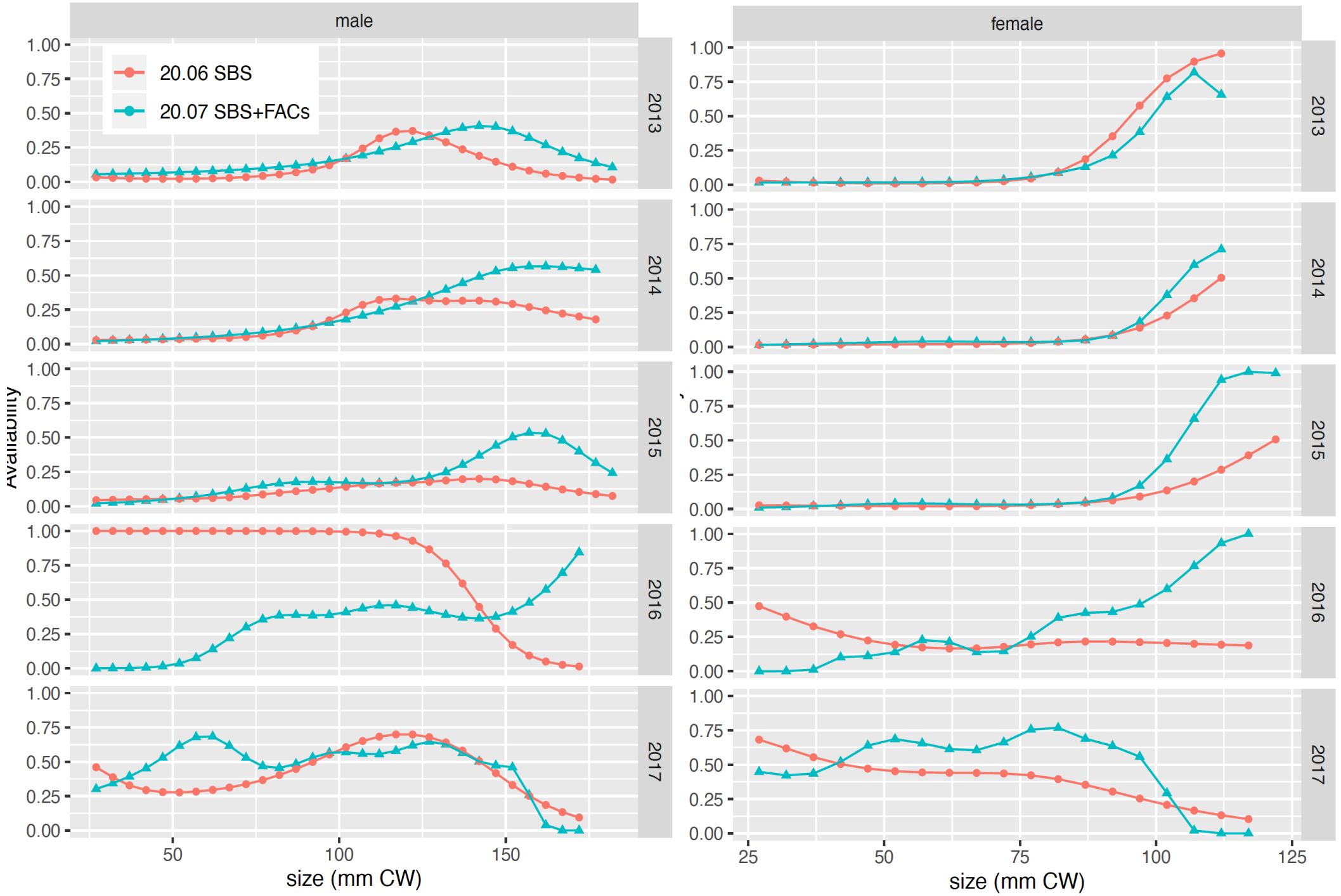
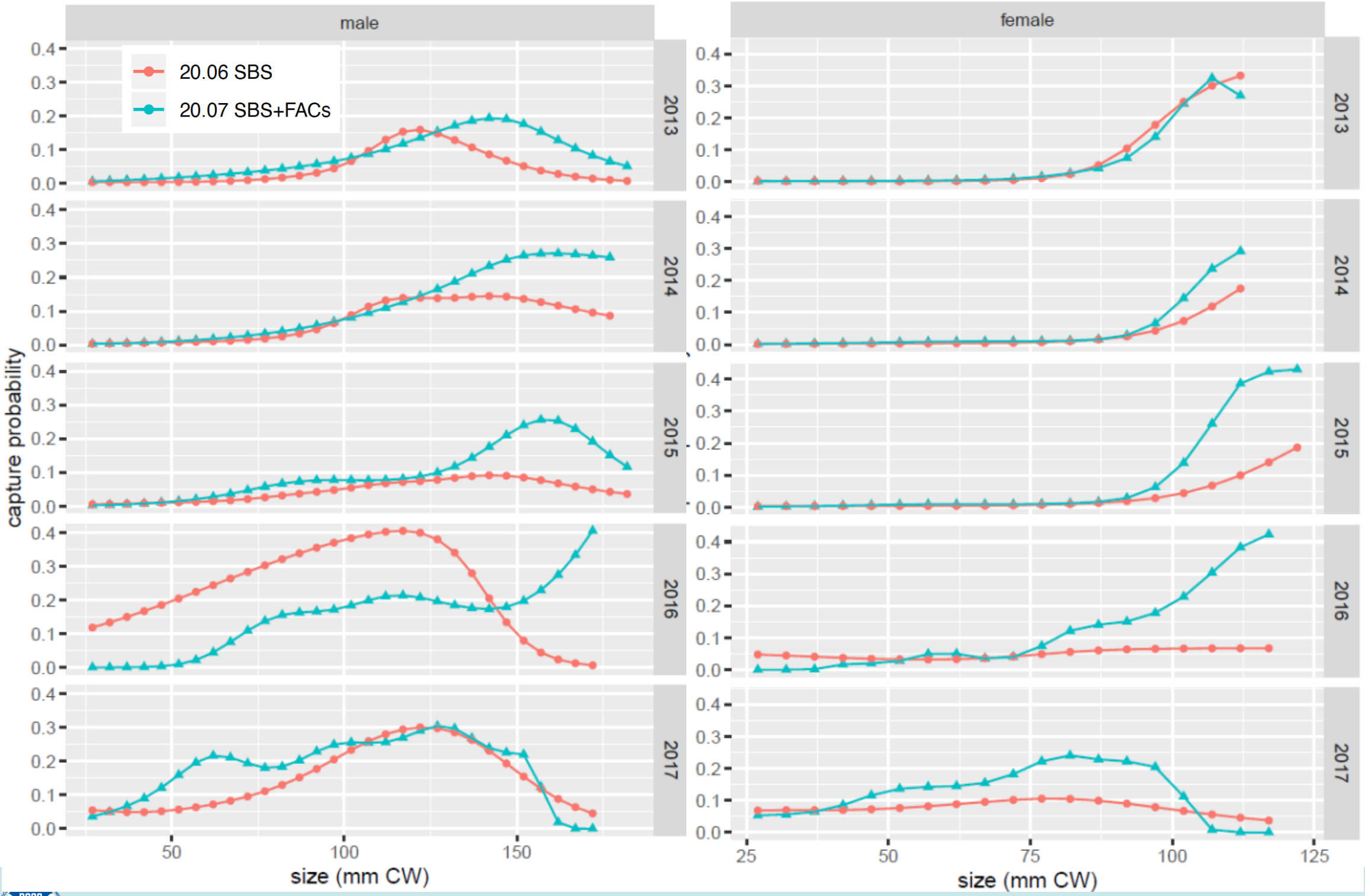
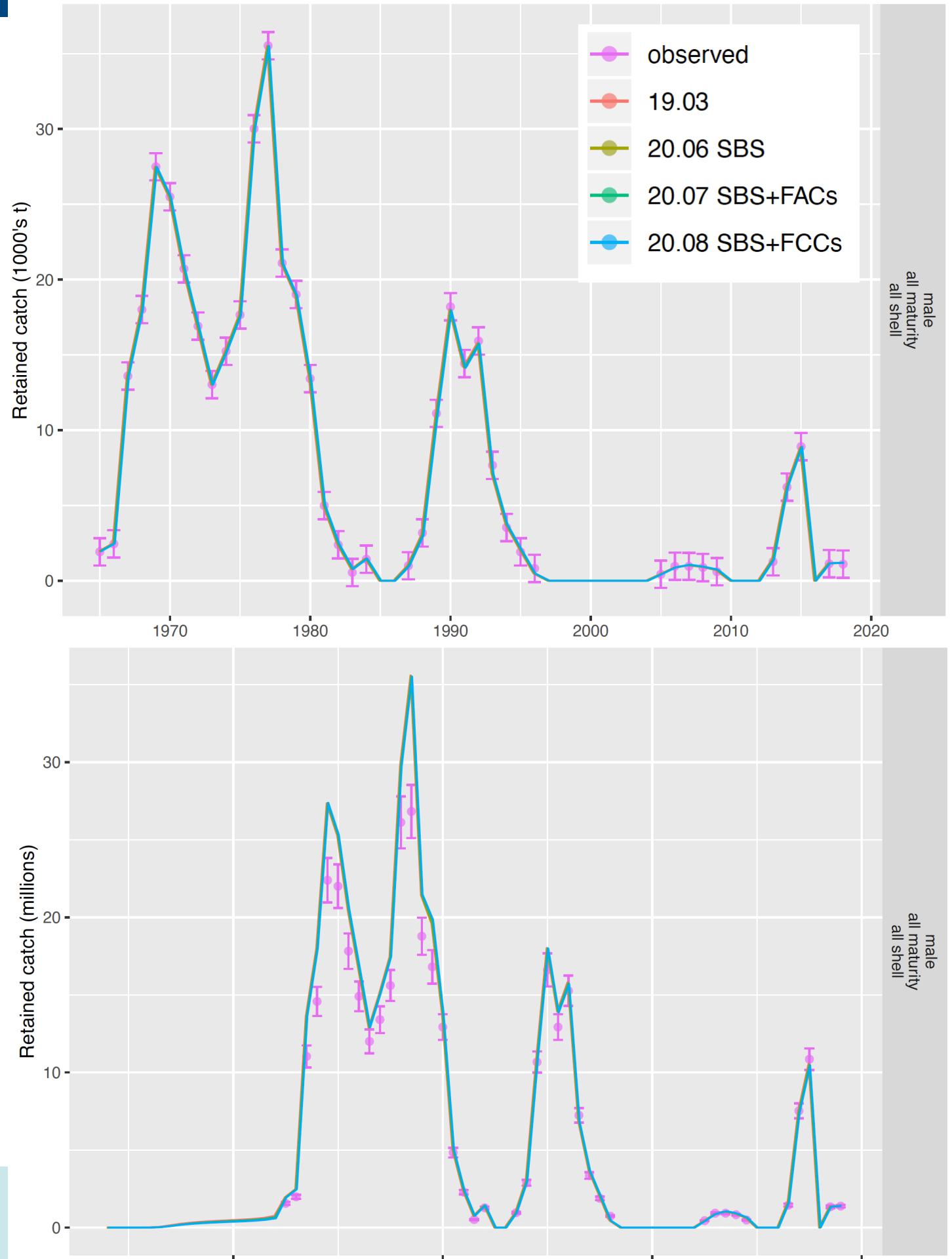
