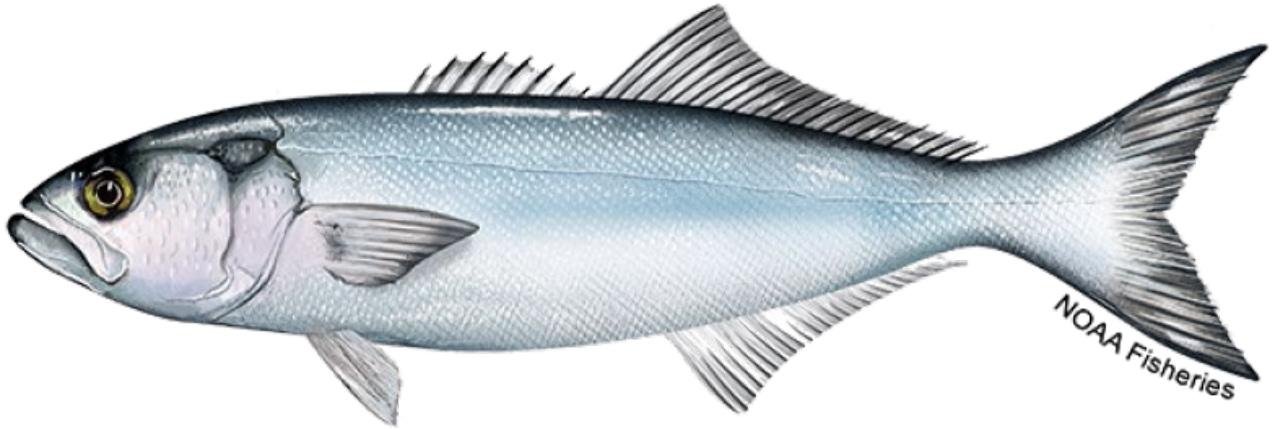
NOAA FISHERIES

NEFSC

MAFMC SSC Meeting

Atlantic Bluefish (*Pomatomus saltatrix*) Management Track Assessment Summary

July 24th 2023



RT2022: Notable Changes from SARC60

- New L-W parameters were calculated using updated biological information
- Recreational discard mortality rate was re-evaluated, changing from 15% to 9.4% (WP11)
- Commercial discards were incorporated (although insignificant ~0.2% of total catch, WP08)
- MRIP index was derived using a Guild approach (WP13)
- New Indices: SEAMAP Age 1 and ChesMMAP
- Recreational discard lengths were stratified by season and region (North/South, WP08)
  - New VAS from SC, ~3000 lengths from 1985-2021
- Natural mortality was changed to age-specific based on Lorenzen empirical WAA (WP06)
  - Changed from 0.2 to M-at-age (constant across years): Age 0: 0.850, Age 1: 0.575, Age 2: 0.453, Age 3: 0.373, Age 4: 0.324, Age 5: 0.294, Age 6+: 0.268
- Multinomial ALKs (WP14)
- Added selectivity blocks into both fleets

RT2022 Final Bluefish Model

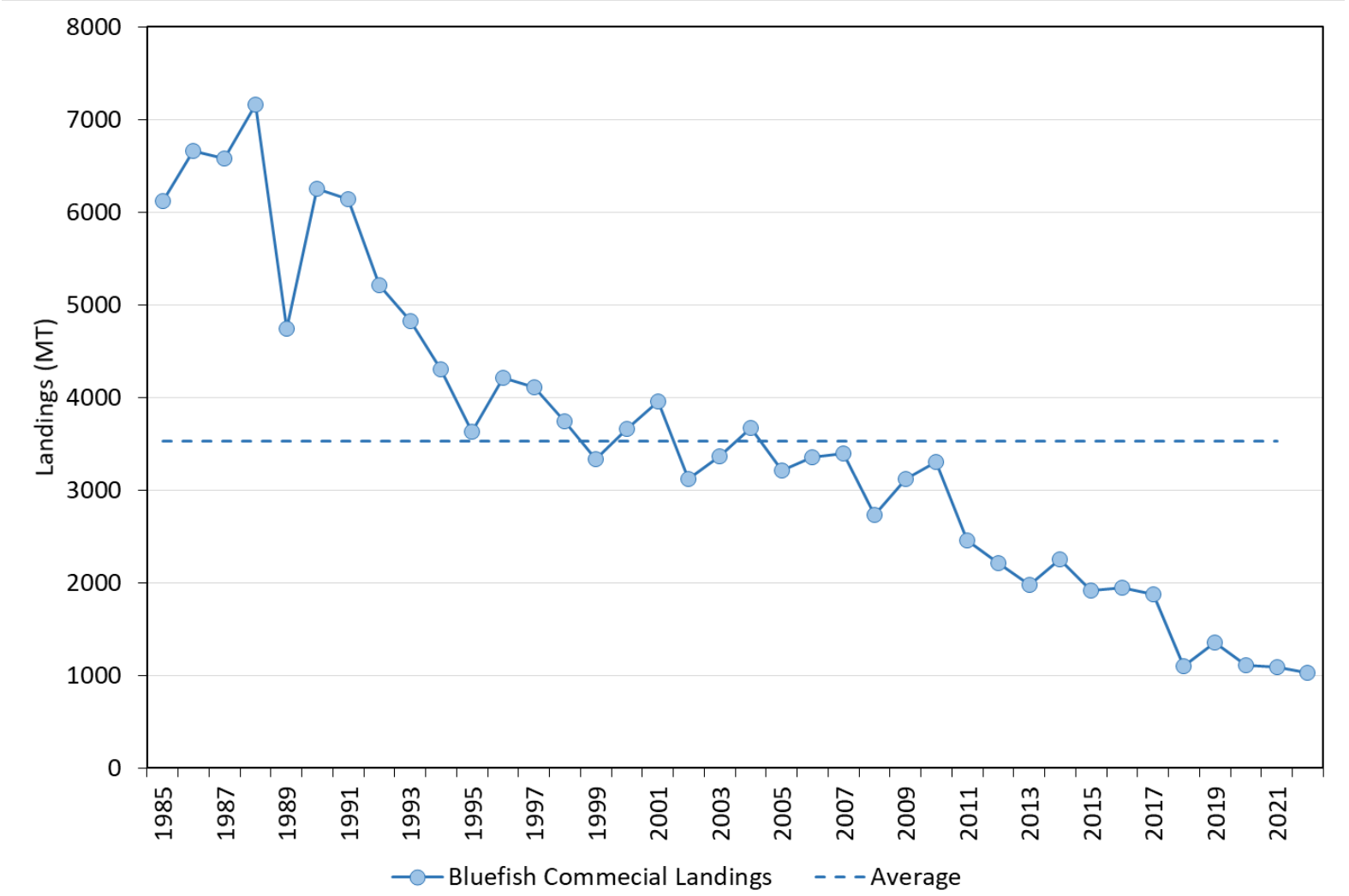
- The Final model was explored with random effects on recruitment and numbers-at-age
- Each model explored different options for treating the yearly transitions in survival

1. Deterministic survival (Traditional SCAA model, recruitment in each year is estimated as independent fixed effect parameters).
2. Recruitment deviations (random about mean) are random effects
    a. Random effects are independent, uncorrelated
    b. Autoregressive (AR1) by year (autocorrelated)
3. Full state-space model where survival of all ages are random effects
    a. Random effects are independent, uncorrelated
    b. Autoregressive (AR1) deviations by year
    c. Autoregressive (AR1) deviations by age
    d. Autoregressive deviations by age and year (2D AR1): New bluefish model

Term of Reference #1

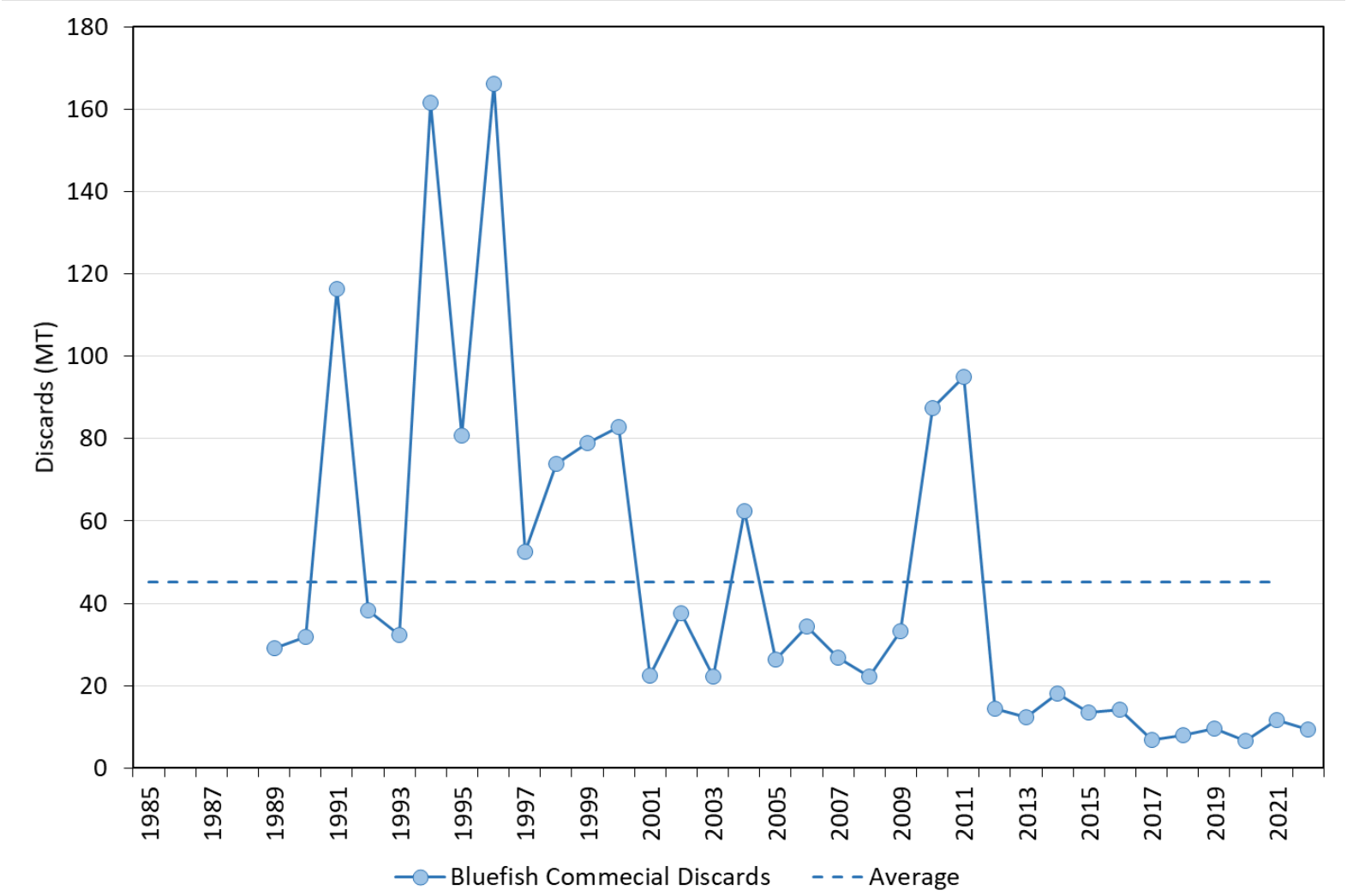
Estimate catch from all sources including landings and discards

