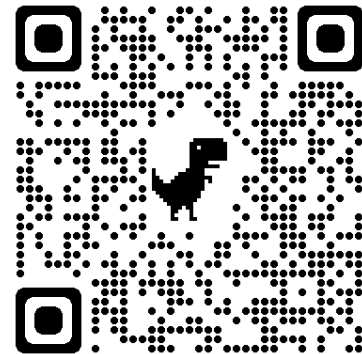


# EBS PACIFIC COD

Steven J. Barbeaux, Lewis Barnett, Jason Connor,  
Julie Nielson, S. Kalei Shotwell, Elizabeth Siddon,  
and Ingrid Spies



May 9, 2023

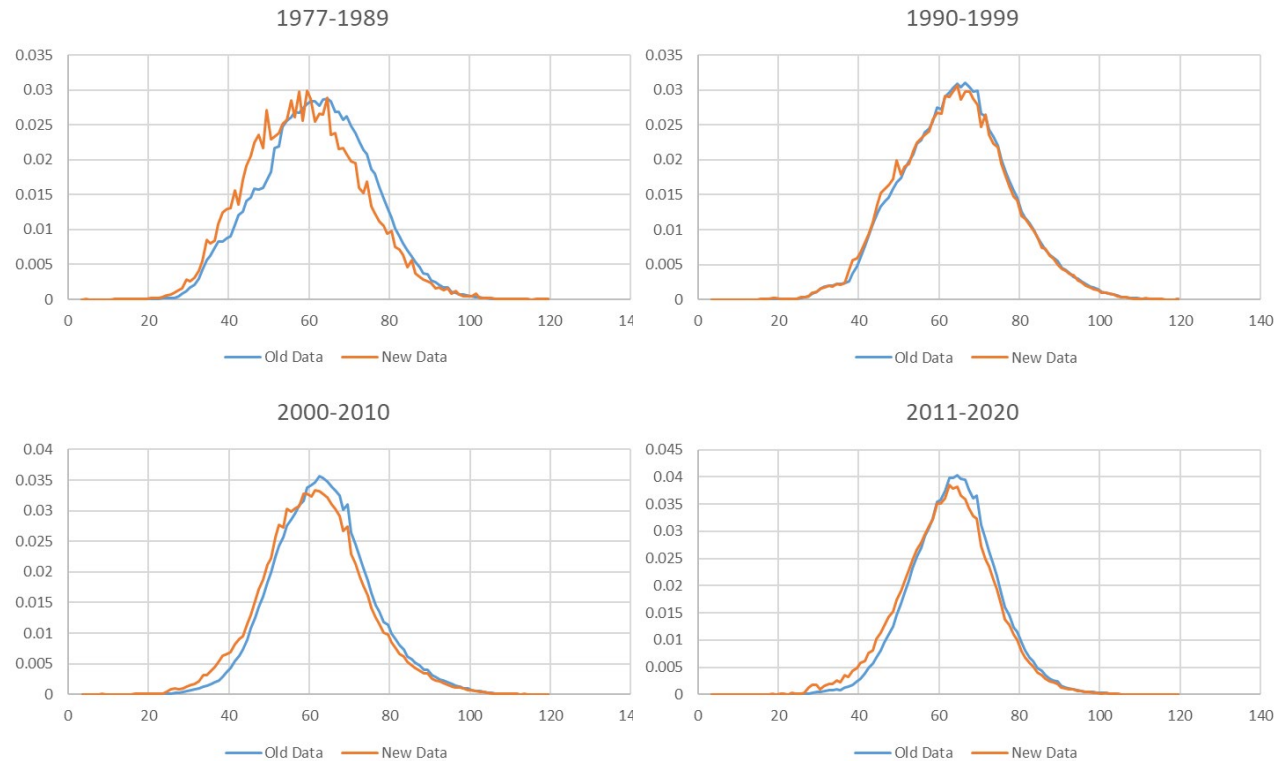


**NOAA**  
FISHERIES

# DATA CHANGES FISHERY LENGTH COMPOSITION



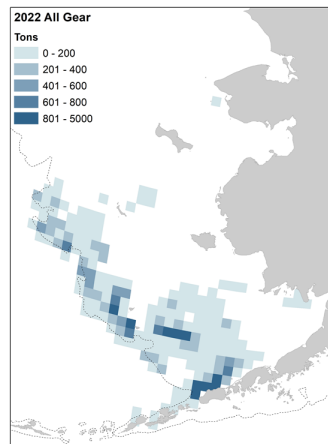
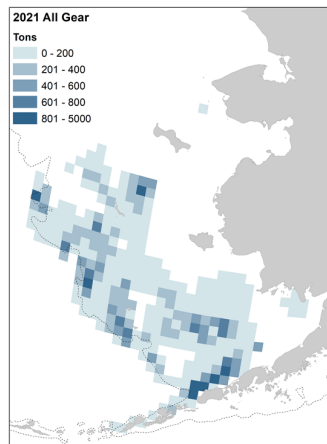
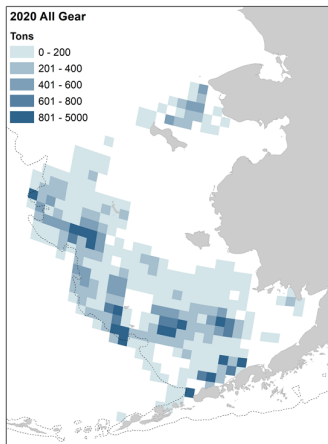
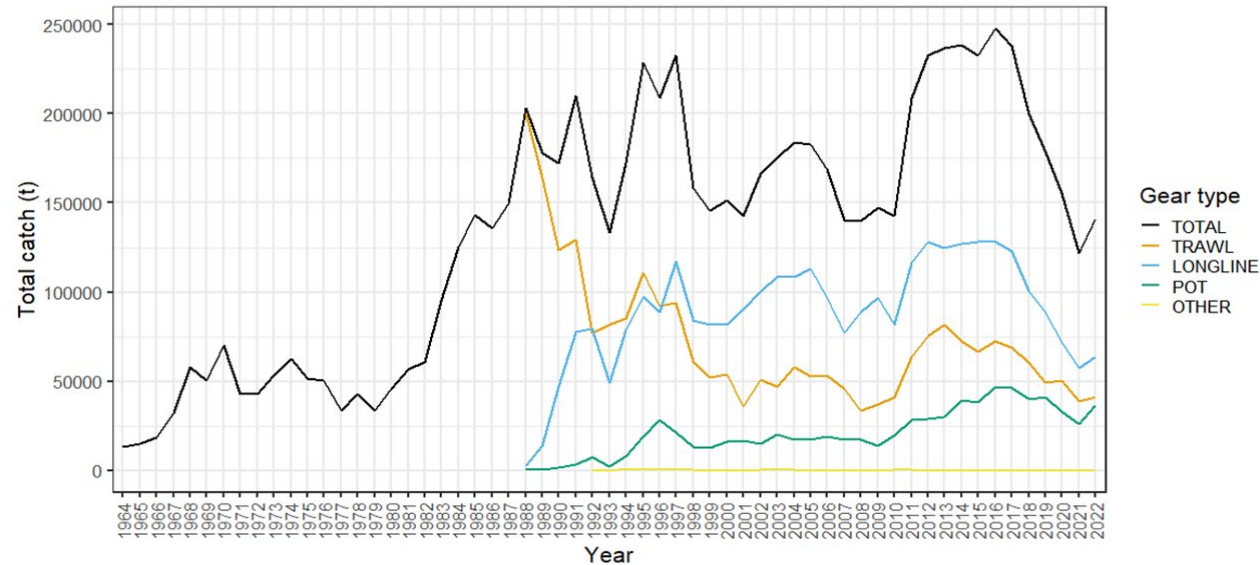
- New algorithm for constructing fishery length composition (described in September)
- Data weighted by haul, vessel, gear, month, NMFS area, and year
- Resulted in shift to more small fish in distribution