Estimated SBS Survey Availabilities



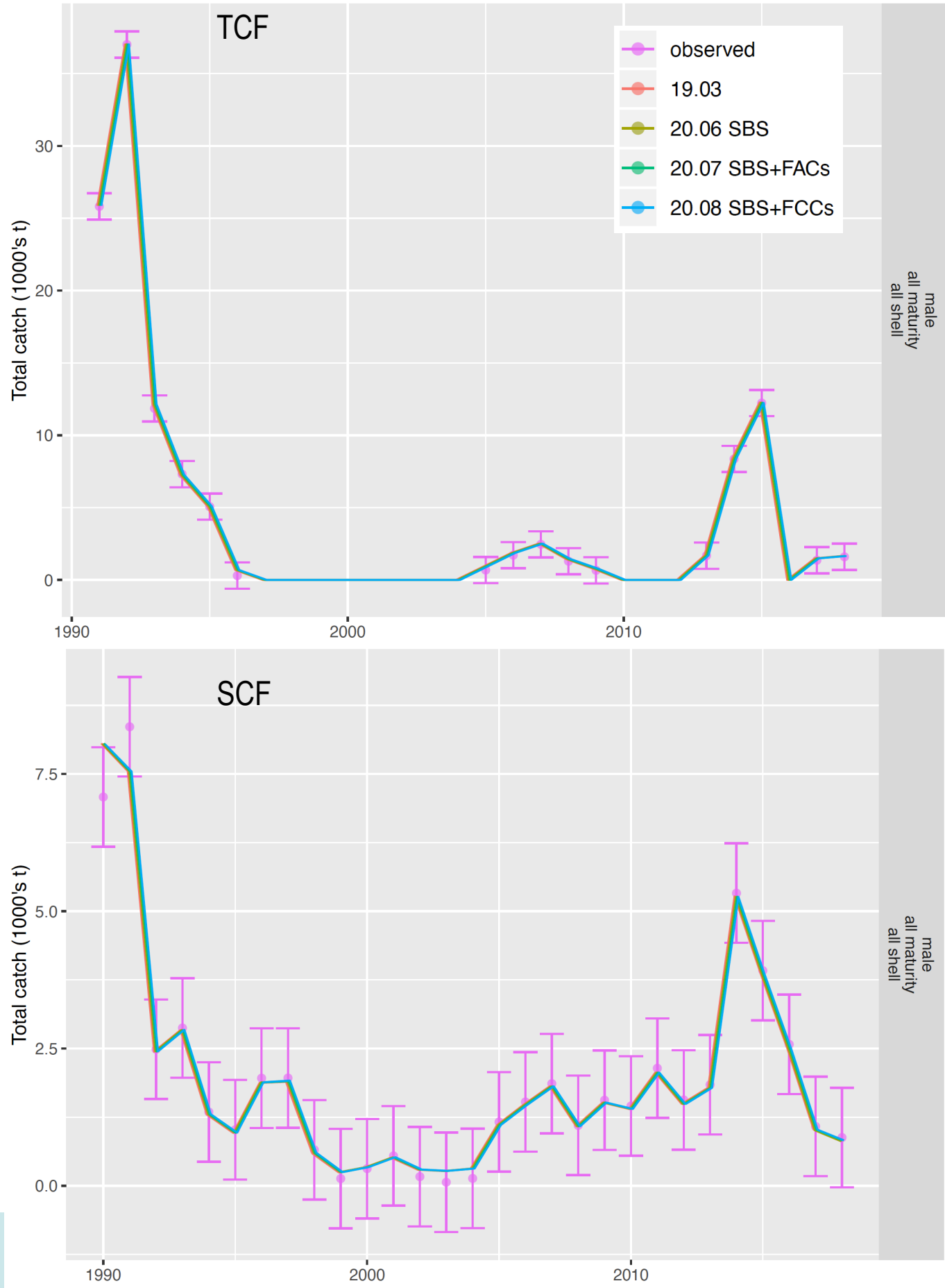
Estimated NMFS SBS Survey Catchabilities