Bluefish Commercial Landings 1985-2022



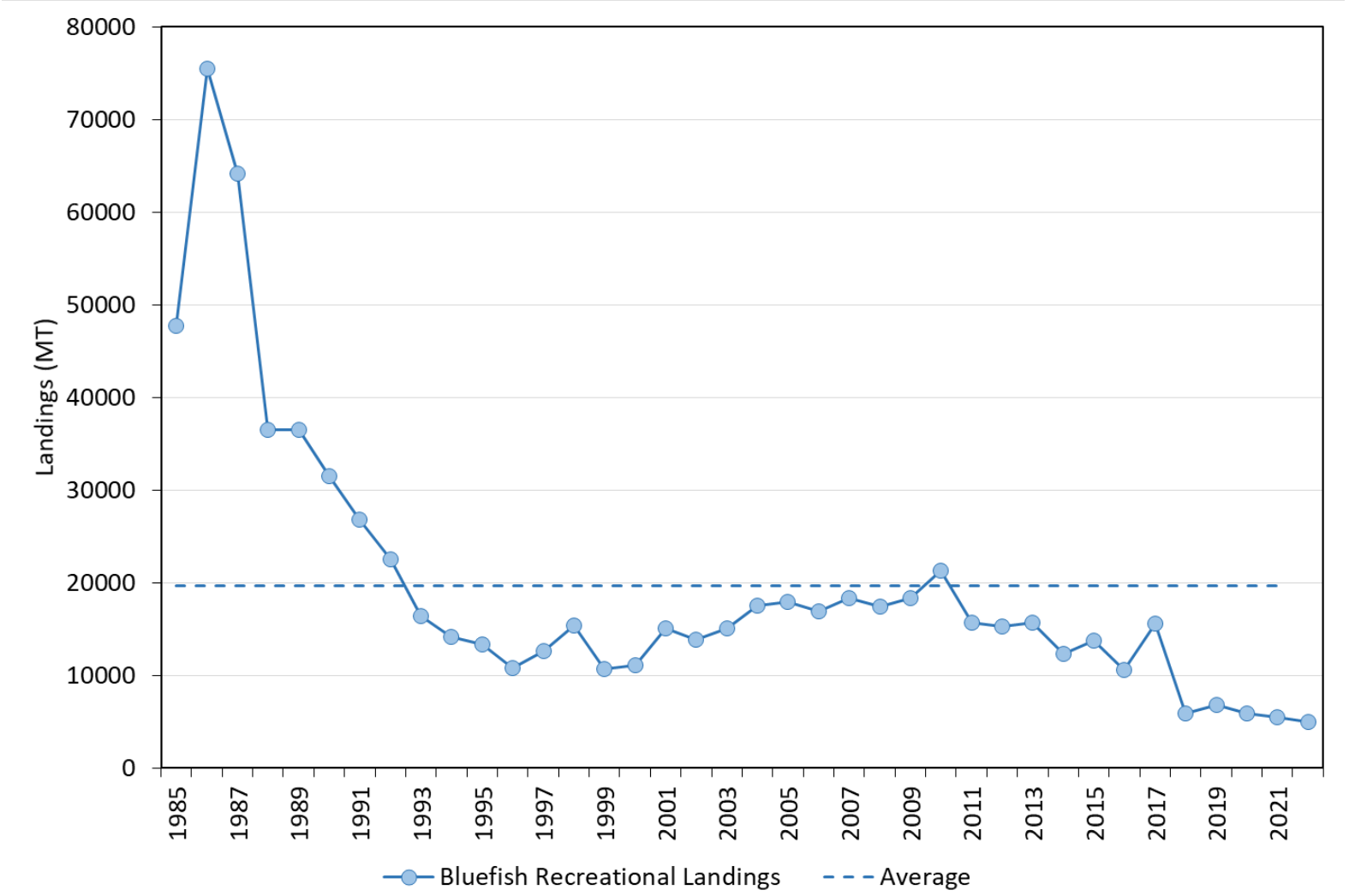
- Commercial landings information provided directly by ACCSP
- 2022 commercial landings were 1,025 MT, time-series average = 3,532 MT

Bluefish Commercial Discards 1989-2022



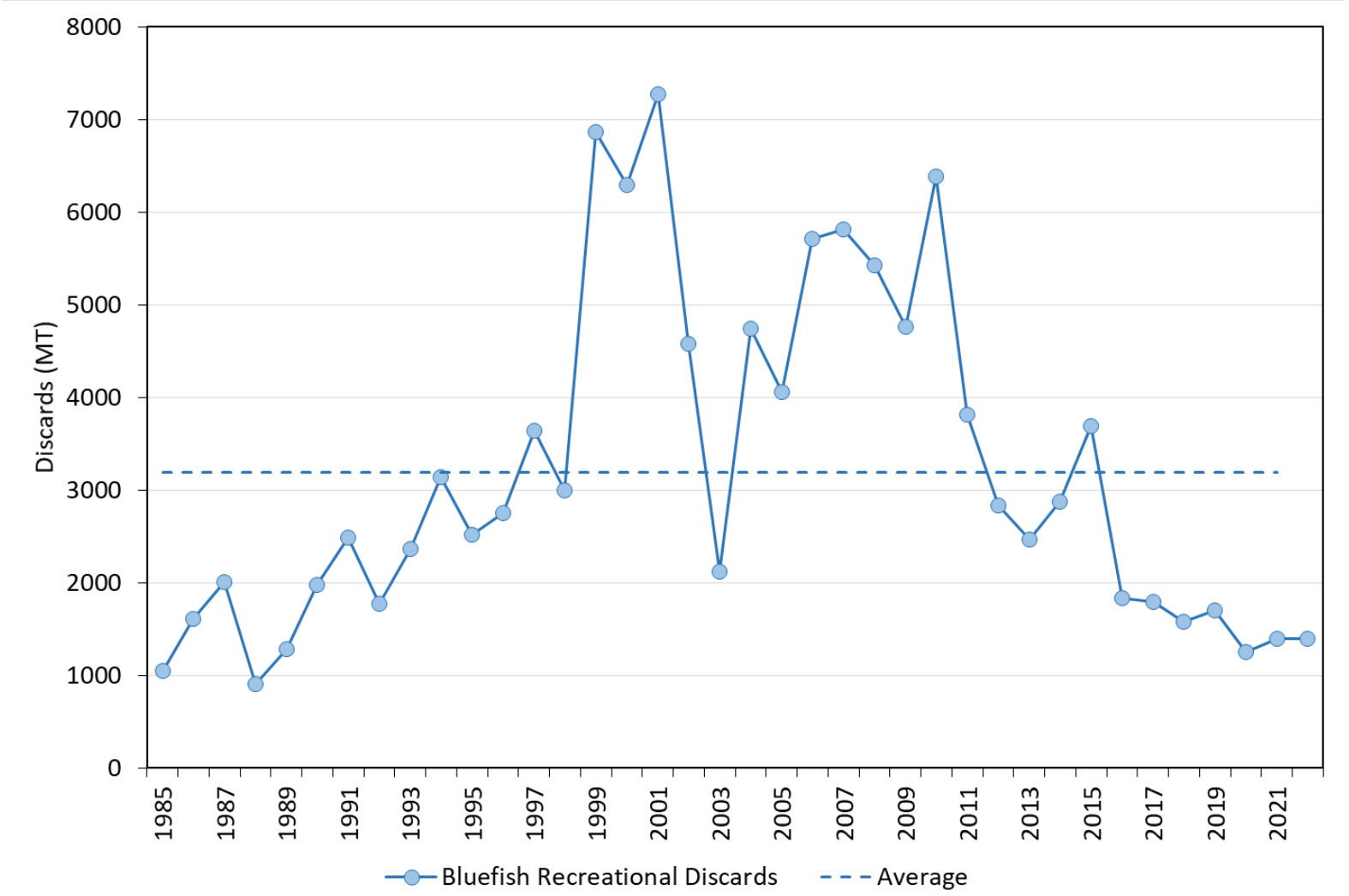
- Commercial discards calculated using SBRM from 1989-2019 and CAMS from 2020-2022
- Insignificant portion of total catch averaging ~0.2%
- 2022 commercial dead discards (32% mortality) were 9 MT, time-series average = 45 MT

Bluefish Recreational Landings 1985-2022



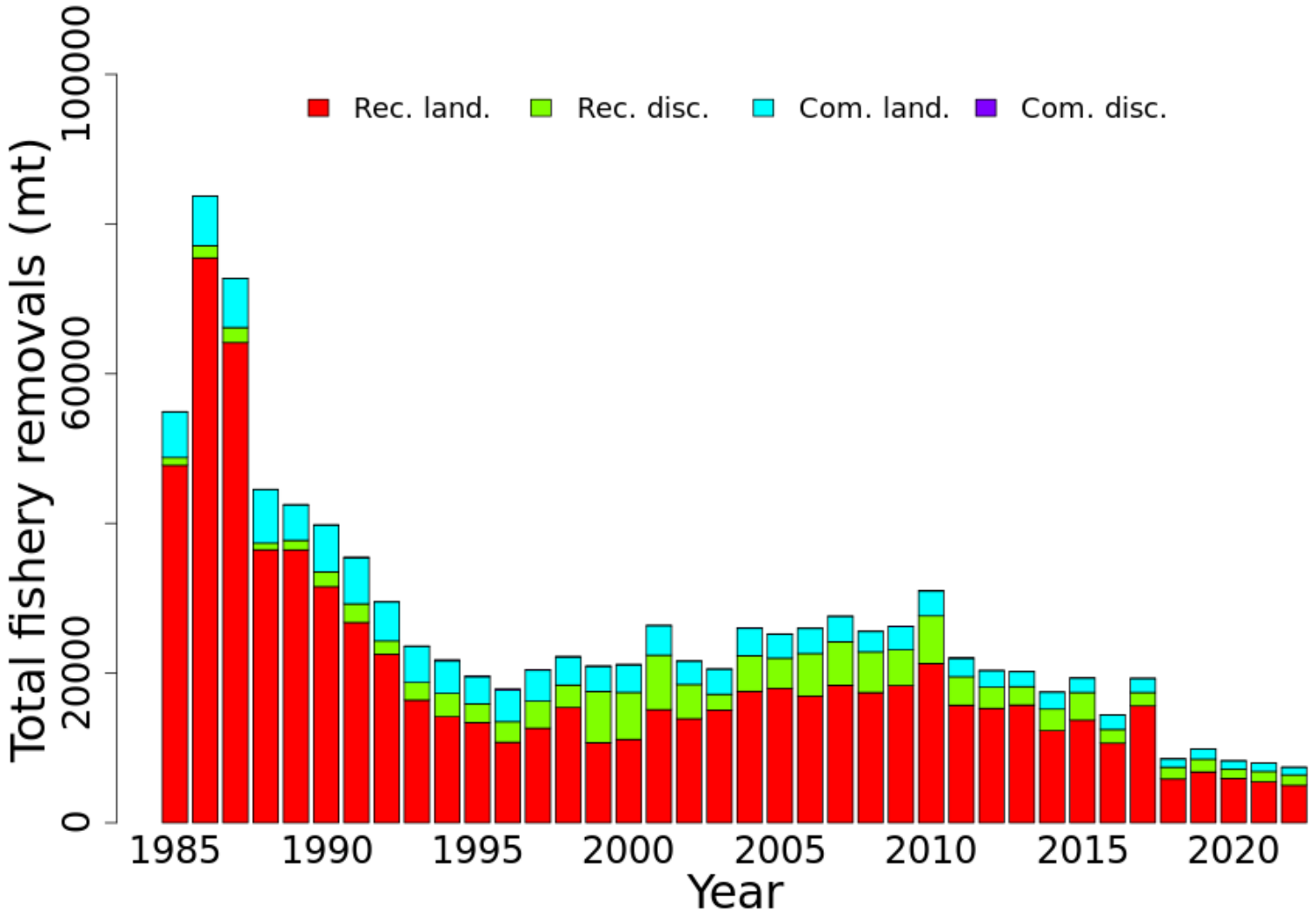
- Recreational landings (AB1) information comes from MRIP
- 2022 recreational landings were 5,002 MT, time-series average = 19,625 MT