# CATCH – FISHERY SECTOR



- Increase in catch from 2021 but lower than 10-year average
- Longline remains dominant
- Continued increasing trend in pot proportion and decreasing trend in trawl proportion

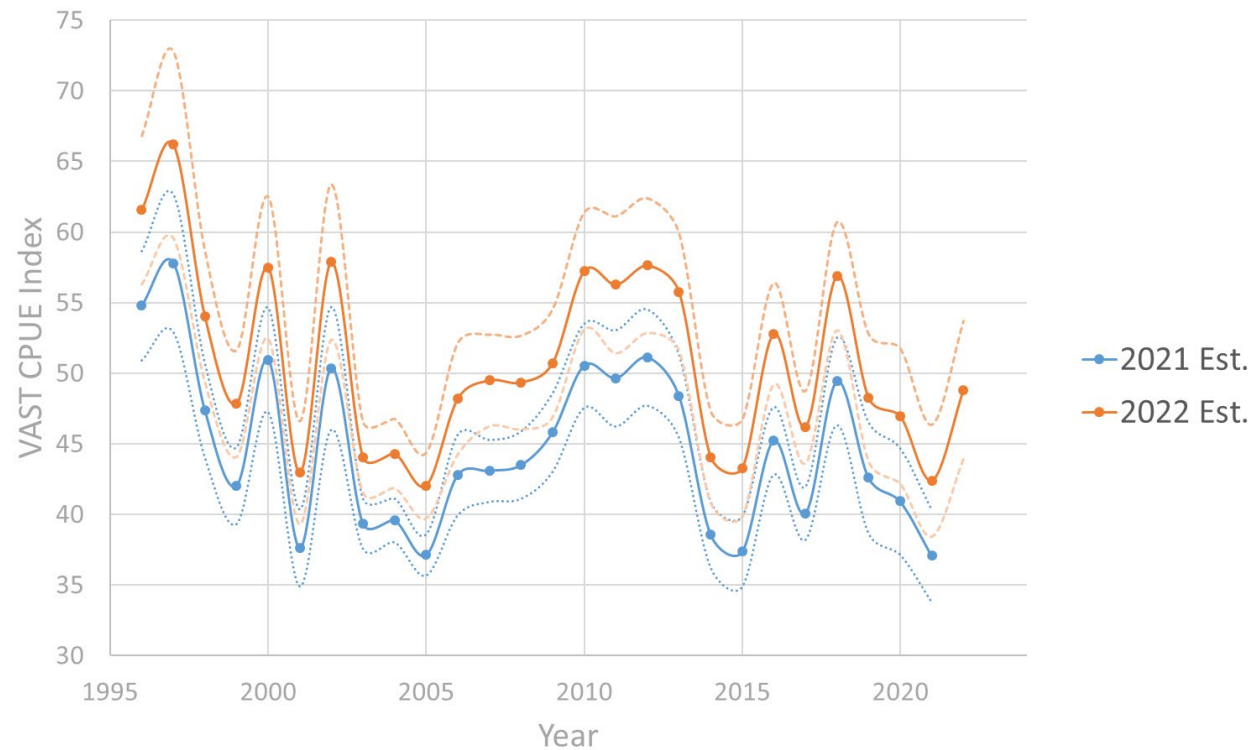


- Southwestward shift in center of gravity
- Low level of fishing in NBS



# VAST CPUE INDEX – JAN.-FEB. LONGLINE FISHERY

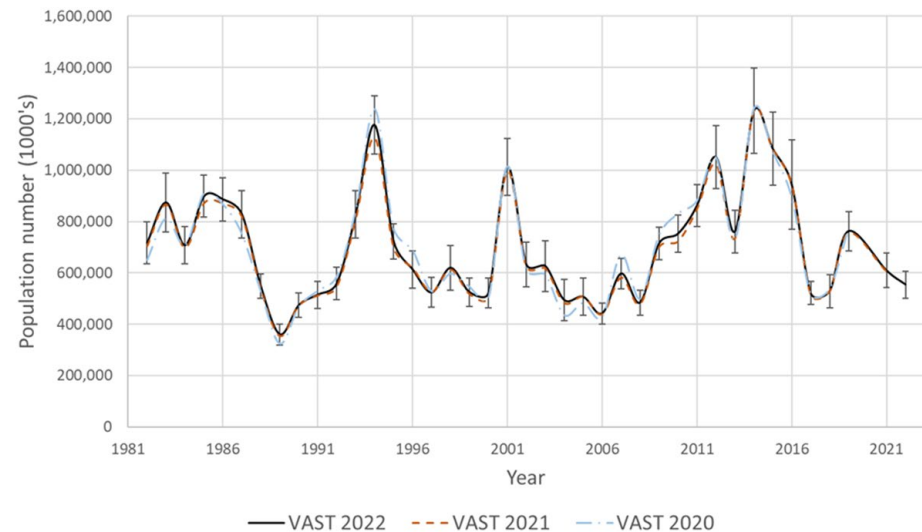
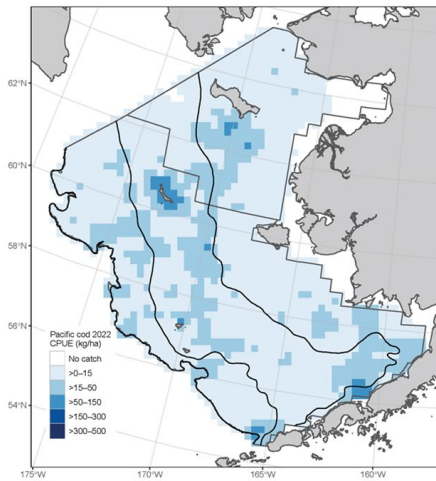
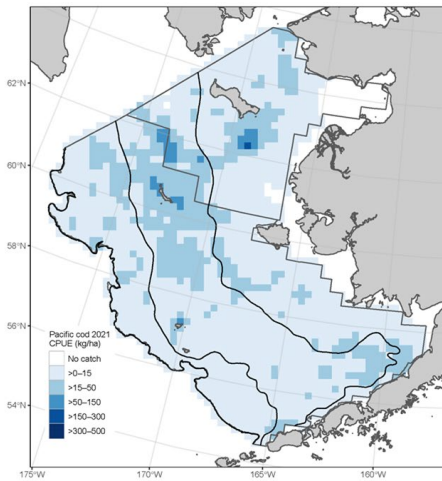
- Difference in spatial extent resulted in overall inflation of index
- Trend remains the same with high correlation between indices
- 15% Increase in 2022 from 2021