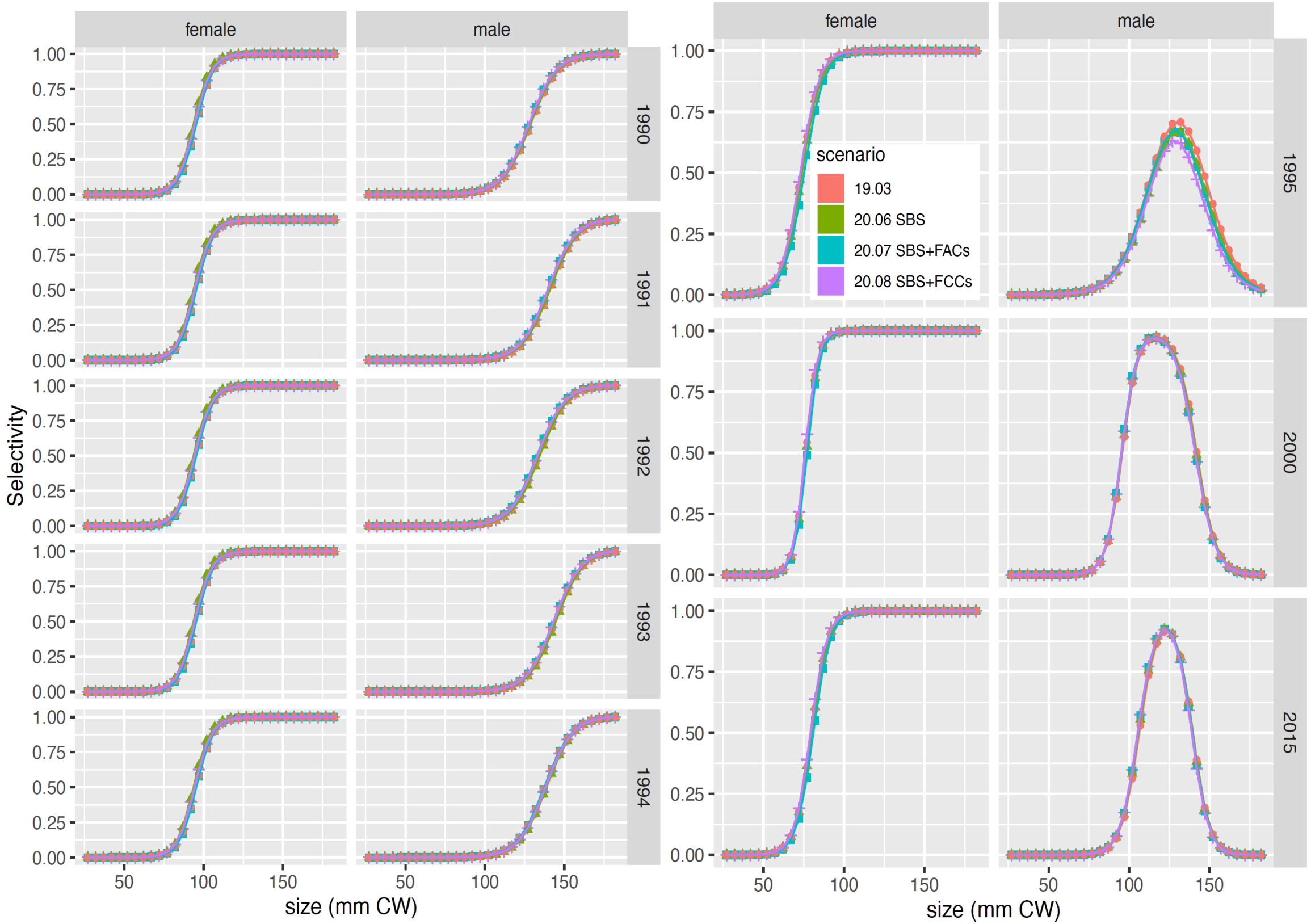
Fits to Retained Catch



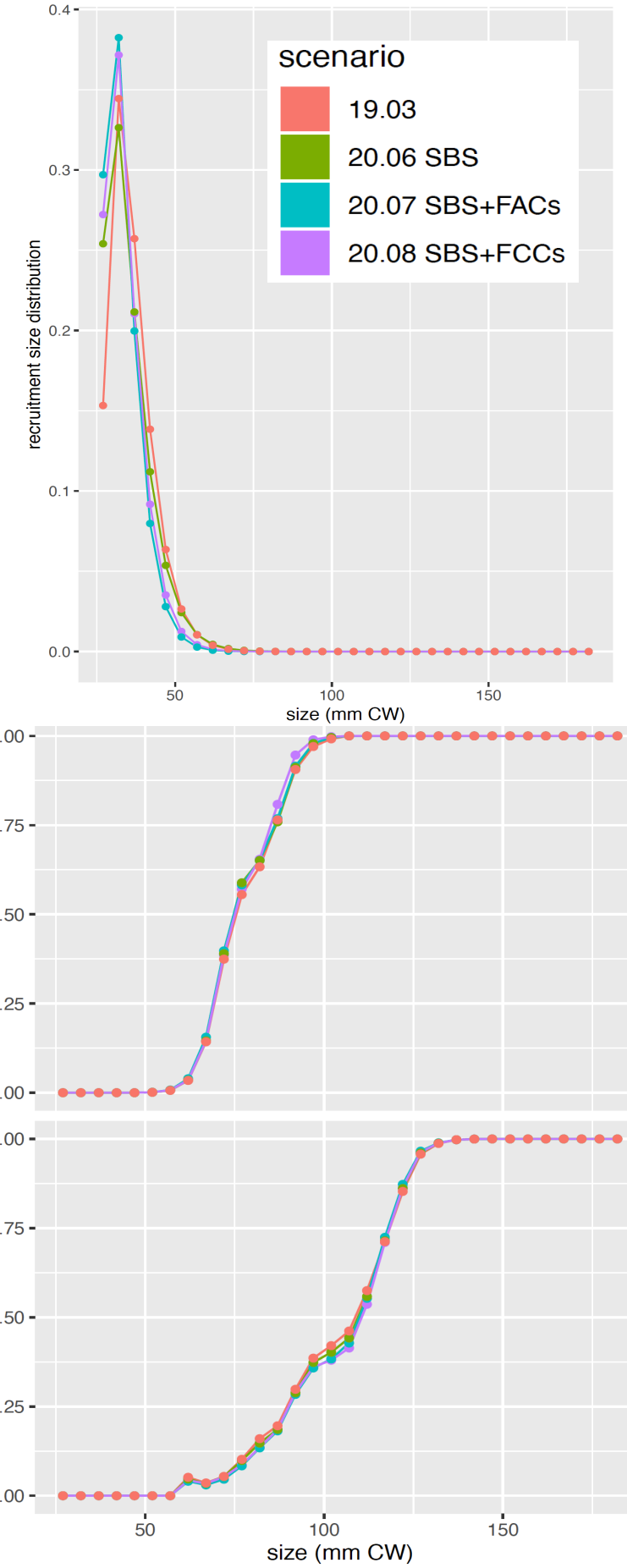