Bluefish Recreational Discards 1985-2022



- Recreational discards (B2) information comes from MRIP
- B2 weight is calculated at a region/season level
- 2022 recreational discards were 1,400 MT, time-series average = 3,189 MT (old average ~7,500 MT)

Bluefish Total Catch 1985-2022



- Total bluefish catch in 2022 was 7,436 MT, average of 26,386 MT
- 2022 catch lowest in the time-series
- Recreational component of the total catch averages 86% over the time-series

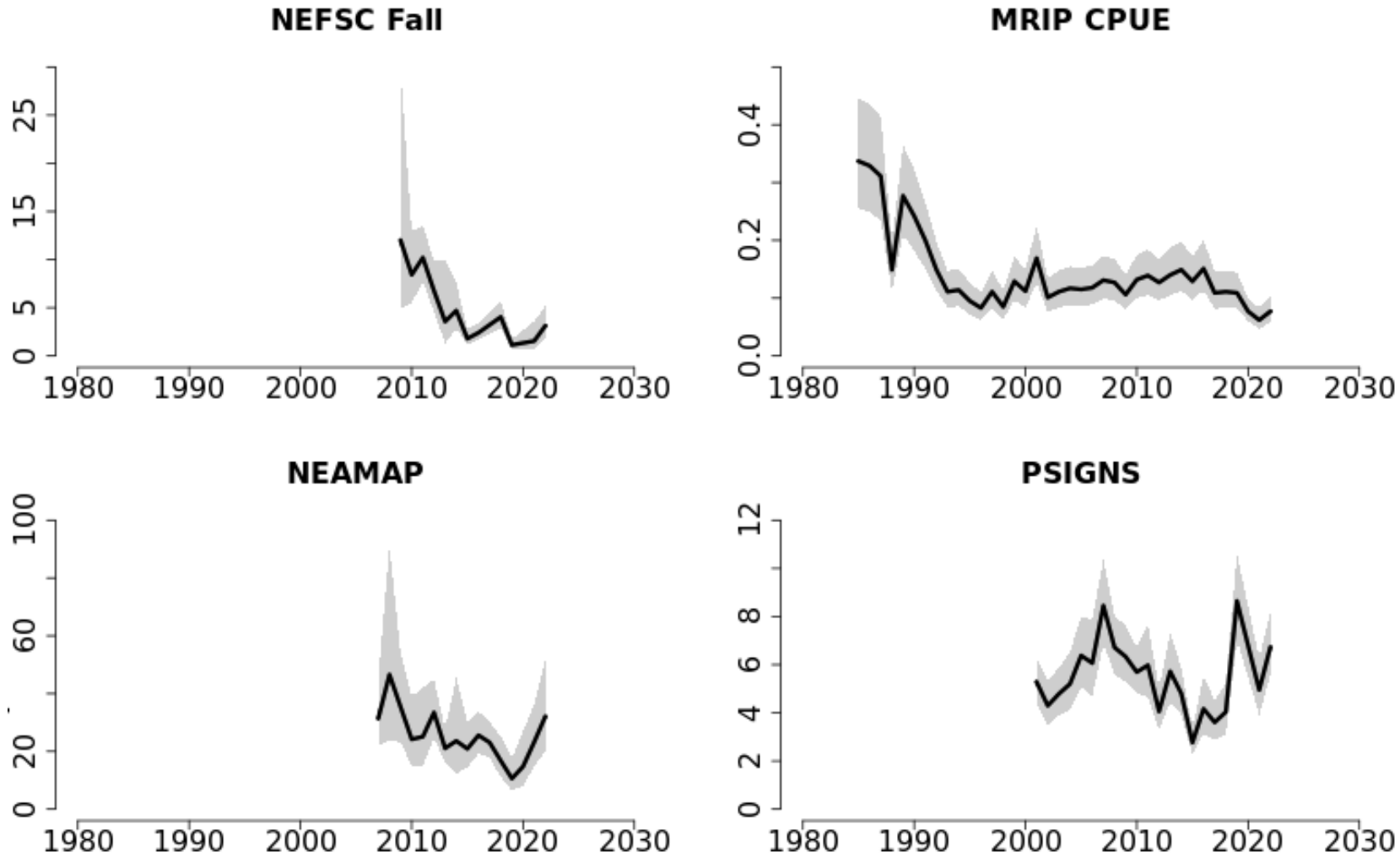
Term of Reference #2

Evaluate the indices used in the assessment

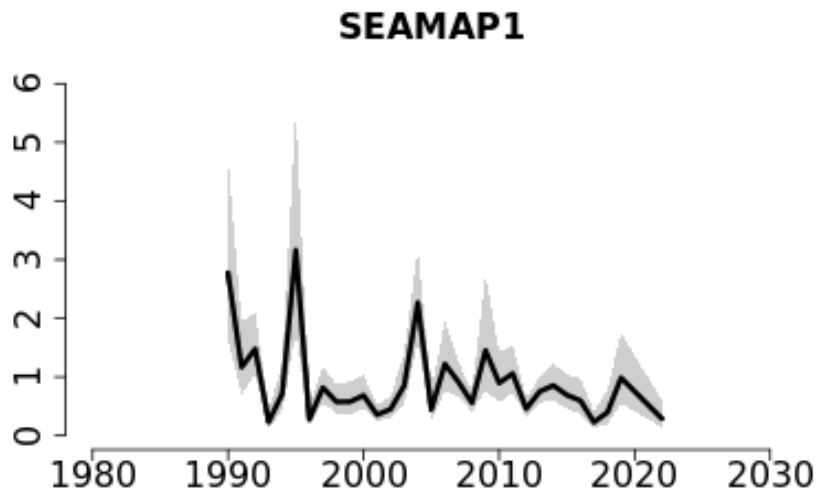
Bluefish Surveys

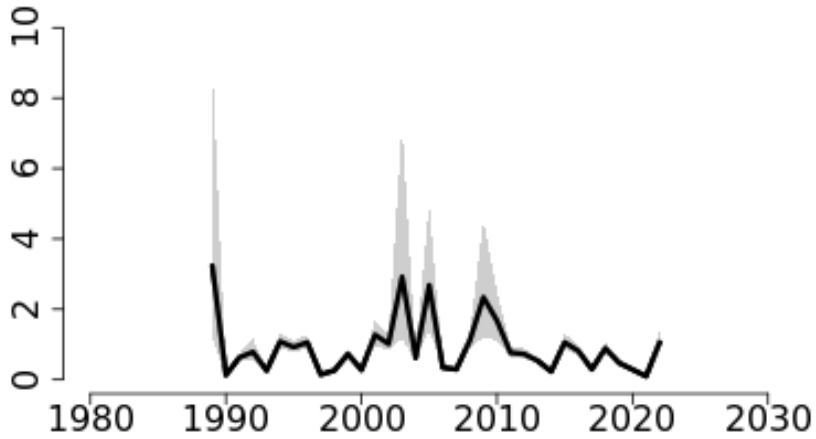
- NEFSC Fall trawl survey Albatross 1985- 2008: age 0-6+
- NEFSC Fall trawl survey Bigelow 2009-2022: age 0-6+
- NEAMAP trawl survey 2007-2022: ages 0-6+
- NC PSIGN 2001-2022: ages 0-6+
- ChesMMAP trawl survey 2002-2018: ages 0-6+
- SEAMAP juvenile survey 1989-2022: age 0
- SEAMAP juvenile survey 1989-2022: age 1
- Composite state agency seine survey 1985-2022: age 0
- MRIP CPUE (Guild approach) 1985-2022: age 0-6+