# VAST SURVEY INDEX – BERING SEA SHELF BOTTOM TRAWL



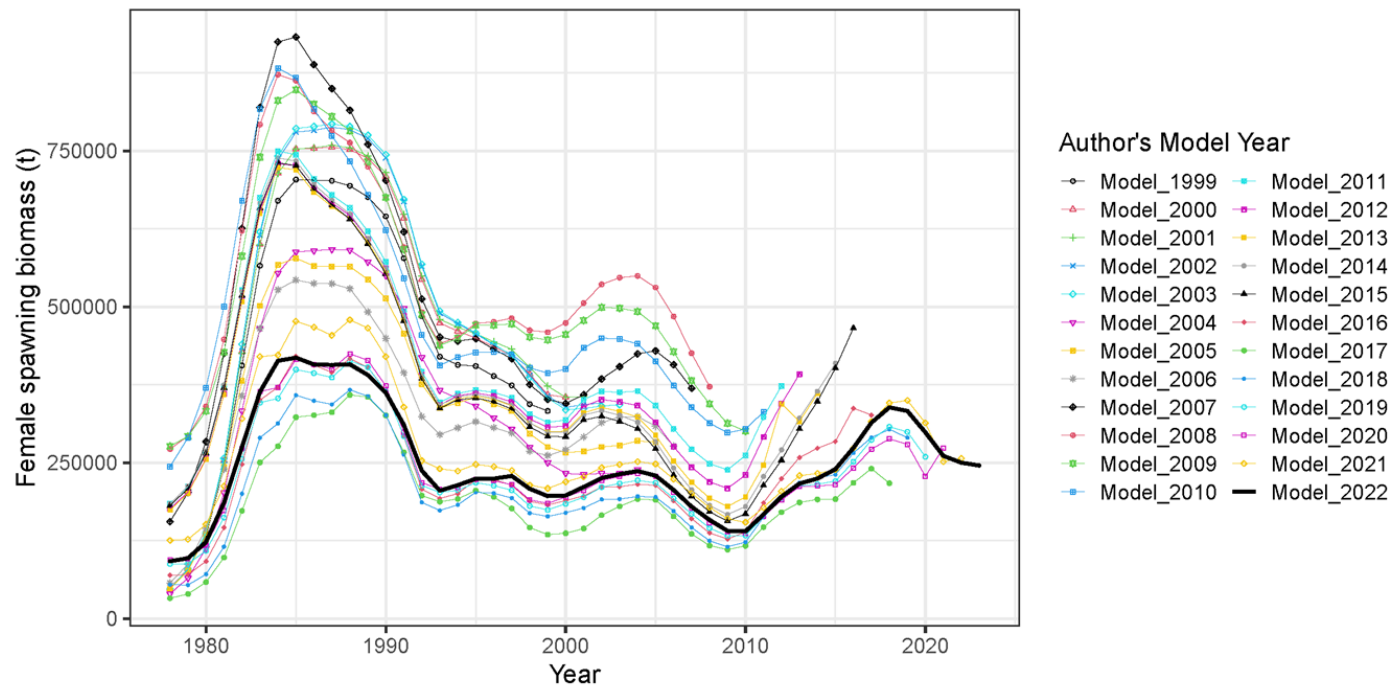
- Southeastward shift in center of gravity
- Small changes in time series from previous years
- Overall drop in abundance (VAST -8.9% from 2021)



# STOCK ASSESSMENT MODELS



- Diverse set of models over the past 24 years
- Current base model is an ensemble of 4 models



# MODEL CONFIGURATIONS



Thompson Series models	M 19.12	M 19.12A	M 21.1	M 21.2
New Series models	M 22.1	M 22.2	M 22.3	M 22.4
Feature 1: Allow catchability to vary?	YES	NO	NO	NO
Feature 2: Allow domed survey selectivity?	NO	NO	YES	NO
Feature 3: Use fishery CPUE?	NO	NO	NO	YES

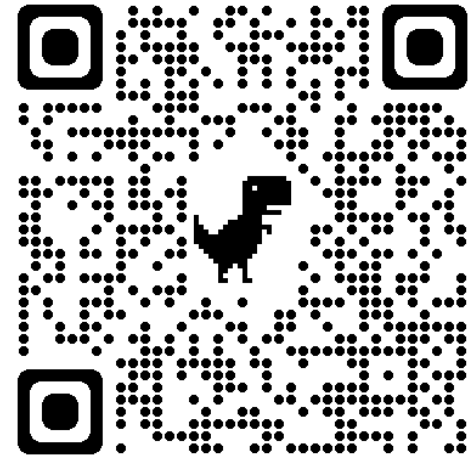
New Series models - Same as Thompson Series models except

- Seasonally corrected annual weight-at-length adjustments removed
- Post-2007 aging bias block removed
- Although minor model changes, substantial changes in data processing resulting in model name changes for this year.

# MODEL FITS



- Exploration of individual models and their fits can be found at the link provided
- Model fits and results were nearly identical between the Thompson and New Series models
- Largest difference was the fit to the age composition data with a degraded fit due to the removal of the post-2007 aging bias



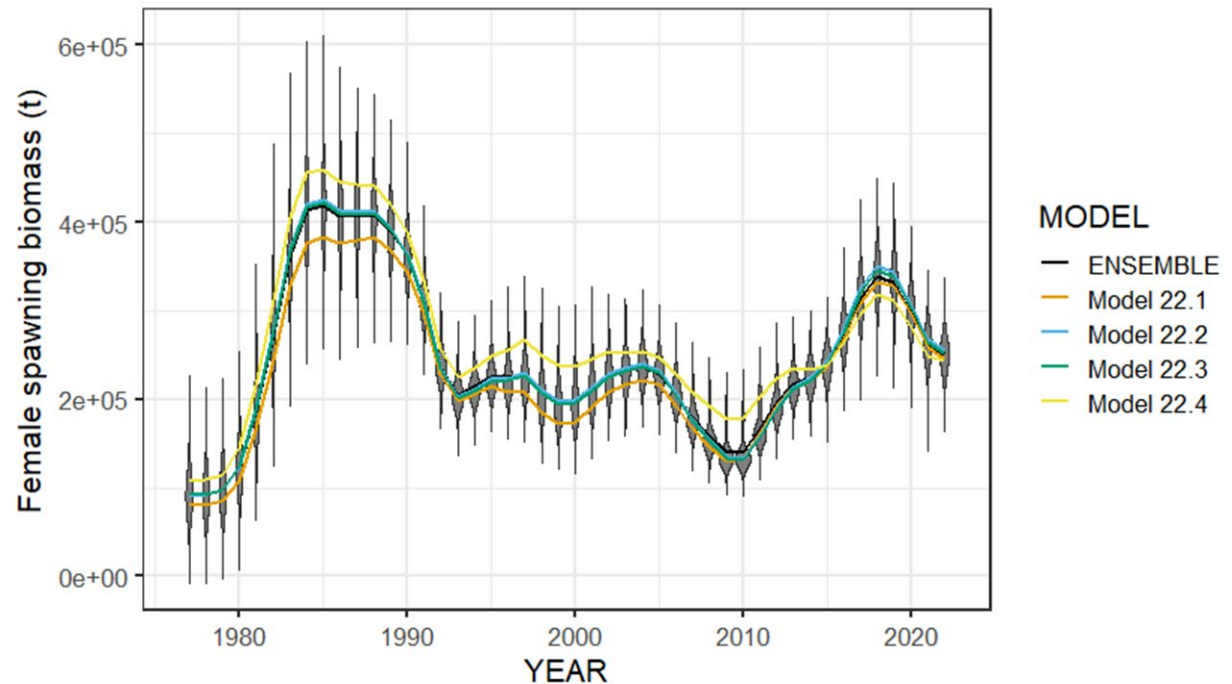
[https://afsc-assessments.github.io/EBS\\_PCOD/2022\\_ASSESSMENT/NOVEMBER\\_MODELS/](https://afsc-assessments.github.io/EBS_PCOD/2022_ASSESSMENT/NOVEMBER_MODELS/)