Fits to Total Catch

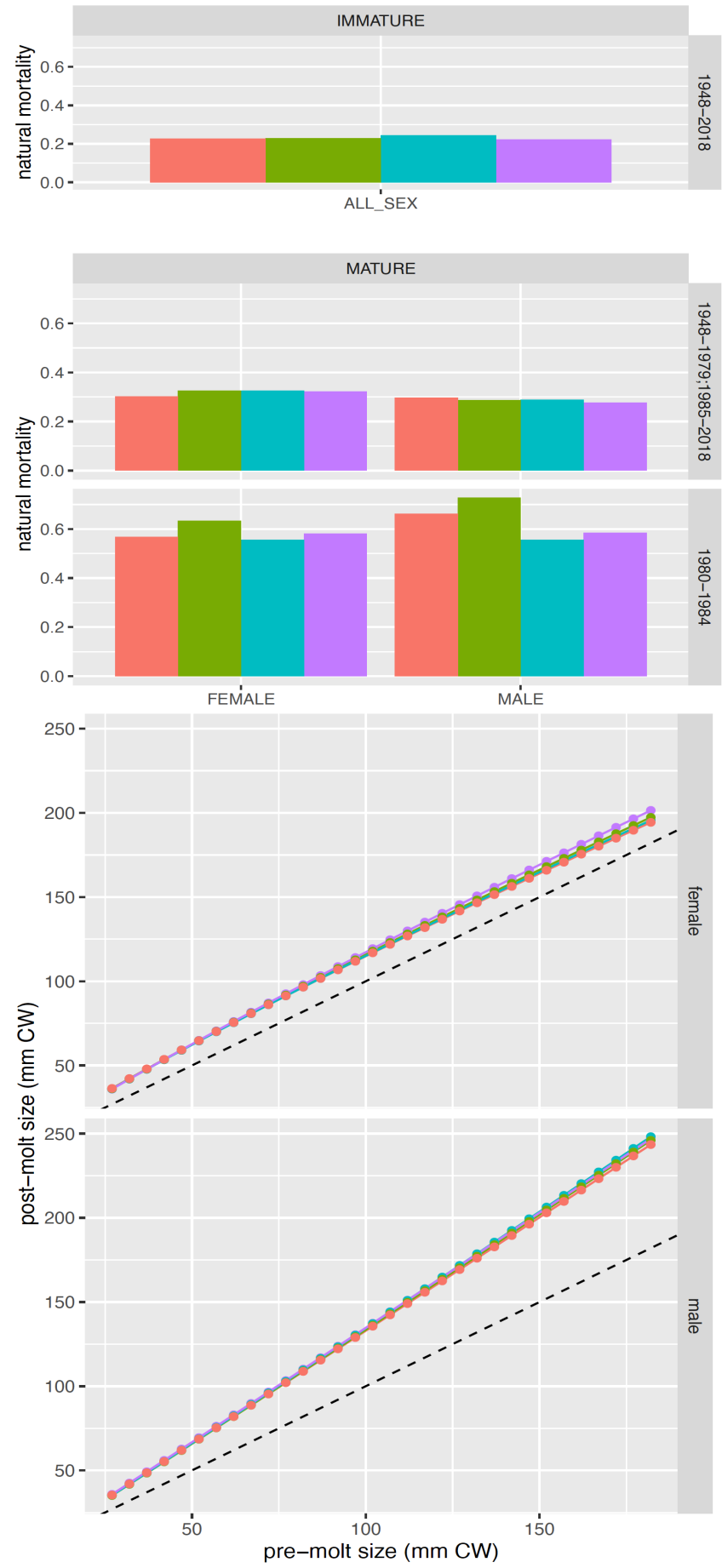


Estimated Fishery Catchabilities



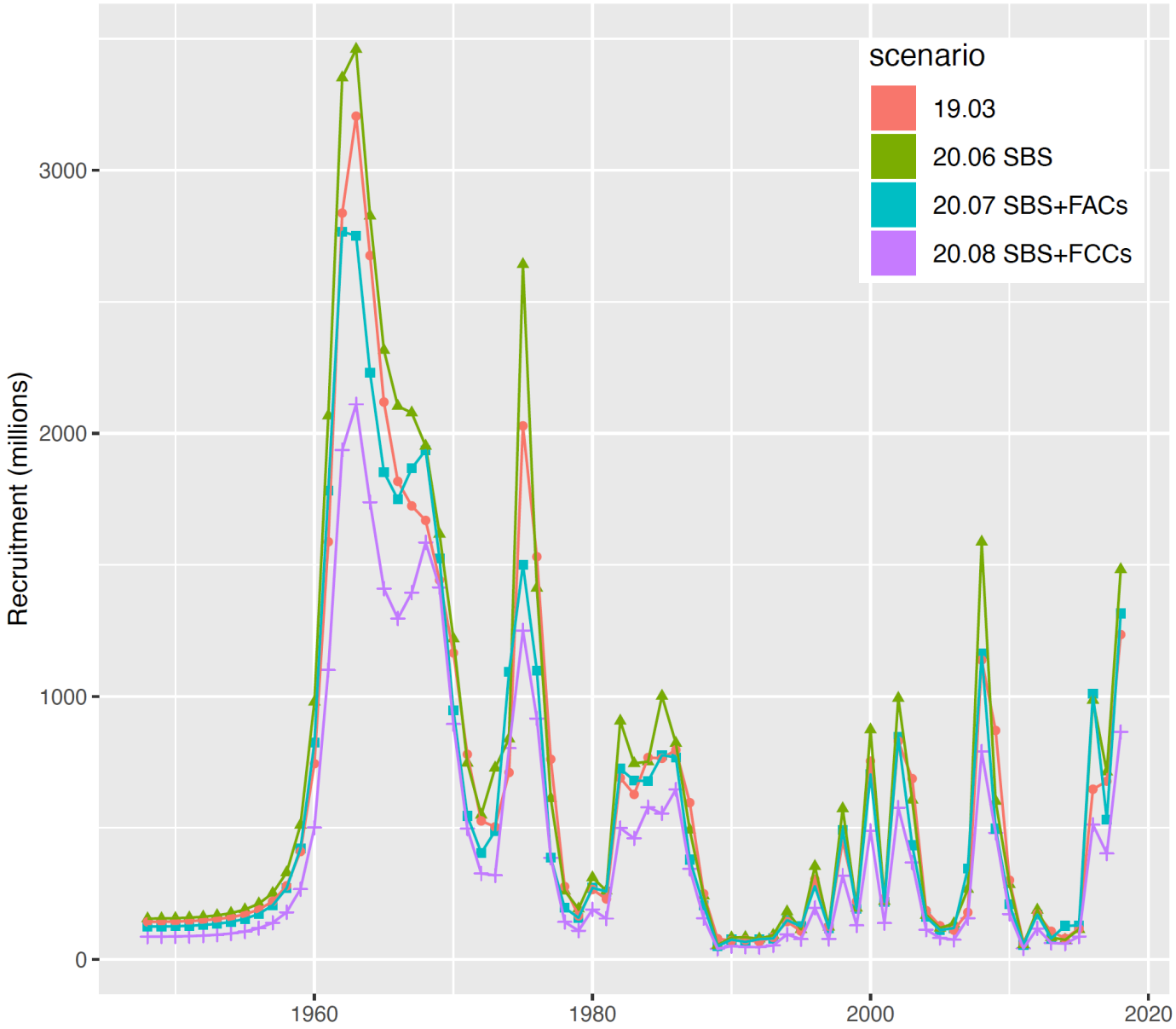
