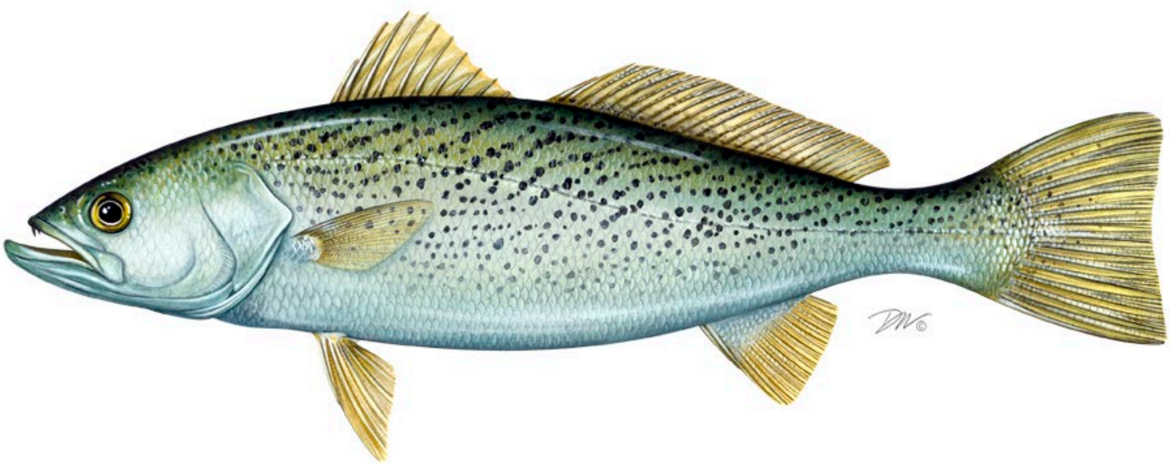
Atlantic States Marine Fisheries Commission

2025 Weakfish Stock Assessment Update



Sustainably and Cooperatively Managing Atlantic Coastal Fisheries

Executive Summary

The Bayesian statistical catch-at-age assessment model for weakfish was updated with data through 2023. This included updated commercial and recreational removals as well as updated fishery-independent and fishery-dependent indices of abundance. The last assessment update of weakfish was conducted in 2019 with a terminal year of 2017. During the current update, the Weakfish Technical Committee became concerned about some prior assumptions in the Bayesian model potentially leading to underestimating natural mortality in recent years, and due to this issue with model performance, does not recommend using this update for management.

Total removals for 2018-2023 averaged 478 mt, less than 10% of the time-series average of 4,912 mt, but have shown a small increasing trend since the last assessment update. Commercial landings reached a time-series low of 42.4 mt in 2015, but have been increasing somewhat in recent years; commercial landings averaged 51.3 mt from 2015-2017 and 86.6 mt from 2018-2023. Commercial discards also increased over this time period, averaging 199 mt from 2015-2017 and 238 mt from 2018-2023. A new time-block was added to the species guilds used to estimate commercial discards for this update which resulted in higher estimates of discards from 2015-2017 compared to the previous assessment update. However, a similar pattern of increasing estimates of discards in recent years is also detected when applying the species guilds from the 2019 assessment update. Recreational removals (harvest + release mortality) reached a time-series low of 45.1 mt in 2018 but have been increasing since then, averaging 153 mt from 2018-2023.

The catch-at-age in both commercial and recreational fisheries remains truncated compared to the late-1990s and early 2000s, with a very small proportion of fish older than age-4 observed. Although most states have met their sampling requirements in recent years, there were still gaps in the age-length keys that required borrowing across regions and years.

The indices showed mixed signals, with the MRIP HPUE, NC PSIGNS, and SEAMAP indices showing a somewhat increasing trend since 2017, while ChesMMAP, NEAMAP, the DE 30ft Trawl, and the NJ Ocean Trawl were variable and low over those years, with the exception of an extremely high value in the standardized NJ Ocean Trawl index in 2023. The young-of-year indices have generally varied without trend over the entire time-series, but the overall composite young-of-year index showed an uptick in 2022 and 2023 after several years of declining values, and indices from the northern end of the weakfish range (New York, Rhode Island, and Connecticut) have shown some increases in recent years.