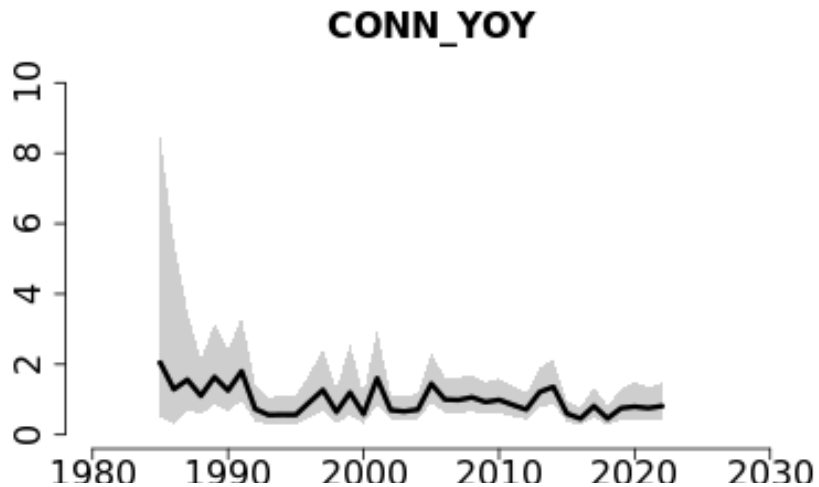
Updated Age 0-6+ indices



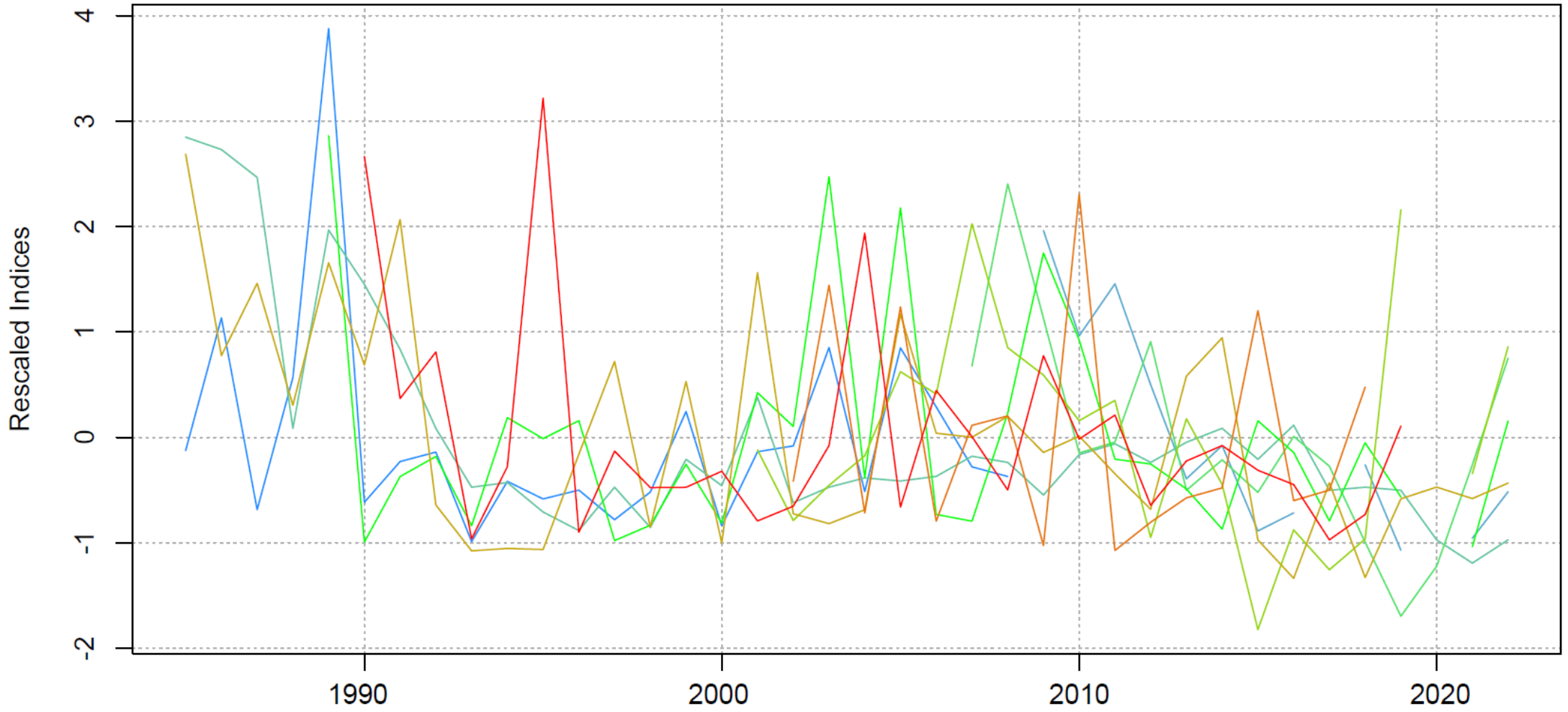
SEAMAP and Conn YoY (Seine)







Rescaled indices



Term of Reference #3

TOR 3: Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) as possible (depending on the assessment method) for the time series using the approved assessment method and estimate their uncertainty. Include retrospective analyses if possible (both historical and within-model) to allow a comparison with previous assessment results and projections, and to examine model fit.

a. Include bridge runs to sequentially document each change from the previously accepted model to the updated model proposed for this peer review

b. Prepare a "Plan B" assessment that would serve as an alternate approach to providing scientific advice to management if the analytical assessment were to not pass review

RT2022 final model configuration

- Fishery dependent: Commercial landings and discards (Fleet 1): 2 blocks (1985-1999, 2000+)

  Recreational landings and discards (Fleet 2): 3 blocks (1985-1999, 2000-2010, 2011+)

  Recreational Catch per unit effort

- Fishery Independent: NEFSC Albatross (1985-2008)

  NEFSC Bigelow (2009-2021)

  NEAMAP (2007-2021)

  PSIGNS (2011-2021)

  ChesMMAP (2002-2018)

  SEAMAP Age 1

  SEAMAP Age 0

  Conn YoY

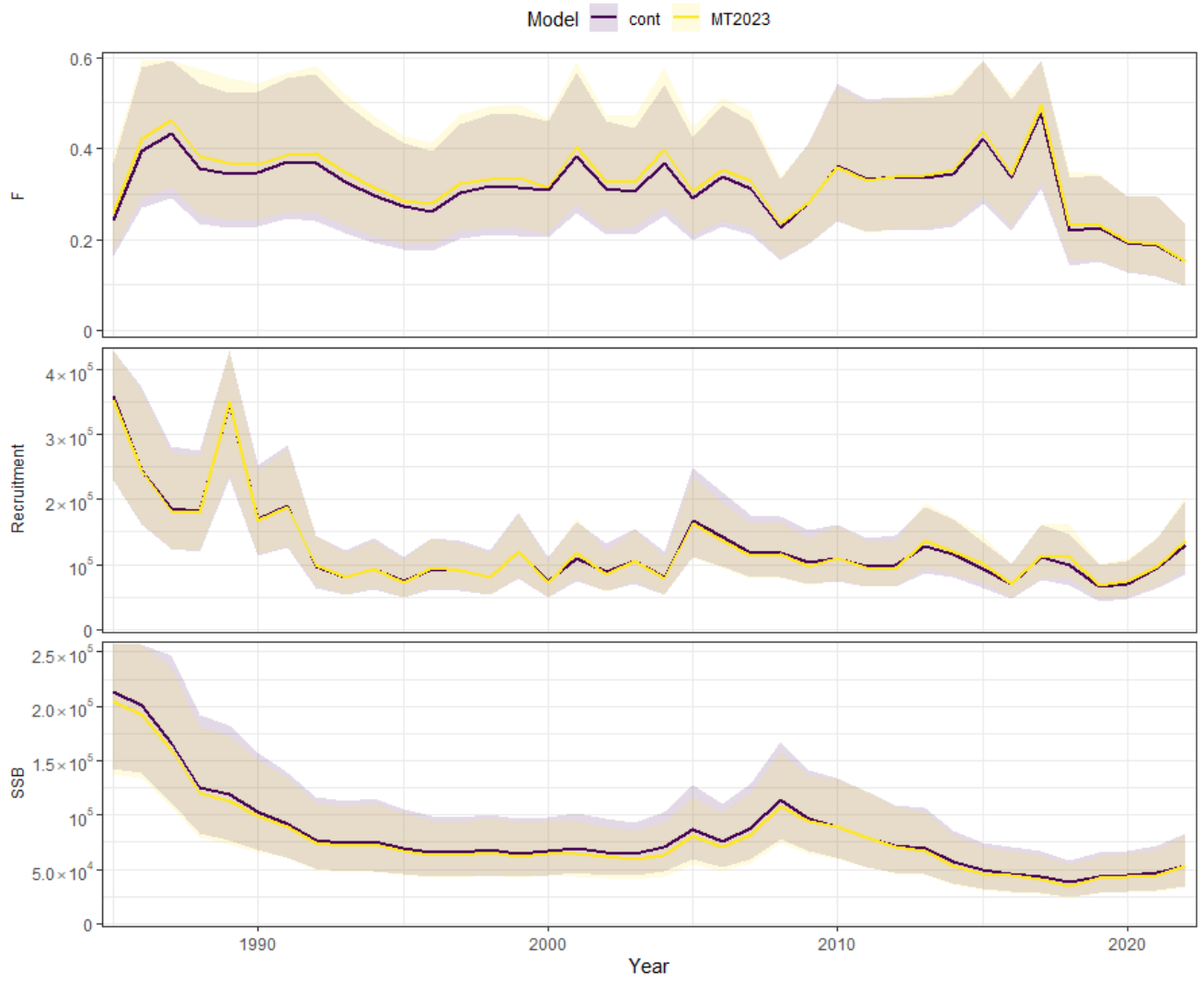
- Biological: Natural mortality - 0.85, 0.58, 0.45, 0.37, 0.32, 0.29, 0.27

  Maturity - 0.0, 0.40, 0.97, 1.0, 1.0, 1.0, 1.0

Changes to Model Input Data

- Change to how the ALKs were developed for this management track from the research track methodology
- RT used full Multinomial ALK
- Switch for this management track to only fill ALK holes with Multinomial model
  - Consistent with NEFSC methods for other stocks and the STOCKEFF system
- This change had very minor impact on model results

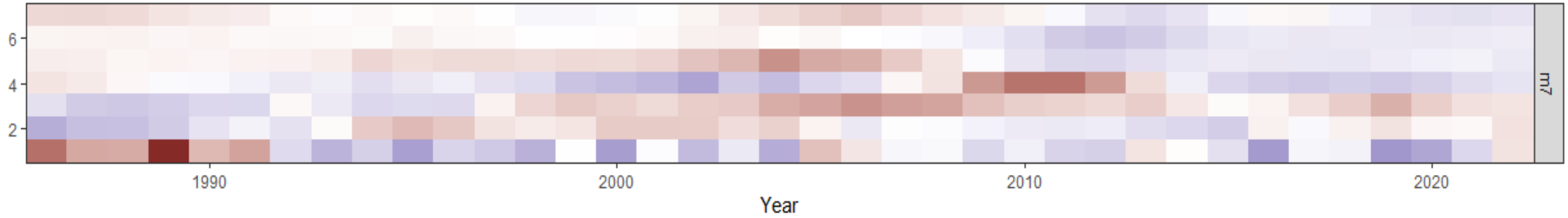
RT2022 Continuity vs MT2023 results comparison



- The change in ALK development methodology had very minor impacts on model results

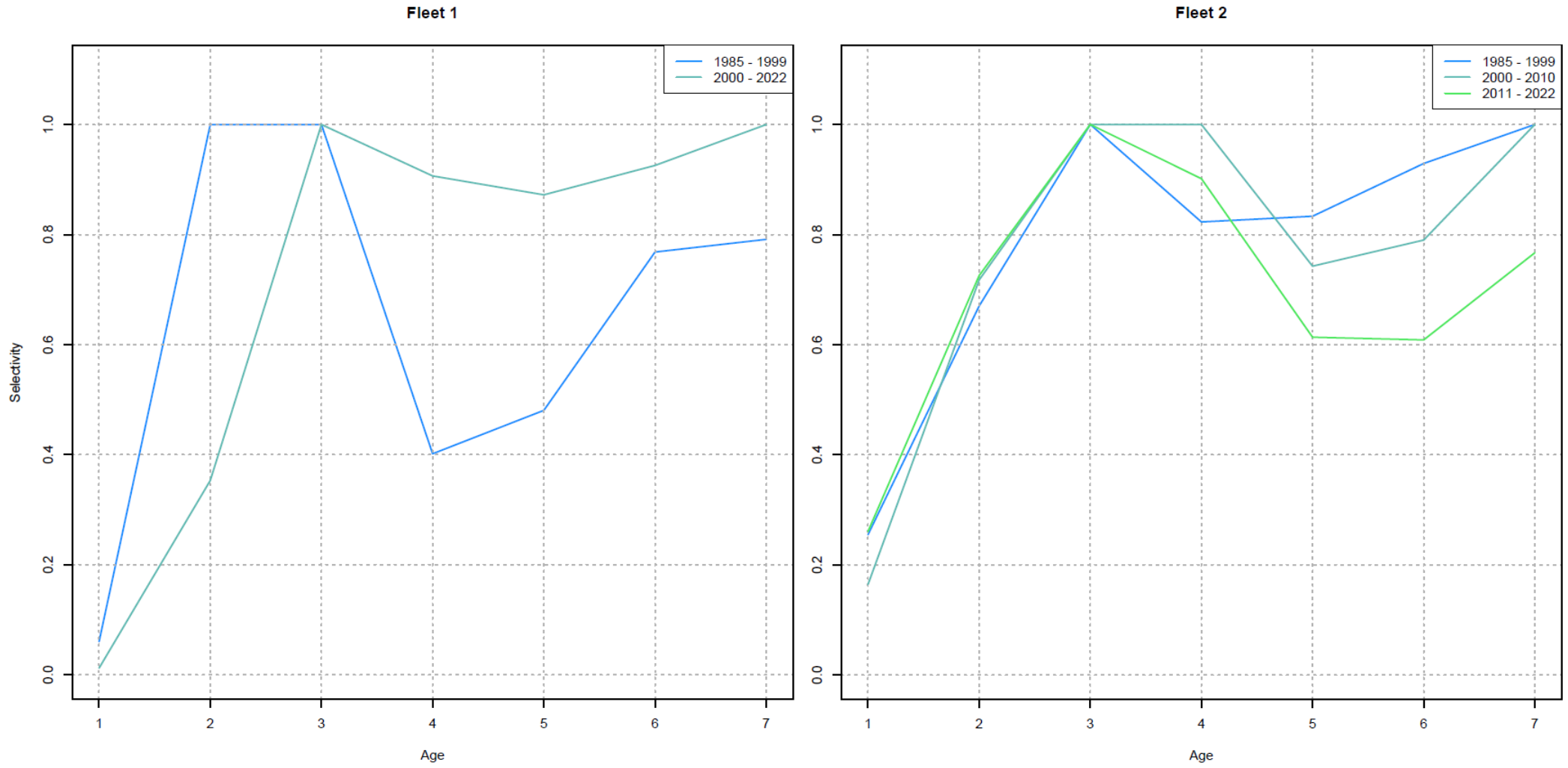
MT2023 Results: NAA deviations

	Estimate	Std. Error	95% CI lower	95% CI upper
NAA σ (age 1)	0.332	0.050	0.248	0.445
NAA σ (age 2-7+)	0.156	0.022	0.118	0.207
NAA residual AR1 ρ age	-0.197	0.134	-0.232	0.037
NAA residual AR1 ρ year	0.767	0.072	0.324	0.589