Estimated Population Processes

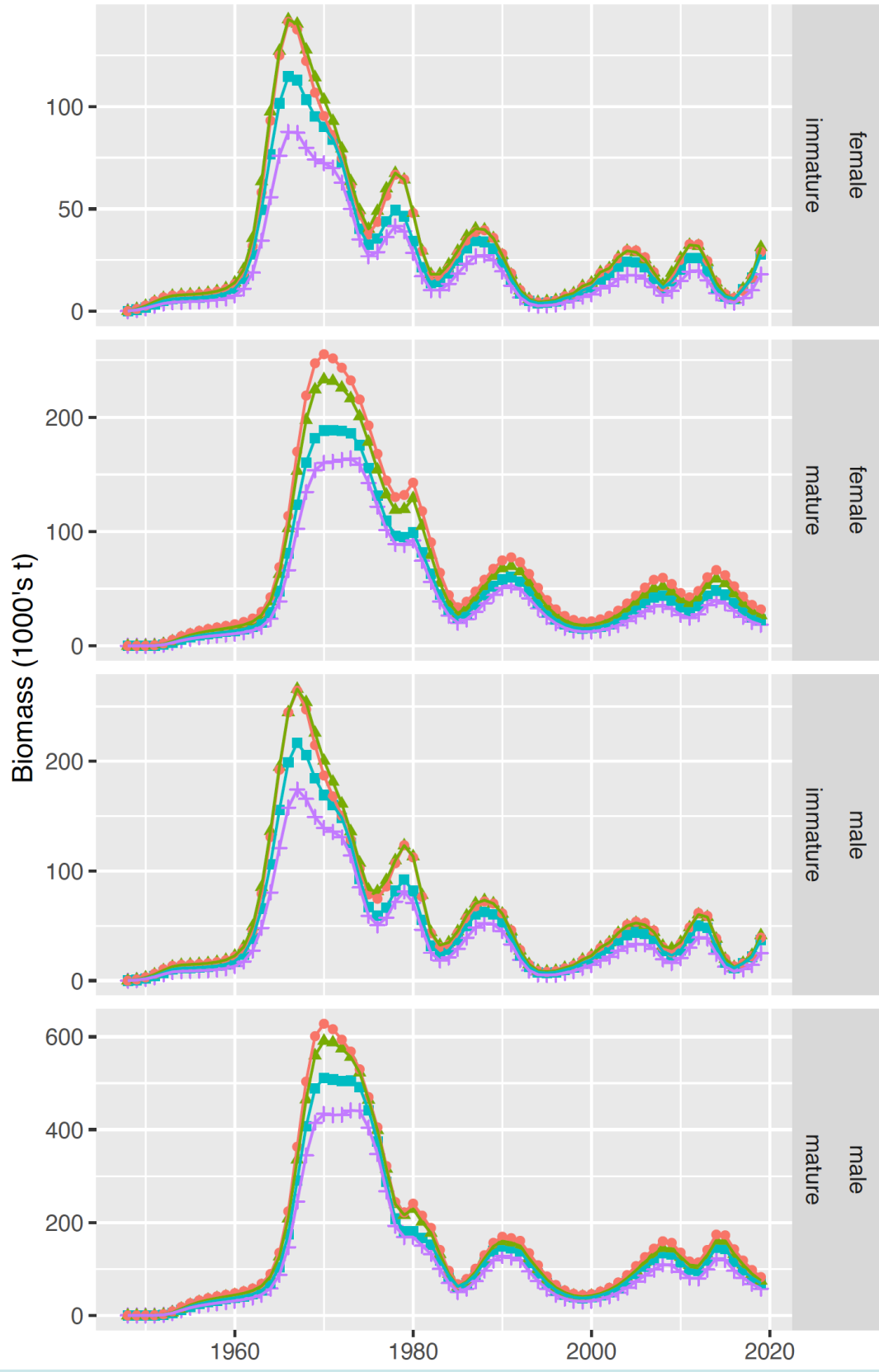




NOAA FISHERIES

Estimated Population Time Series





Recommended Scenarios for Fall 2020

- 19.03 (the 2019 assessment model updated with 2019/2020 data)
- 20.01 (19.03 + estimating the recruitment size distribution)
- 20.04* (20.01 [not 19.03] + VAST model-based survey biomass estimates)
- 20.06 (20.01 + SBS BSFRF and NMFS data)
- 20.07 (20.01 + SBS BSFRF data and fixed availability curves)