The Bayesian model developed for the 2016 benchmark assessment estimates a time-varying natural mortality for weakfish, which was low and stable during the 1980s, increased rapidly during the late 1990s and early 2000s, and stabilized at a high level from 2007 onwards (ASMFC 2016). An upper bound of 1.0 on M was used in this model during the benchmark and 2019 assessment update; however, estimates of M came very close to that bound from 2008-2013. Additionally, the 2019 assessment update estimated an average M of 0.89 for 2014-2017 while

Krause et al. (2020) estimated an M of 2.33 for weakfish during that time period using an integrated tagging model. A model with an increased upper bound of M was tested in this update and resulted in higher estimates of M from 2008 to 2017. Estimates of SSB and recruitment were also higher from the early 2000s onward than the estimates from the 2019 assessment, and estimates of F were lower in model runs using higher bounds on M. Estimates of total Z were similar across models. Based on the empirical estimate of M from Krause et al. (2020) and the performance of the model, the TC is concerned that the model when constrained by an assumed upper bound on M set at the same low bound as in the benchmark and 2019 update is underestimating M in recent years, which has implications for both the scale of the population and the reference points. The extent of the work needed to resolve this issue is beyond the scope of an assessment update. Therefore, the TC recommends that this update not be used for management and that a benchmark should be conducted as soon as possible. Although there are some positive signs in the fishery-independent and fishery-dependent data, the status of weakfish has likely not changed significantly since the last assessment update, and the TC does not believe management changes are warranted at this time.

Table of Contents

List of Tables

List of Figures

Introduction

This Terms of Reference (TOR) report describes the update to the benchmark stock assessment for weakfish (ASMFC 2016). The benchmark was updated in 2019 (ASMFC 2019) to extend the fishery-independent and -dependent data for weakfish through 2017, and this update further extends the data, model, and assessment through 2023. Based on model performance issues when constrained by prior assumptions (see TOR 4 below), the TC does not recommend this assessment for management use and instead recommends that a benchmark assessment be completed as soon as possible.

TOR 1. Fishery-Dependent Data

Update fishery-dependent data (landings, discards, catch-at-age, etc.) that were used in the previous peer-reviewed and accepted benchmark stock assessment.

Total removals for 2018-2023 averaged 478 mt, less than 10% of the time-series average of 4,912 mt, but have shown a small increasing trend since the last assessment update (Table 1, Figure 1). Part of this was driven by an increasing trend in commercial discards, which were not well-estimated and accounted for 50% of total removals over this time period, but the more reliable estimates of removals from other sectors (commercial landings, recreational harvest, and recreational release mortality) have increased somewhat in recent years as well.

Commercial landings reached a time-series low of 42.4 mt in 2015 and averaged 51.3 mt from 2015-2017, but averaged 86.6 mt from 2018-2023.

Commercial discards were estimated from the Northeast Fisheries Observer Program data. The benchmark assessment used a species guild approach to identify other species commonly caught on trips that discarded weakfish. The observed ratio of weakfish discards to the landings of those guild species was then used to estimate weakfish discards from the total landings of guild species by region and gear (ASMFC 2016). For the benchmark, a single time-block (1982-2014) was used to determine the species guilds; however, a new time-block was added to determine the species guilds for this update (2015-2023; i.e., years since the benchmark). The new guild was implemented to capture recent changes in other fisheries and stocks that could influence what species were commonly caught when weakfish were discarded, while incorporating enough years of data to develop reliable associations. In general, the species guilds were similar between the benchmark and the 2025 update, but one notable change was Atlantic croaker in the northern region no longer being significantly associated with weakfish discards. Additional changes included kingfish, menhaden, and black drum becoming significant for some gears/regions.