# NEW SERIES RESULTS – FEMALE SPAWNING BIOMASS



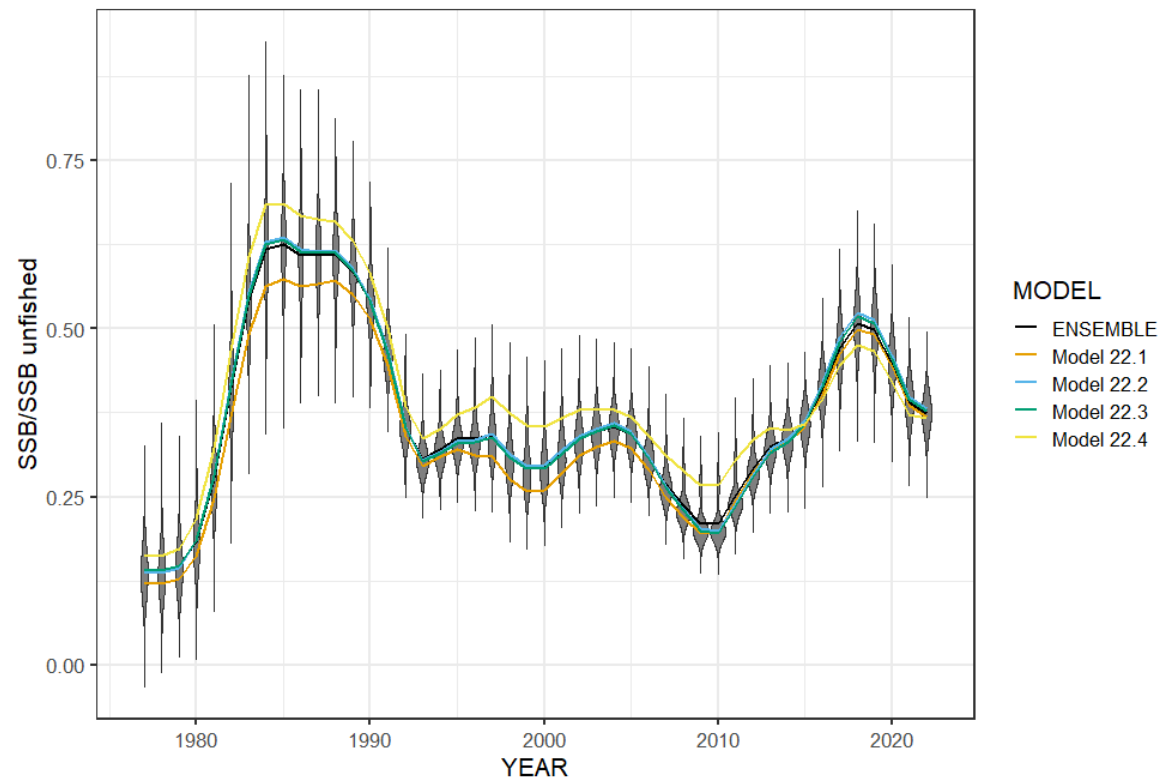
- All four models show reduction from 2018 high point.
- Model 22.4 with CPUE index indicates higher SSB earlier in the time series and lower in most recent



# NEW SERIES RESULTS – FEMALE SPAWNING BIOMASS



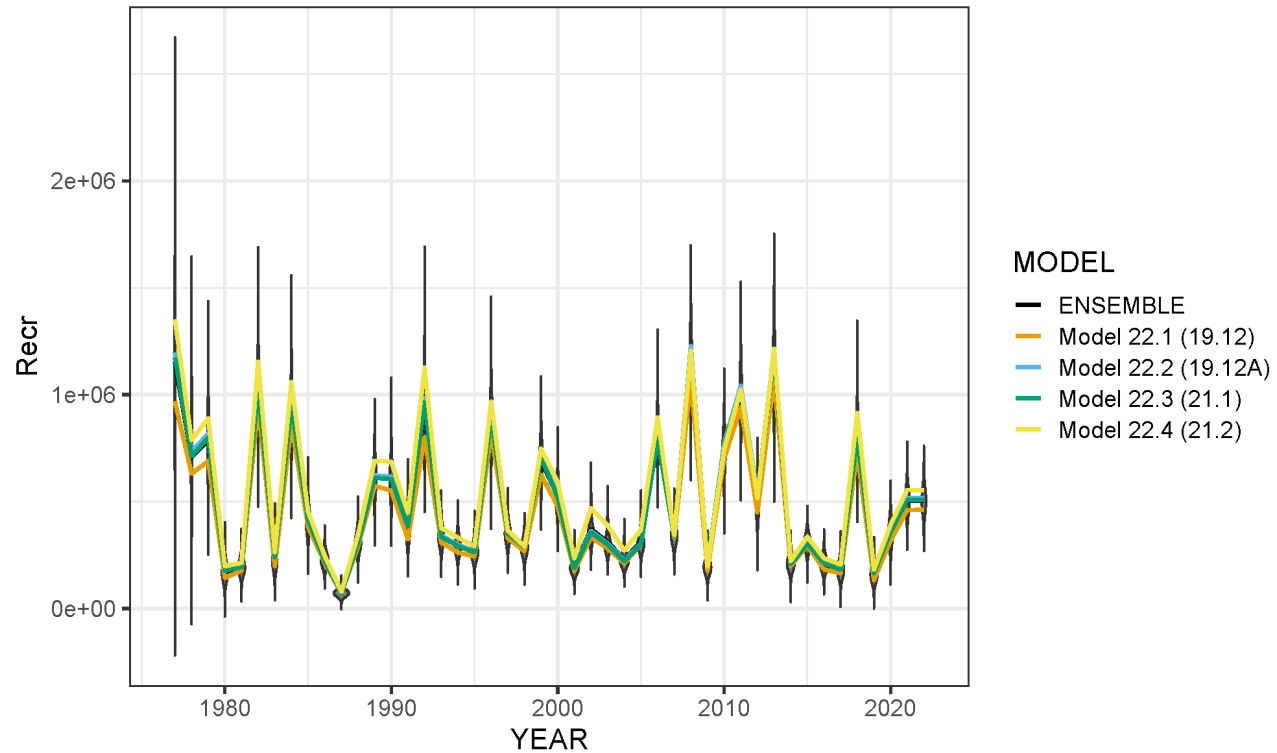
- High point in the mid to late 1980s
- Low point in 2010 at  $B_{21\%}$
- Currently below  $B_{40\%}$



# NEW SERIES RESULTS – AGE-0 RECRUITMENT



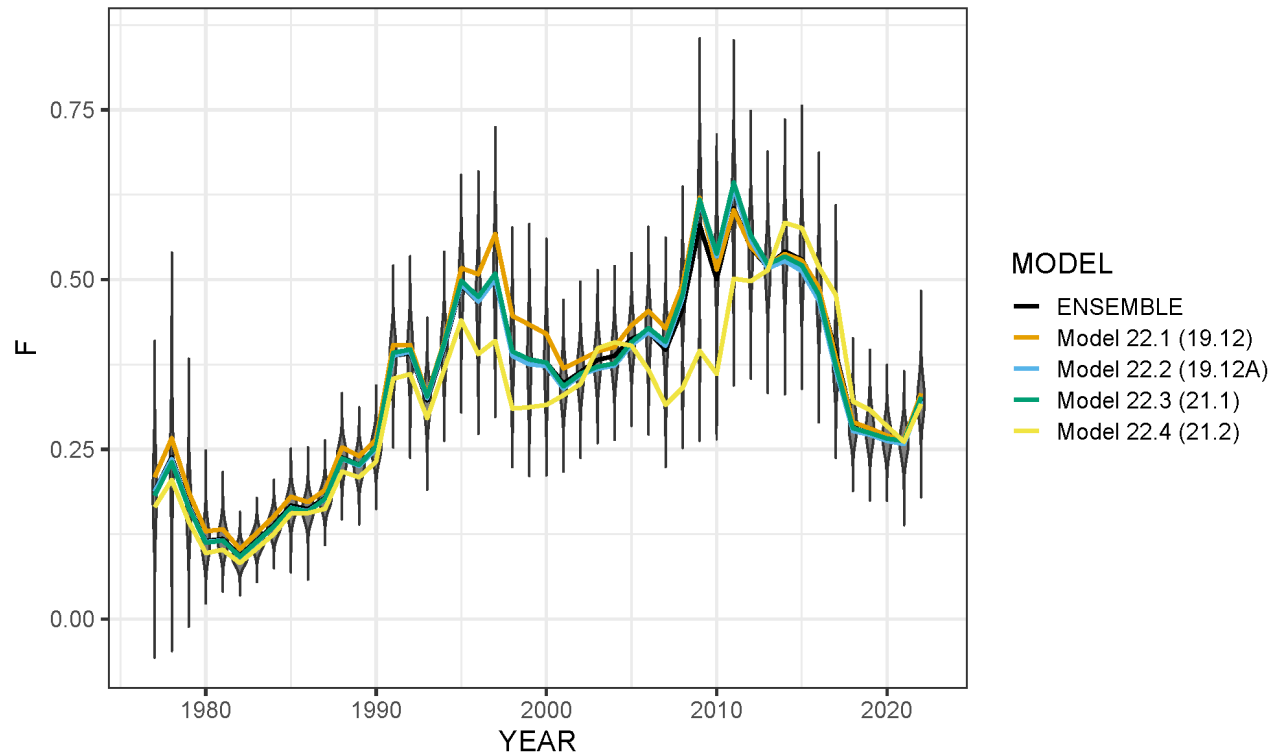
- Large 2018 year class
- 2014-2017, 2019, and 2020 estimated to be below average
- 2021 and 2022 set at  $\sim R_0$  as not yet well defined in the data.