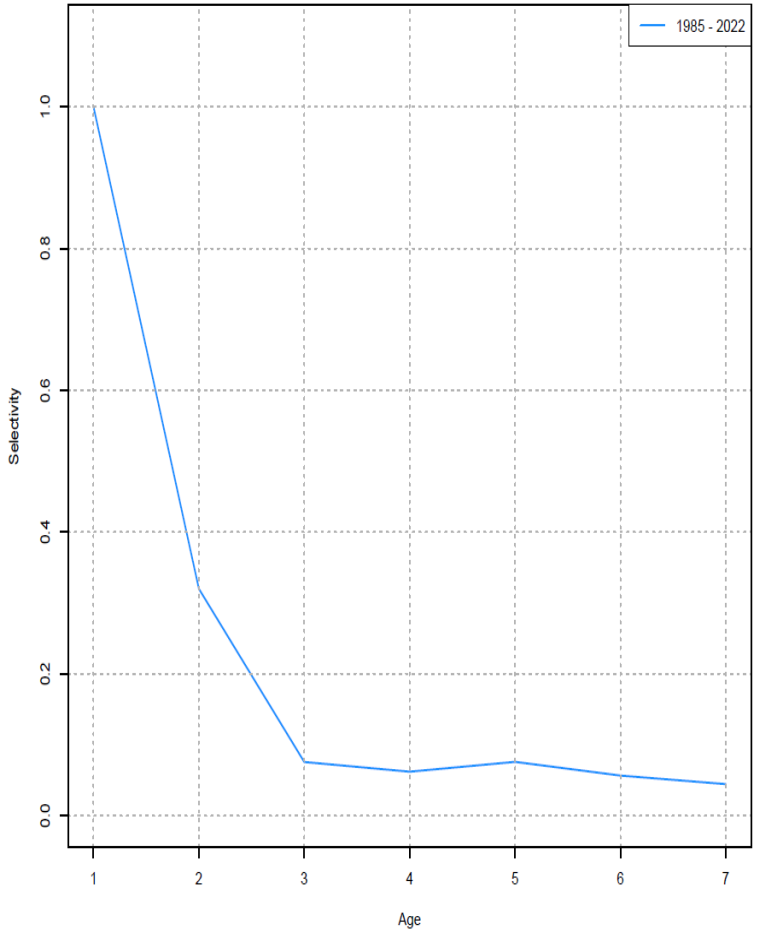
- Correlation by age is low, and shows series of positive, negative and positive values from age-3 to age-5 in the middle of the time-series
- negative correlation between these ages is likely a result of the changing availability over time of this size class to the fisheries