# NEW SERIES RESULTS – APICAL FISHING MORTALITY



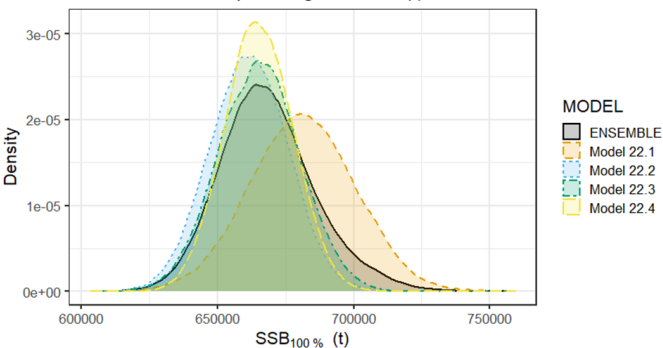
- High fishing mortality from 2008-2016 with dome-shaped survey selectivity
- Drop in  $F$  2017-2021 change to asymptotic survey selectivity.
- Increase in 2022 due again to change in model with ensemble



# HARVEST RECOMMENDATION – NEW SERIES ENSEMBLE

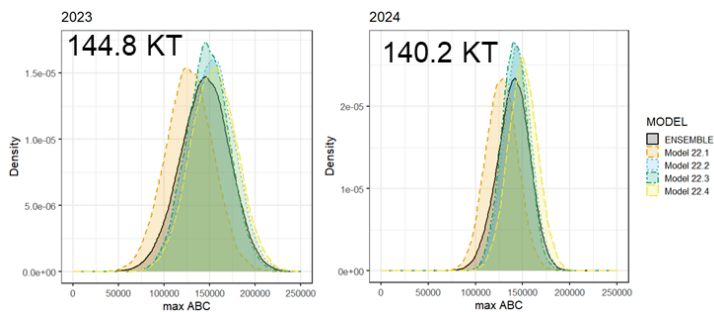


## Unfished SSB (t)

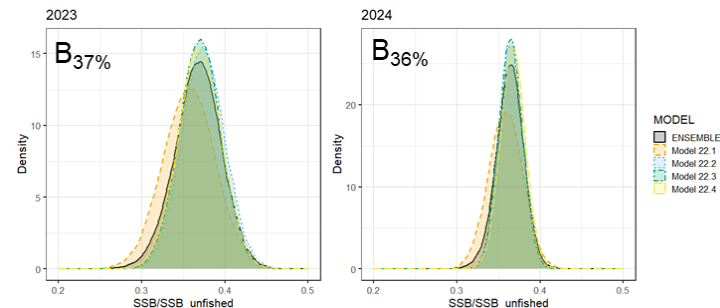


Year	Quantity	Last Year	New Series	Change
	$B_{100\%}$	686,761	668,477	-2.70%
2023	Tot Biom Age 0+	848,615	844,578	-0.50%
2023	$B_{2023}$	254,585	245,594	-3.50%
2023	$B_{\%}$	0.370	0.367	-0.80%
2023	$\max F_{ABC}$	0.310	0.293	-5.50%
2023	$\max ABC$	151,709	144,834	-4.50%
2024	Tot biom Age 0+		831,566	
2024	$B_{2024}$		242,911	
2024	$B_{\%}$		0.364	
2024	$\max F_{ABC}$		0.29	
2024	$\max ABC$		140,159	

## ABC



## Bratio

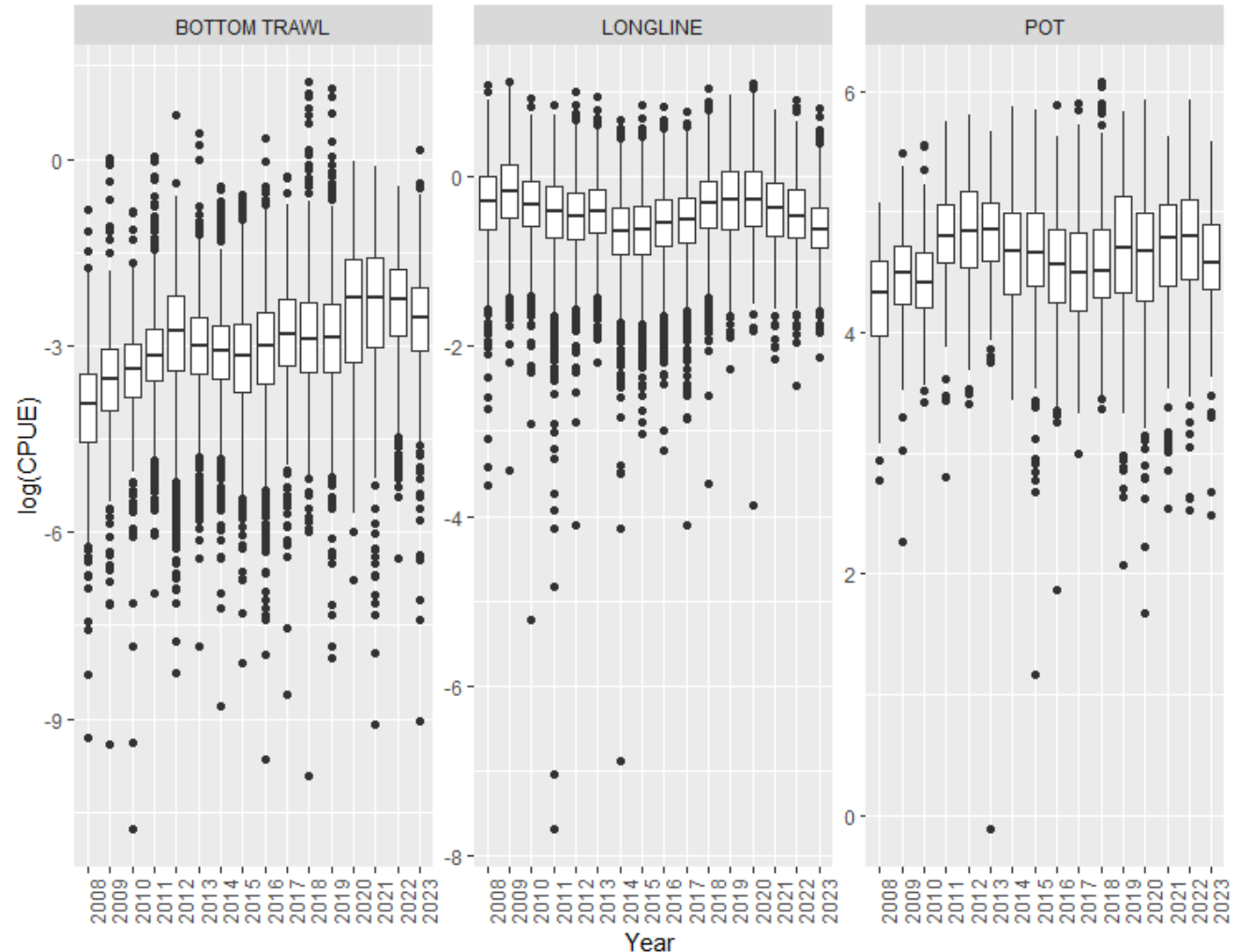




# RAW CPUE – JAN.-MAR. ALL FISHERIES

Weight CPUE by Year for BS Jan-Apr

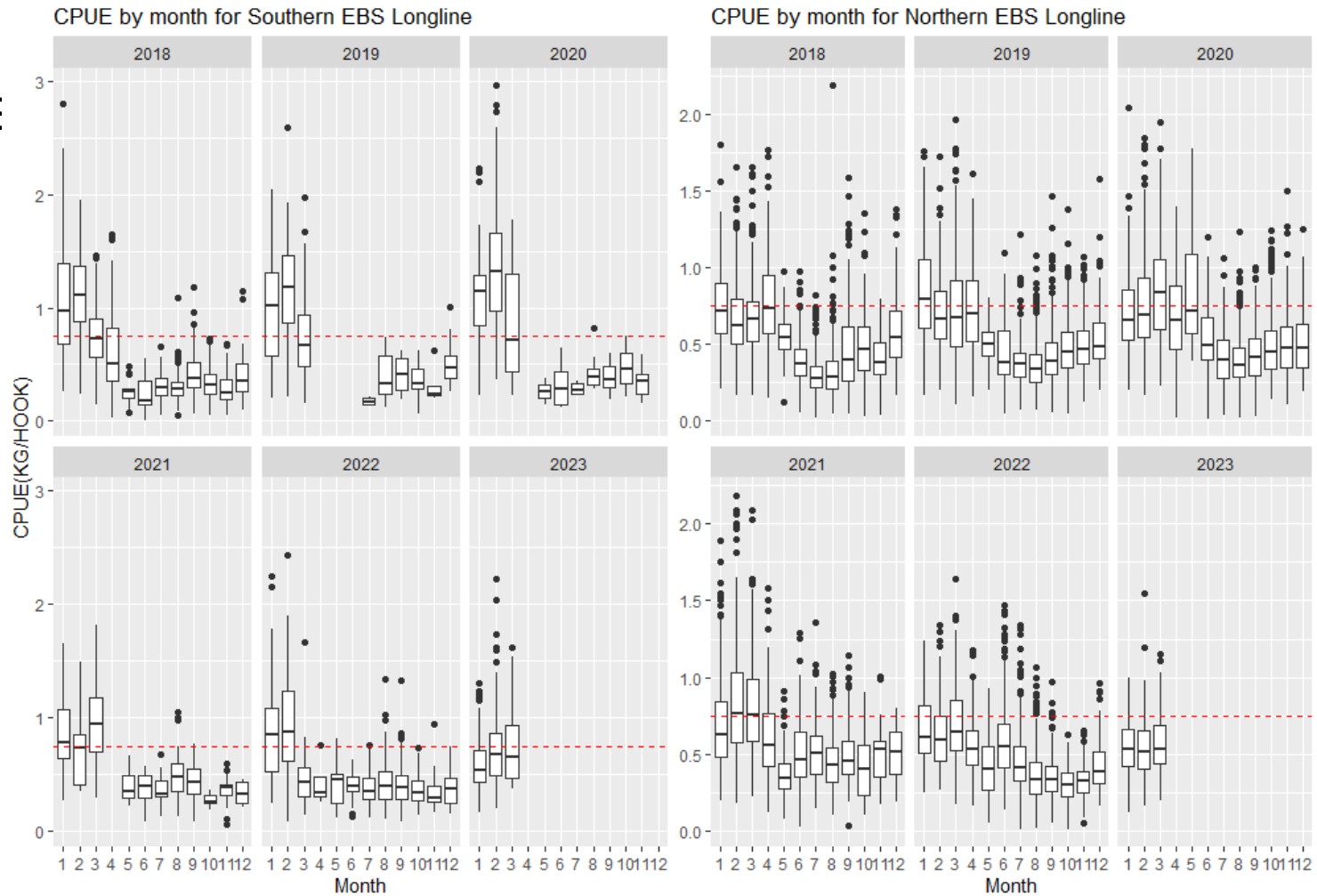
- Drop from 2022 for all gear types





# RAW CPUE – LONGLINE FISHERY

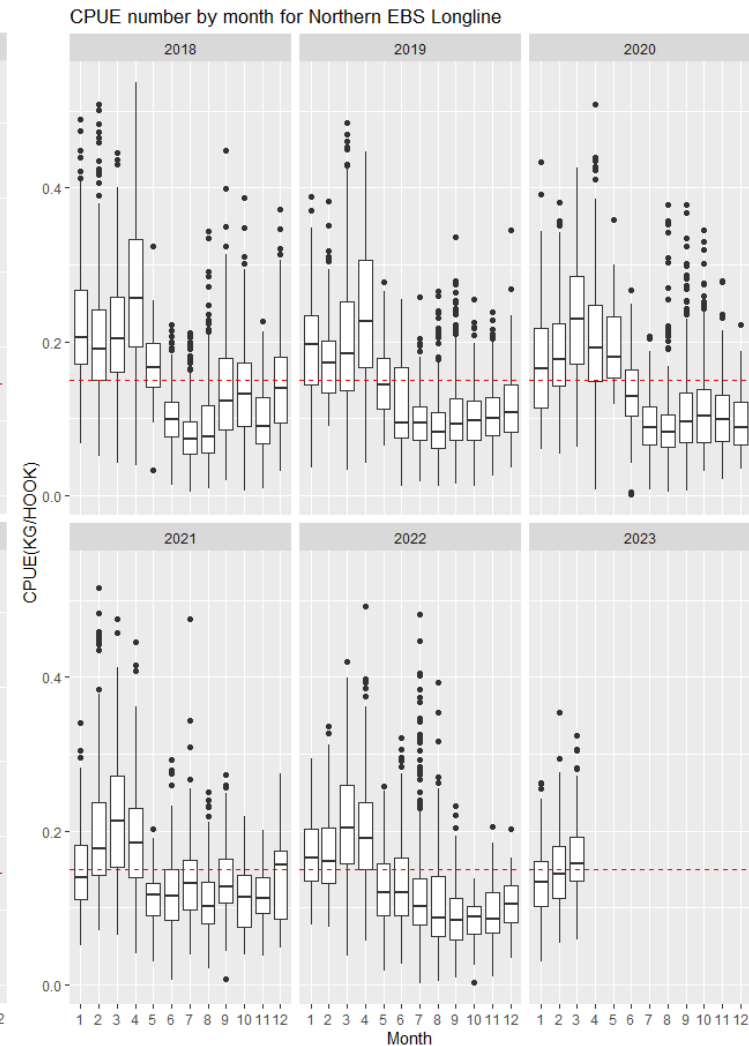
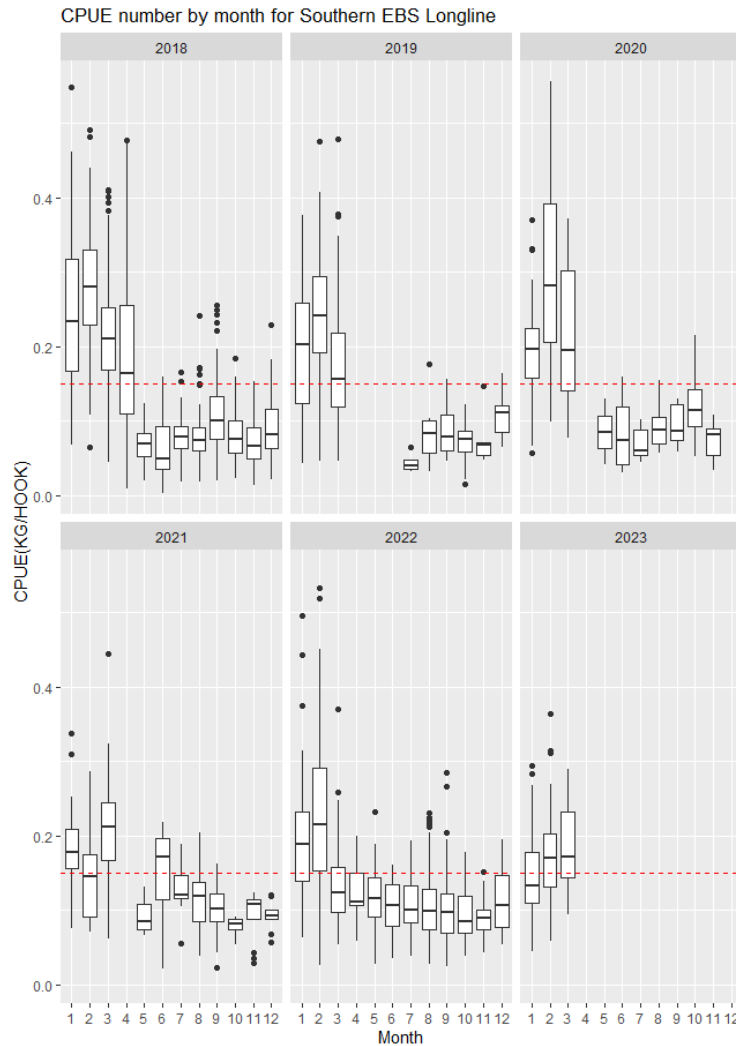
- Drop in longline CPUE by weight for both the Southern and Northern Bering Sea