MT2023 Fleet Selectivity

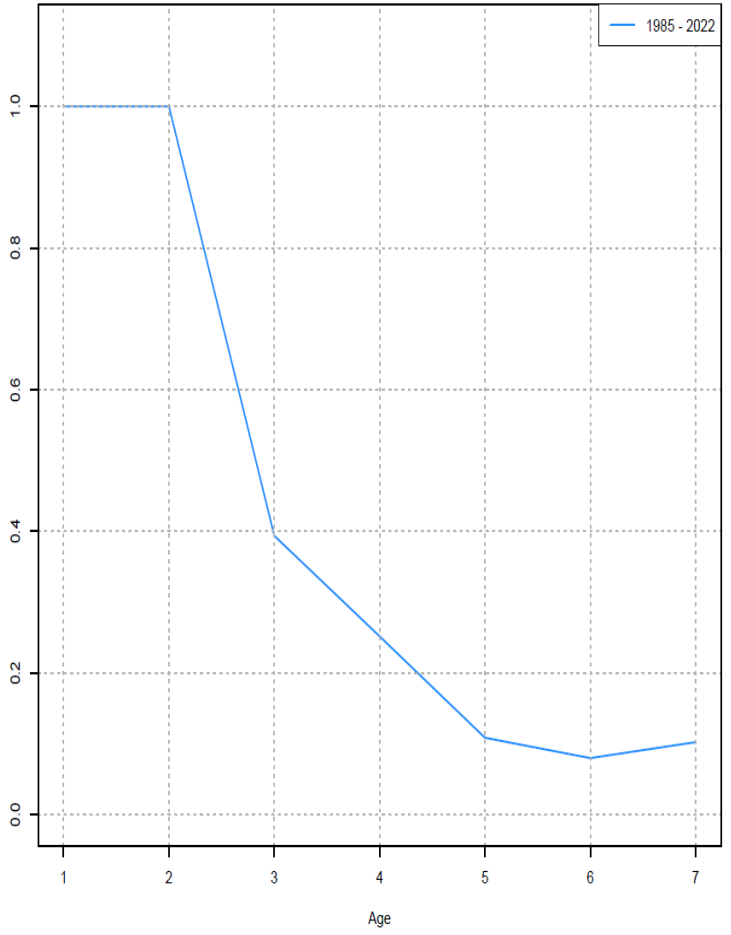


MT2023 Index selectivity

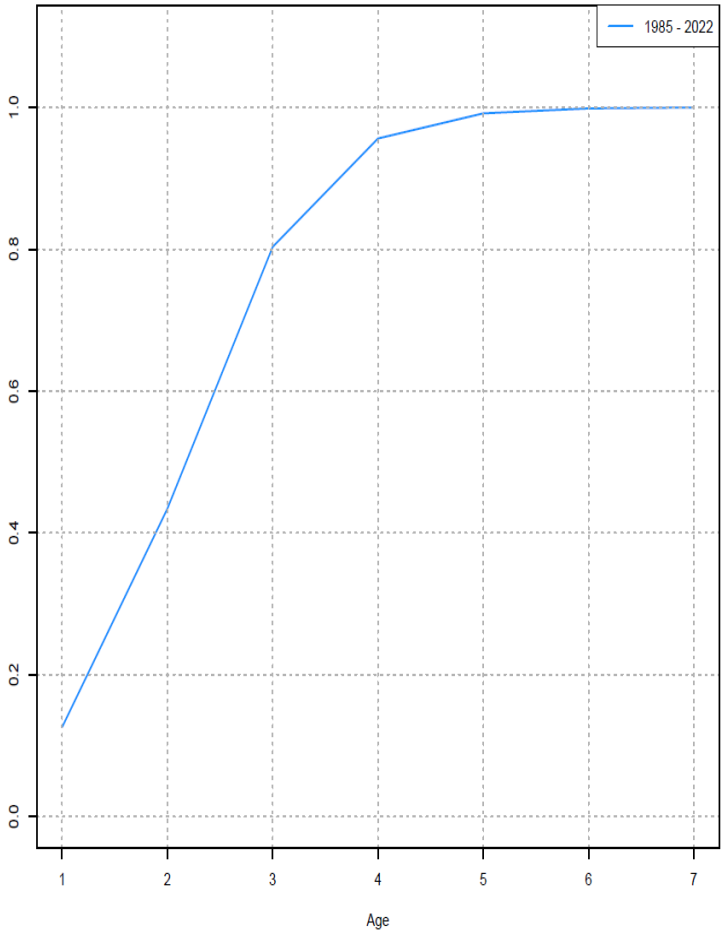
NEFSC Alb



NEFSC Big

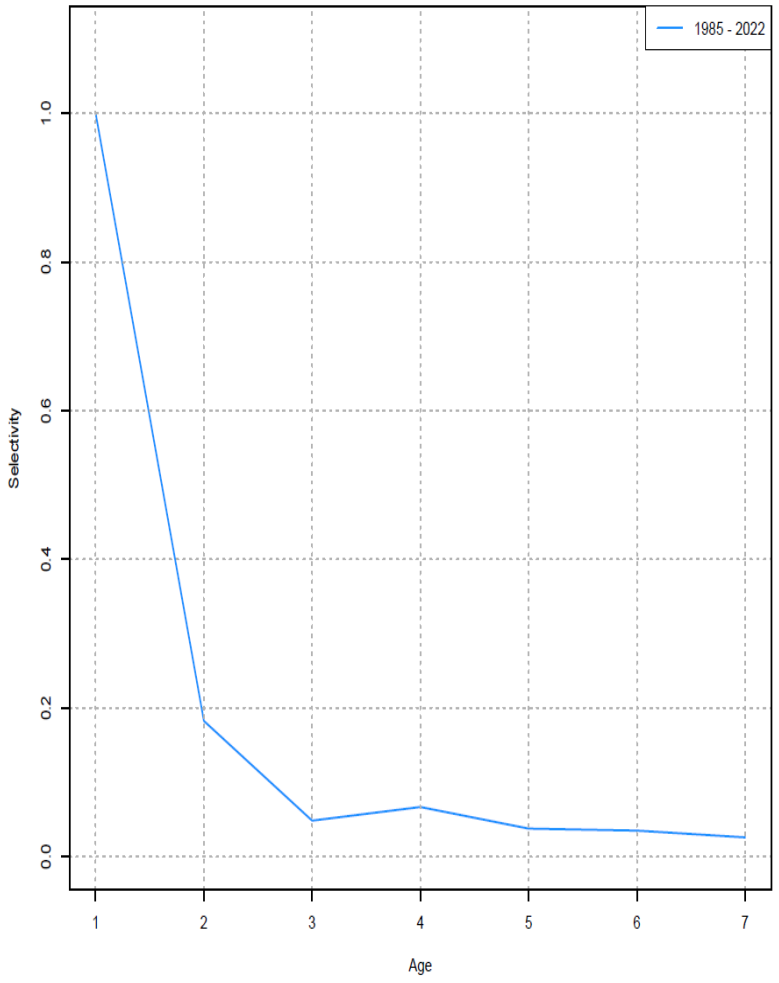


MRIP CPUE

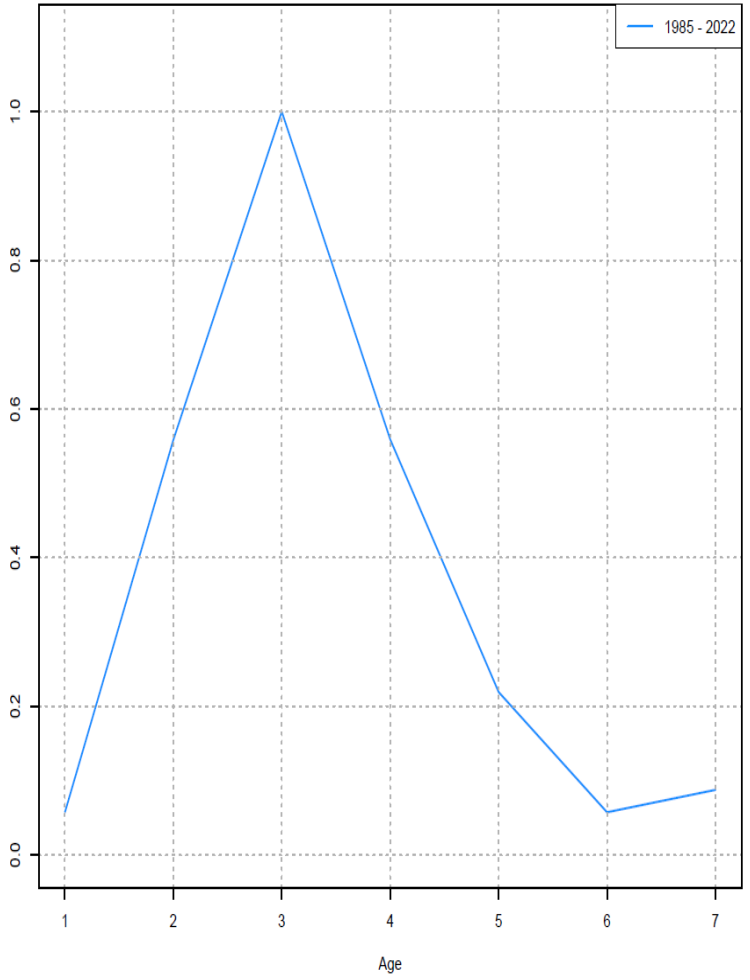


MT2023 Index Selectivity

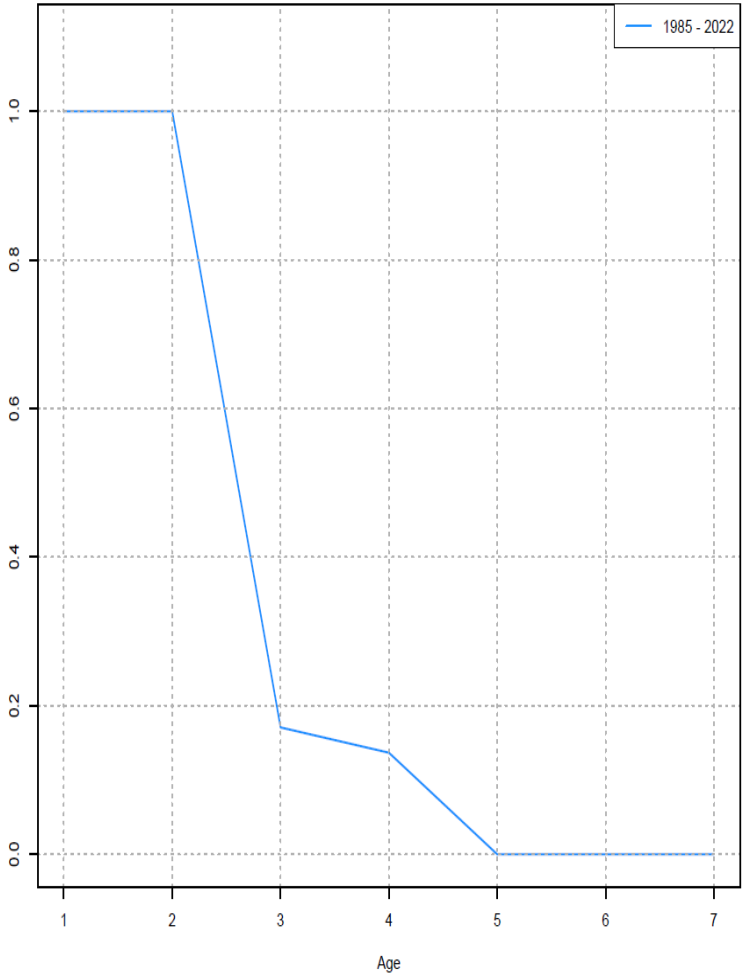
NEAMAP



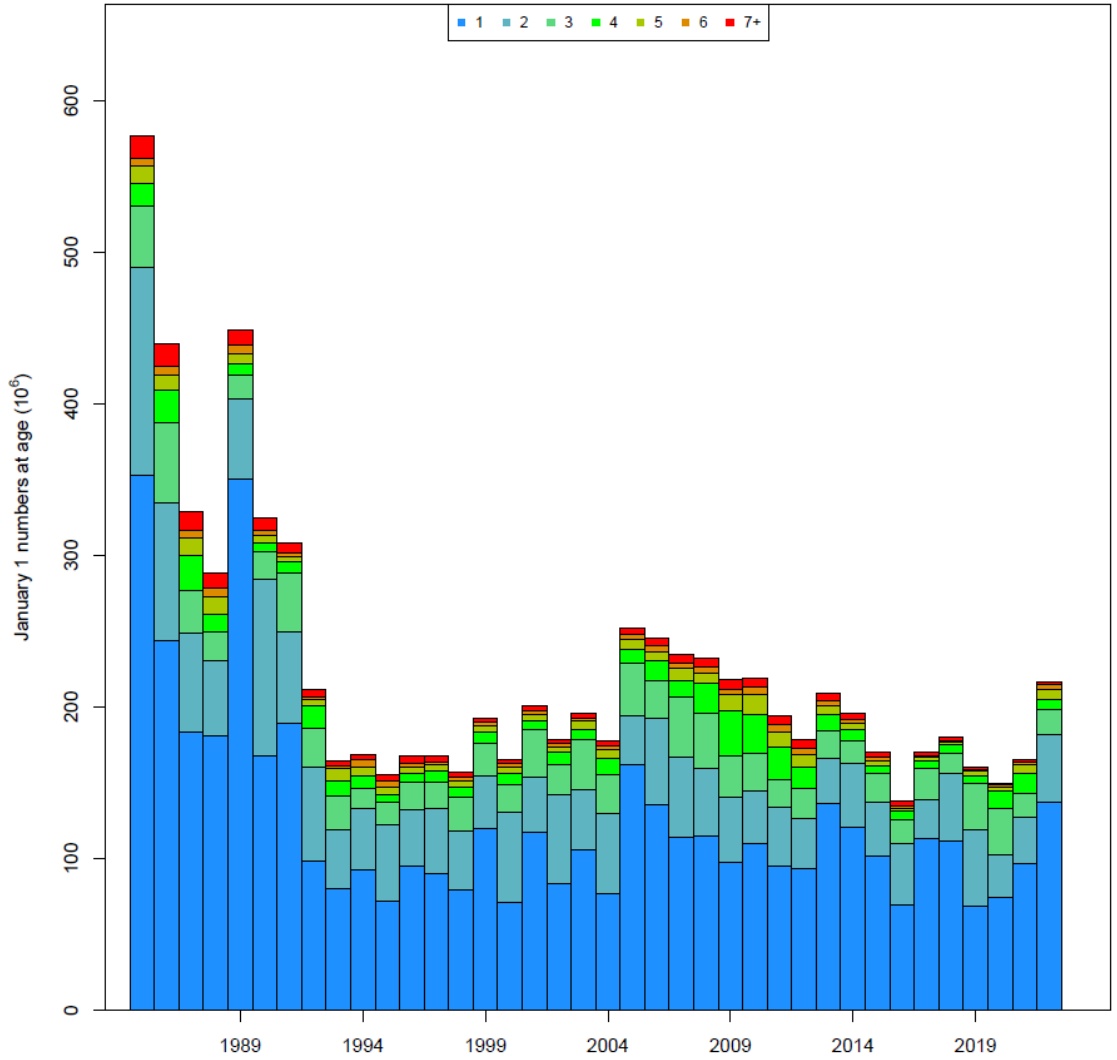
PSIGNS



ChesMMAP

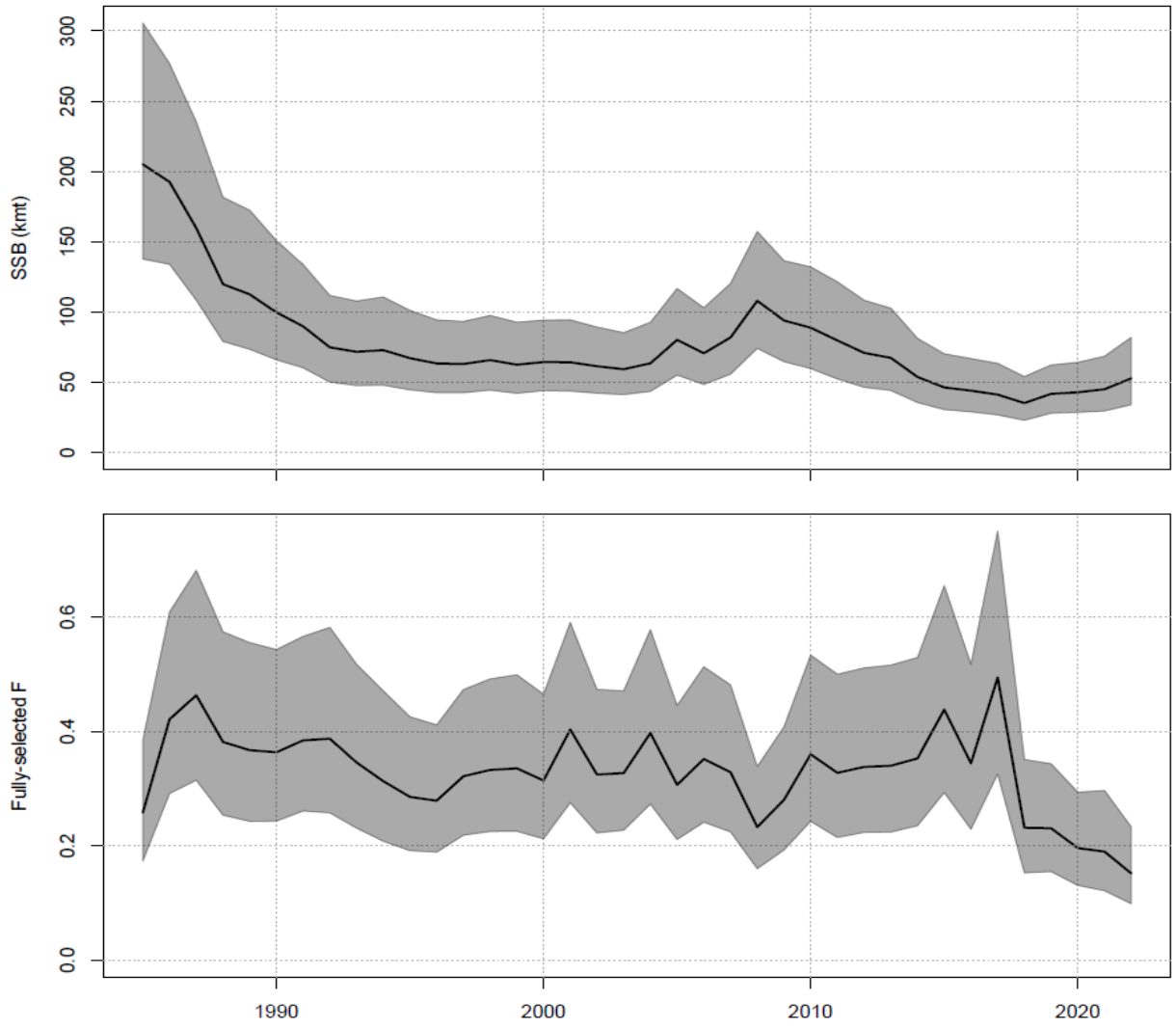


MT2023 Abundance



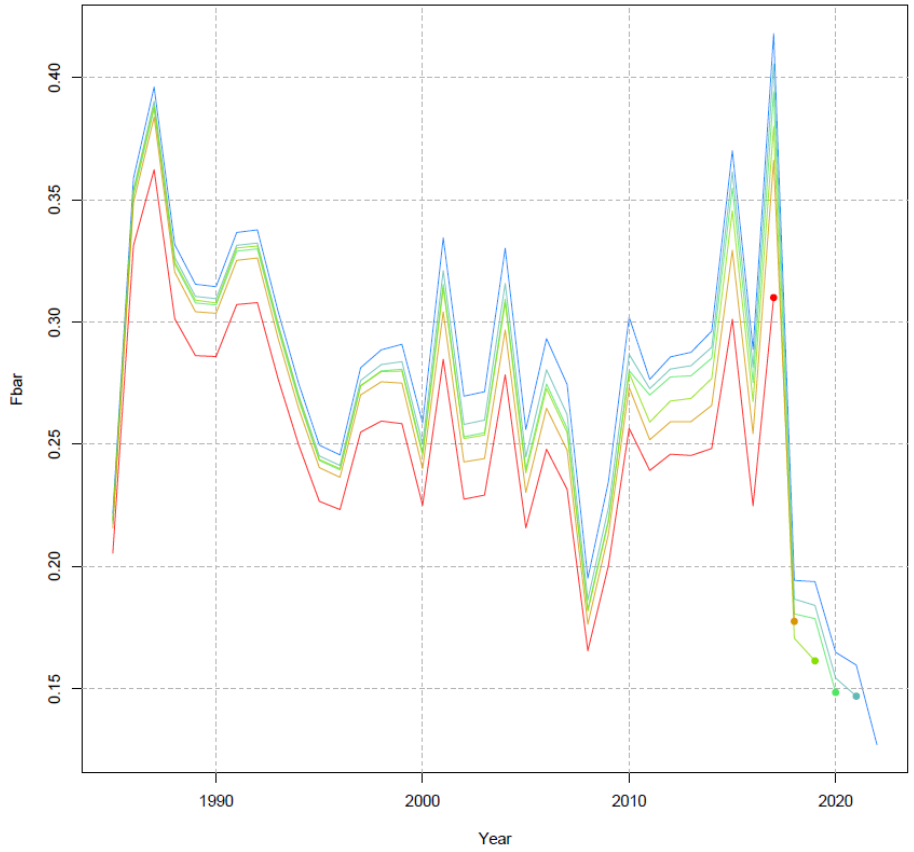
- Abundance estimates max of 577 million fish in 1985, declining to 155 million in 1995, increasing to a peak of 252 million in 2005, declined to a low of 138 million in 2016, and a terminal year estimate of 217 million fish
- Until 2022, estimates of recruitment have remained been below average (126 million) for the past decade
- Terminal year recruitment was estimated at 137 million, above average, and the highest value since 2005

MT2023 SSB and F



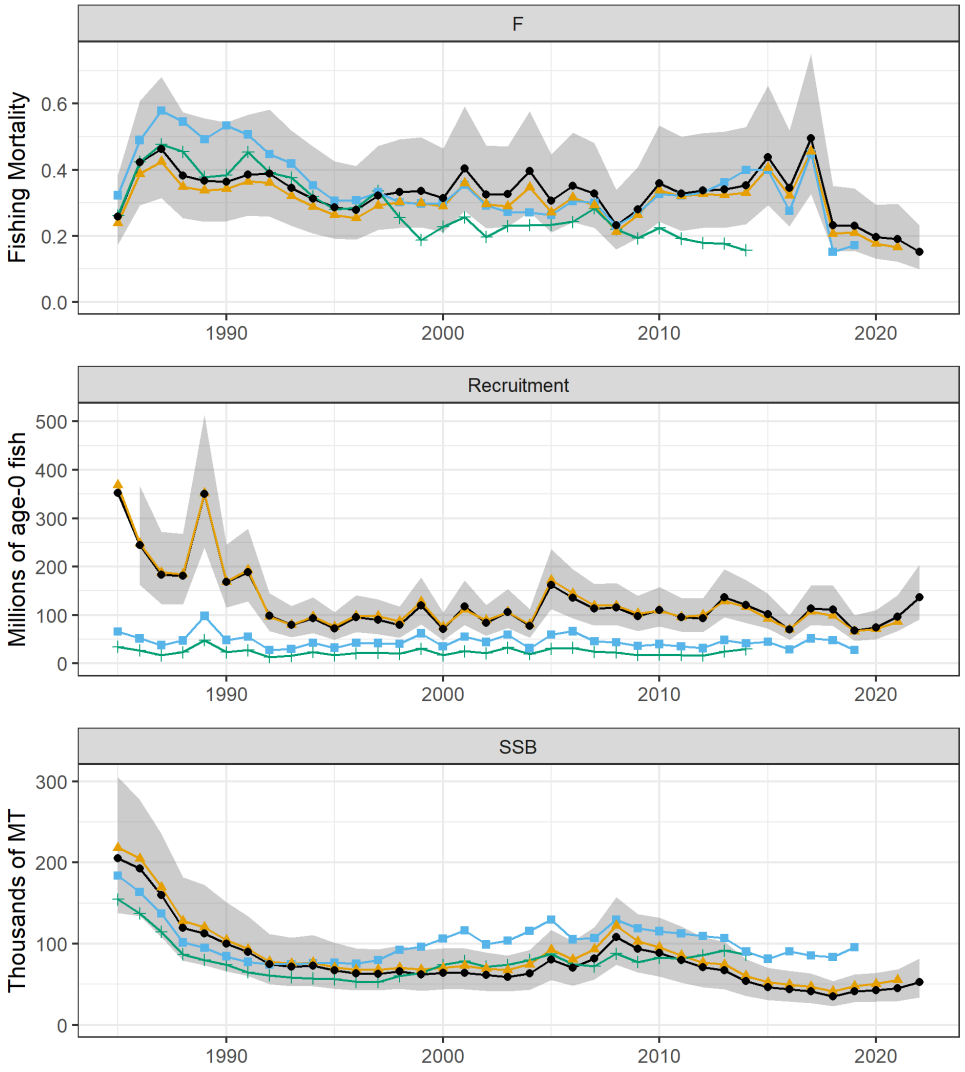