# RAW CPUE – LONGLINE FISHERY

- Drop in longline CPUE number for both the Southern and Northern Bering Sea



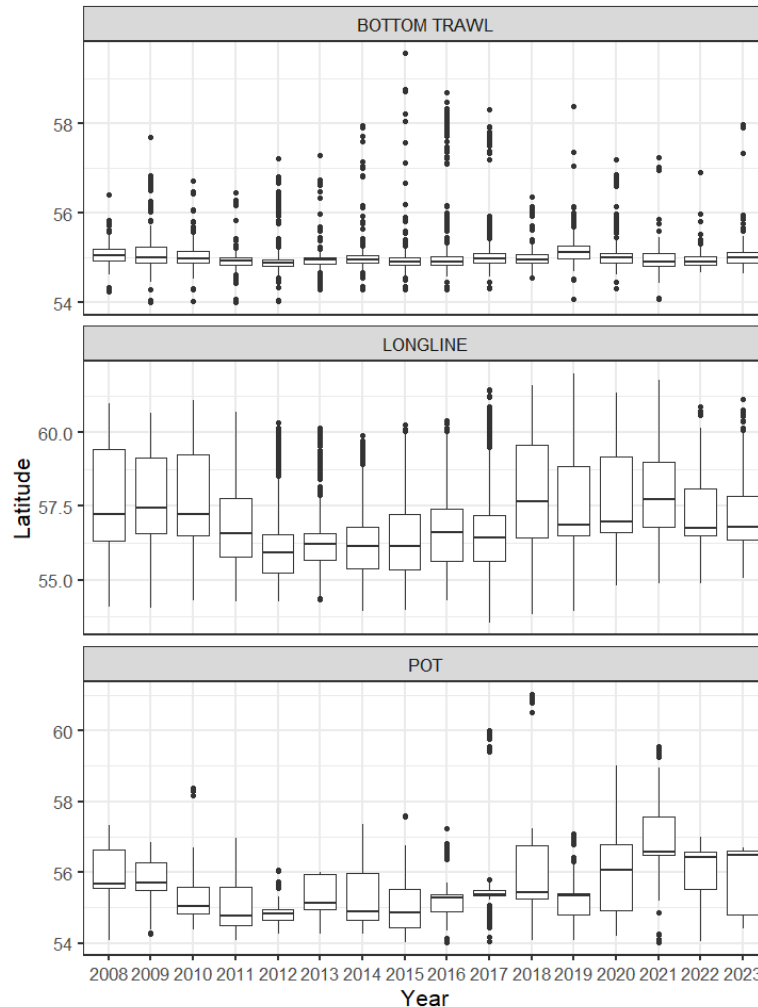




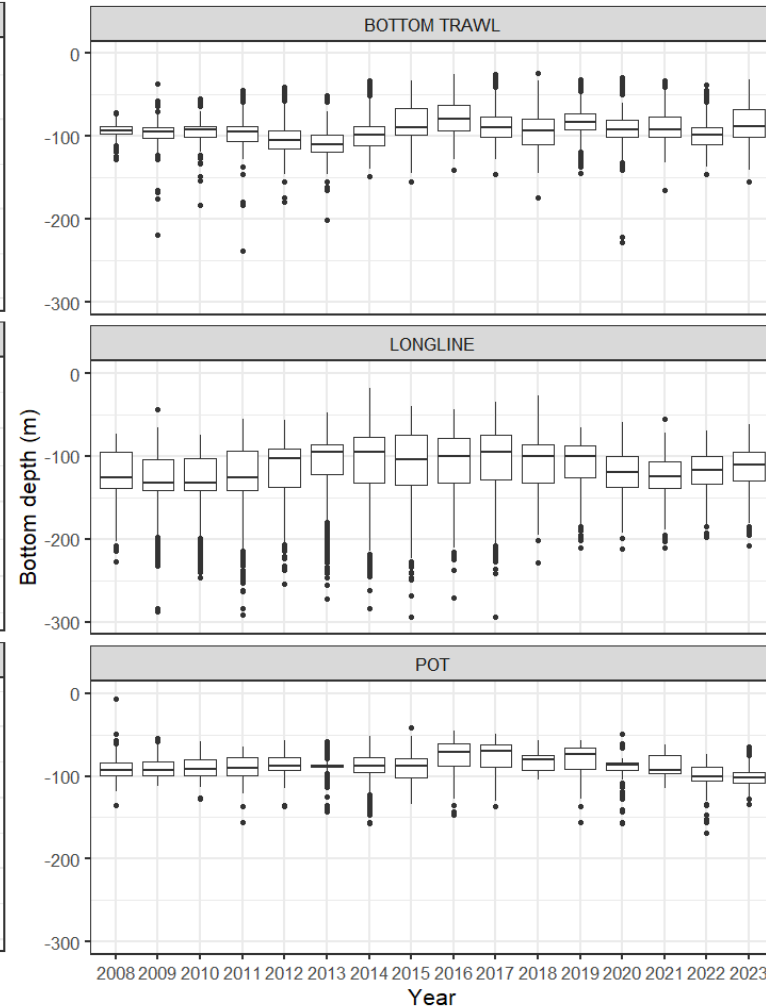
# RAW CPUE – LONGLINE FISHERY

- Longline shifting southward
- Trawl and pot remaining the same
- Lower variability in depth for longline in recent years.

Observed latitude fished Jan. - Mar.



Bottom depth fished Jan.- Mar.