- Spawning stock biomass started from a high of 205,067 MT in 1985, declined over the time-series to a low of 35,152 MT in 2018, and increased to a value of 52,747 MT in 2022
- The majority of the spawning stock biomass is ages 4, 5, and 6+ for the entire time-series
- Fully selected fishing mortality in 2021 was 0.152, compared to an average F from 1985 to 2022 of 0.329.
- Estimates of F have varied over the time series with a peak in 2018 of 0.494, and the lowest value of 0.152 in 2021

MT2023 Retrospective



- Retrospective patterns for SSB (rho = 0.22) and F (-0.14) are within the 90% confidence bounds of model results and considered minor

MT2023 Historical Retrospective



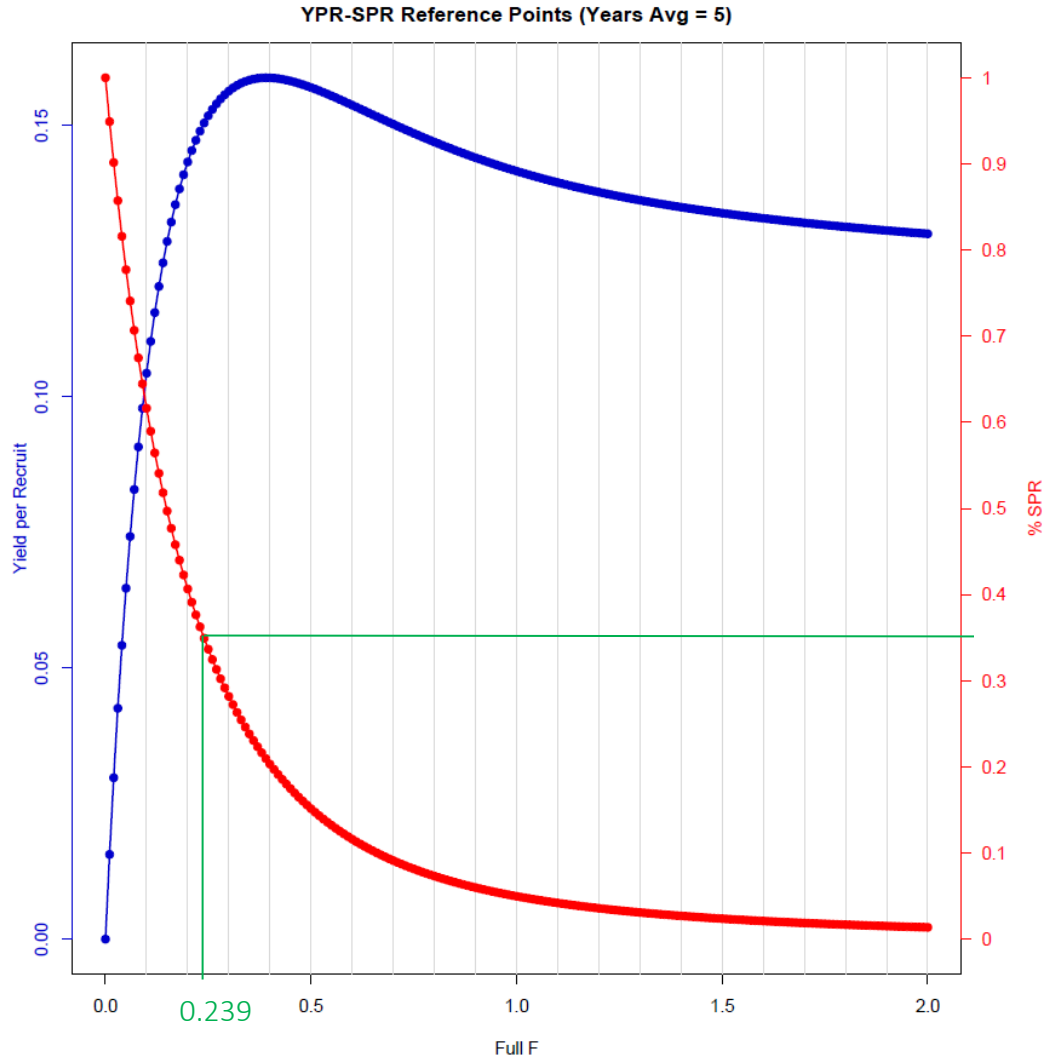
- A historical retrospective analysis showing the model results from the 2015 benchmark assessment, 2021 operational assessment, RT2022 model and the MT2023 update

Mgmt Track Update 2023
Mgmt Track Update 2021
Final WHAM Model 2022
SARC60 Model 2015