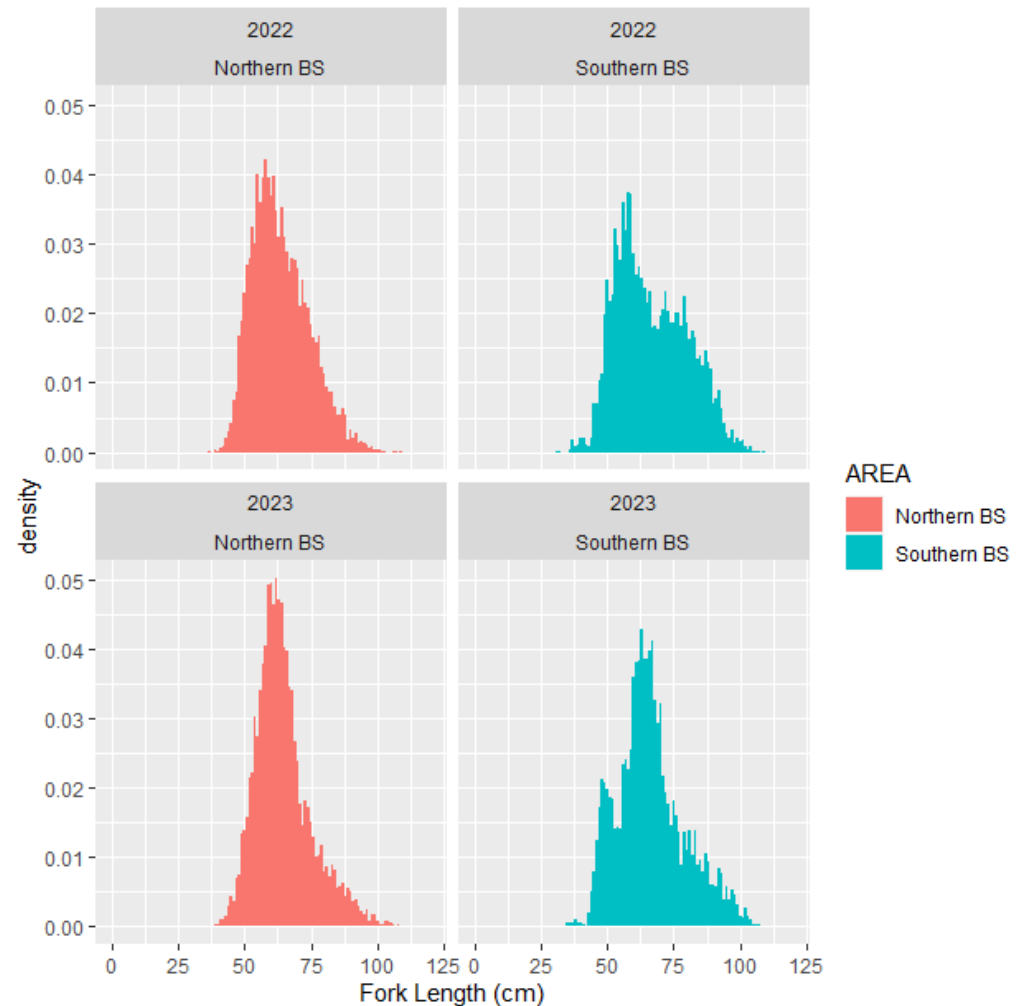




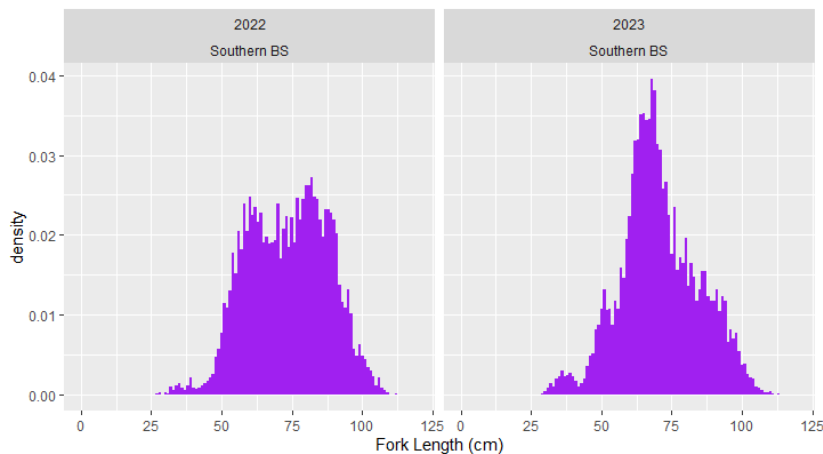
# LENGTH COMPOSITION– LONGLINE FISHERY

- Northern Bering Sea length comps look similar between years
- Small fish showing up in the southern Bering Sea.

## Longline fishery



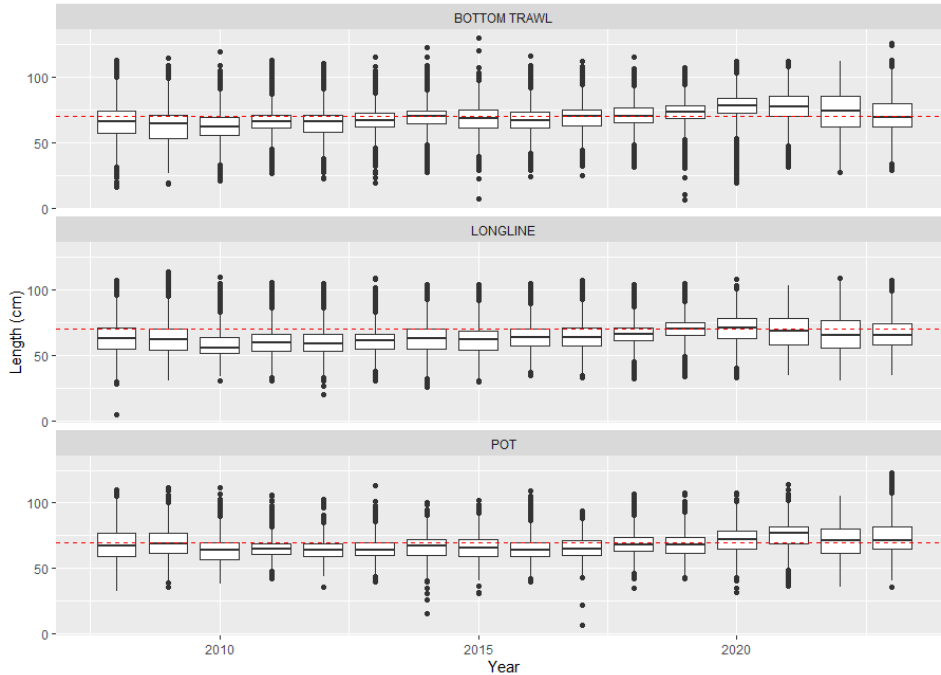
## Bottom trawl fishery



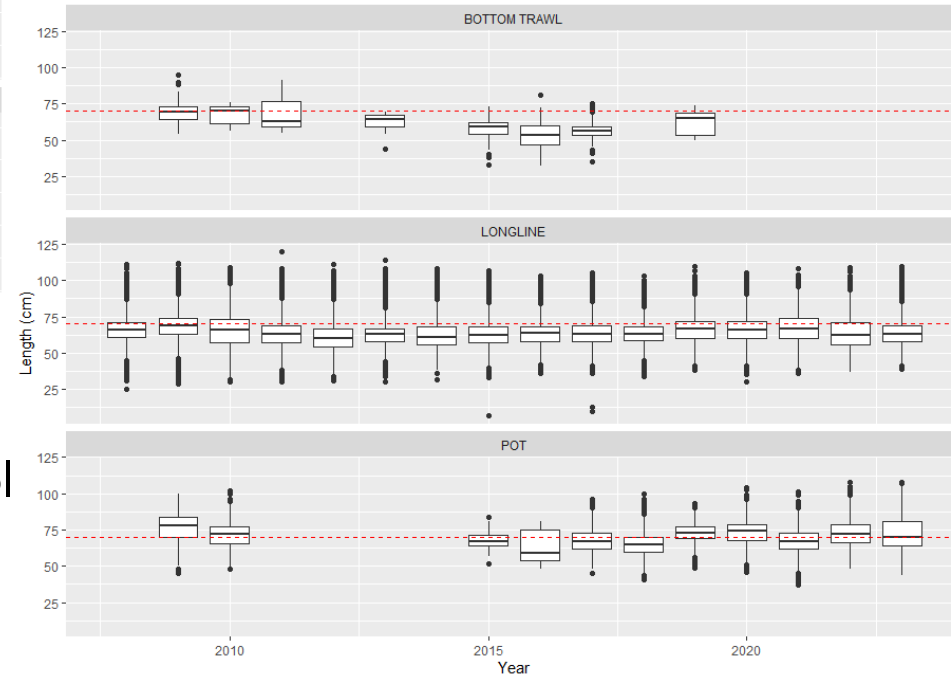


# LENGTH COMPOSITION– LONGLINE FISHERY

Pcod Length in Southern BS for past 120 days compared to same period in previous 10 years for 02 May 2023



Pcod Length in Northern BS for past 120 days compared to same period in previous 10 years for 02 May 2023



- Slightly smaller fish than previous 5 years longline and trawl fisheries, relatively stable for the pot fishery