Term of Reference #4

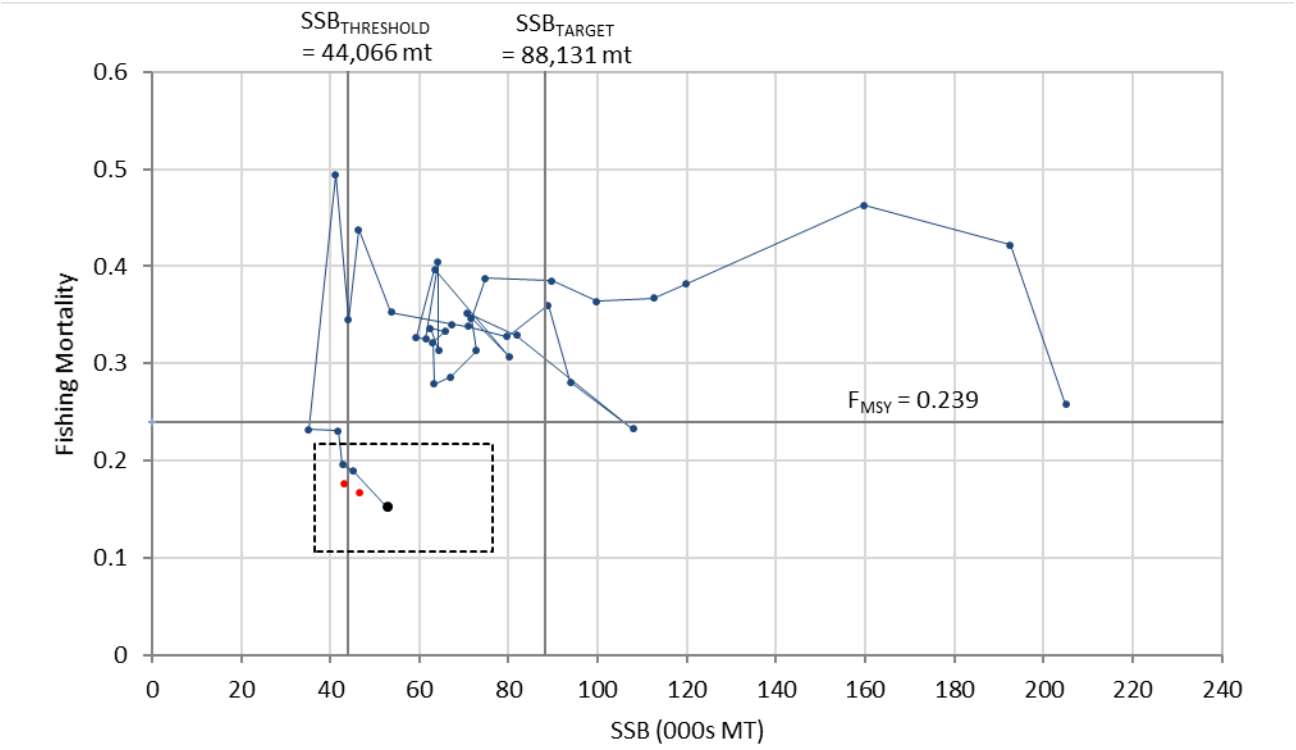
Re-estimate or update the BRP's as defined by the management track level and recommend stock status. Also, provide qualitative descriptions of stock status based on simple indicators/metrics (e.g., age- and size-structure, temporal trends in population size or recruitment indices, etc.).

MT2023 Reference Points



- Both F35% and SSB35% were calculated internally in WHAM using average recruitment over the time series (1985-2022), and 5 year averages for fishery selectivity, maturity and weights-at-age for SSB per recruit calculations
  - F35% = 0.239
- SSB35% was calculated using SPR at 35% (0.697) and the mean of the full time series of recruitment (126,474 MT)
  - SSB35% = 88,131 MT

MT2023 Stock Status



Not overfished and overfishing is not occurring

- Reference points from the final model:

$F_{35\%}$ = 0.239 (0.199 – 0.287)

$SSB_{35\%}$ = 88,131 MT (65,576 – 118,445 MT)

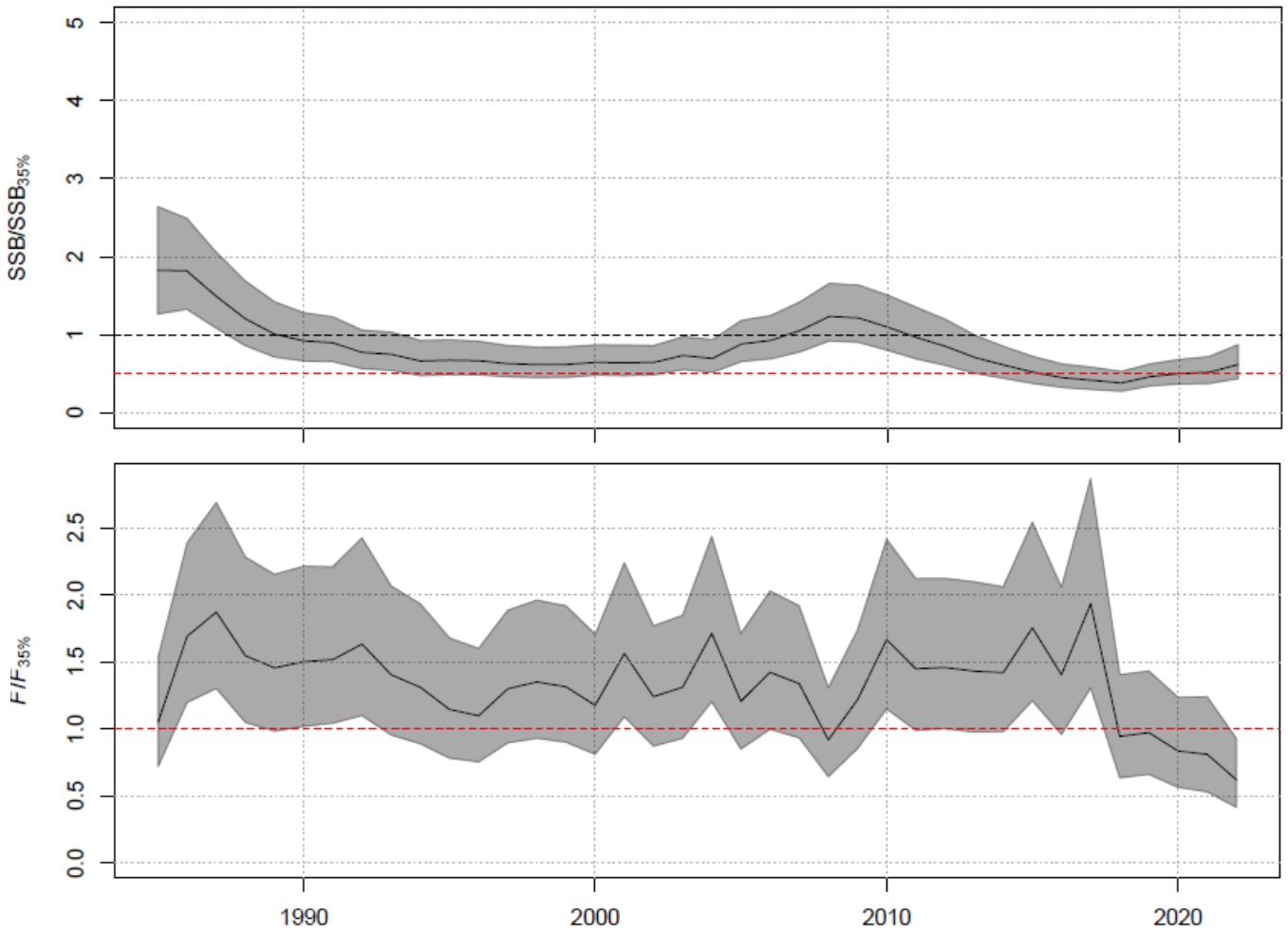
$SSB_{THRESHOLD}$ = 44,066 MT (32,788 – 59,223 MT)

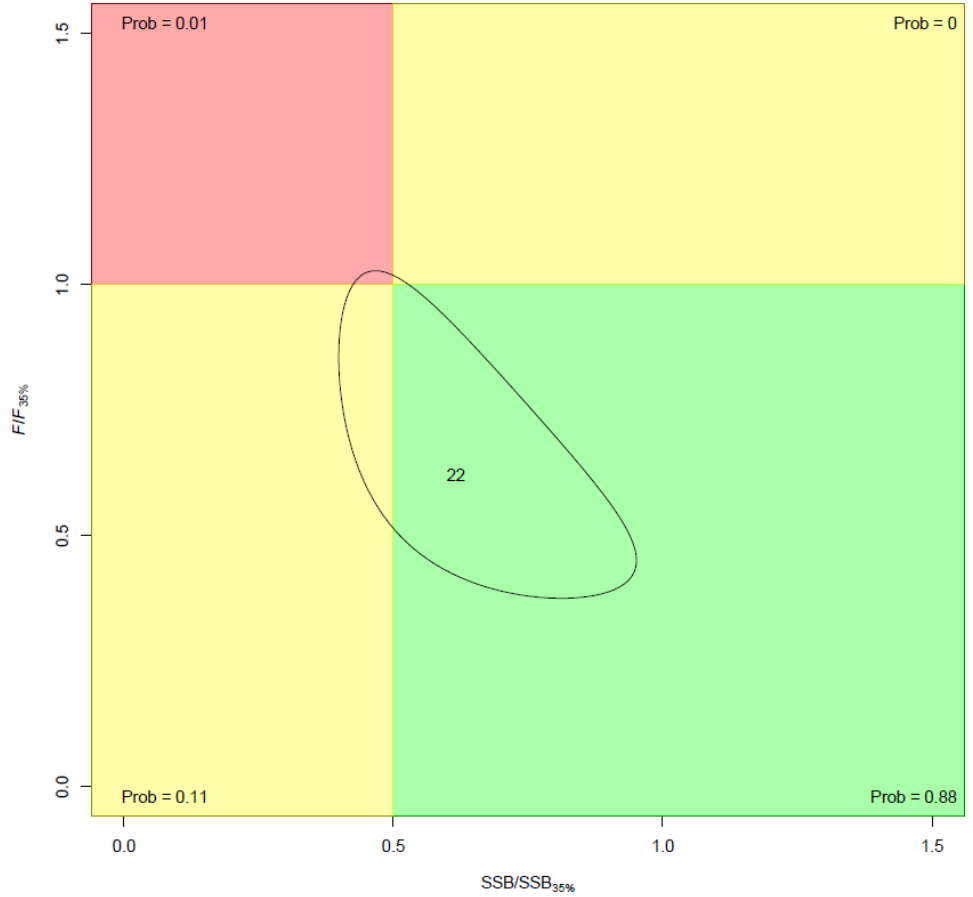
- Retrospective pattern minor for both F and SSB and adjustment not necessary

Historical BRP table

Reference Point	SAW60	OA2021	RT2022	MT2023
$F_{35\%}$	0.190	0.181	0.248	0.239
SSB_{TARGET}	101,343 MT	201729 MT	91,897 MT	88,131 MT
$SSB_{THRESHOLD}$	50,672 MT	100,865 MT	45,949 MT	44,066 MT

MT2023 Stock Status





- 88% chance that the bluefish stock is currently not overfished and over-fishing is not occurring

Term of Reference #5

Conduct short-term stock projections when appropriate