The change in guild species resulted in higher estimates of commercial discards for 2015-2017 compared to the 2019 assessment update. Commercial discards averaged 199 mt from 2015-2017 and 238 mt from 2018-2023. A sensitivity run was conducted using the same species guilds used in the 2019 assessment update, which showed a similar increasing trend for 2017 onwards and a similar magnitude of peak discards for each method, although the estimates using the 2019 guilds peaked in 2021, slightly later than the base run time-series which peaked in 2019 (Figure 2). This indicated that while the change in guild species had some effect on estimates of total discards, the overall increasing trend was not solely caused by the new time-block for the species guilds.

Recreational removals (harvest + release mortality) reached a time-series low of 45.1 mt in 2018 but have been increasing since then, averaging 153 mt from 2018-2023. Recreational release mortality accounted for 27% of recreational removals and 9% of total removals over that time period.

As in the benchmark assessment, Florida commercial and recreational removals were adjusted to account for hybridization of weakfish with sand seatrout. Only data from Nassau and Duval counties were used, and the estimates were adjusted by the county-specific proportion of "pure" weakfish from Tringali et al. (2011).

The catch-at-age in both commercial and recreational fisheries remains truncated compared to the late-1990s and early 2000s, with a very small proportion of fish older than age-4 observed. Although most states have met their sampling requirements in recent years, there were still gaps in the age-length keys that required borrowing across regions and years.

The index of relative abundance derived from the MRIP intercept data from NY-GA was updated. The MRIP harvest-per-unit effort (HPUE) index has been increasing since the last assessment update, although it is still not at the levels seen during the mid-1990s to early 2000s (Figure 3).

TOR 2. Fishery-Independent Data

Update fishery-independent data (abundance indices, age-length data, etc.) that were used in the previous peer-reviewed and accepted benchmark stock assessment.

The six ongoing fishery-independent indices of age-1+ abundance and seven young-of-year indices were updated through 2023; the NEFSC Albatross index was also included in the model although its time-series ends in 2008. The composite recruitment index developed from the young-of-year indices was also updated. Several indices (SEAMAP, NC PSIGNS, NC P195, NJ Ocean Trawl, CT LISTS) had missing data points in 2020 and/or 2021 due to sampling issues resulting from COVID-19 and other factors. ChesMMAP changed vessels between assessment updates but provided calibrated data so the time-series was complete and consistent.

The indices showed mixed signals, with the MRIP HPUE, NC PSIGNS, and SEAMAP indices showing an increasing trend since 2017, while ChesMMAP, NEAMAP, the DE 30ft Trawl, and the NJ Ocean Trawl have generally been variable and low over those years (Figure 3). The young-of-year indices have generally varied without trend over the entire time-series, but the overall composite young-of-year index showed an uptick in 2022 and 2023 after several years of declining values, and indices from the northern end of the weakfish range (New York, Rhode Island and Connecticut) showed some increases in recent years. (Figure 4).

TOR 3. Life History Information and Model Parameterization

Tabulate or list the life history information used in the assessment and/or model parameterization (M, age plus group, start year, maturity, sex ratio, etc.) and note any differences (e.g., new selectivity block, revised M value) from benchmark.

Model parameterization is summarized in Table 3. The preferred model from the benchmark assessment was used, a Bayesian framework that estimates an age-constant, time-varying M and allows for spatial heterogeneity in the indices (that is, the proportion of the population available to each index can vary over time). No new selectivity blocks were added for the recreational or commercial fleets.

The benchmark assessment and 2019 assessment update used an upper bound of 1.0 on M, which was deemed reasonable for a species with a maximum observed age of 17 years. However, Krause et al. (2020) estimated a value of 2.33 for M for weakfish ages 2-3 from tagging data, which suggested that the upper bound of 1.0 might not be appropriate for recent years. Furthermore, the change in age structure seen in fishery independent surveys and the truncated catch-at-age seen in both the commercial and recreational fisheries indicated a higher M than the bound set in the benchmark. Therefore, the TC explored testing an increase in the upper bound of M during this assessment update.

TOR 4. Updated Assessment Model

Update accepted model(s) or trend analyses and estimate uncertainty. Include sensitivity runs and retrospective analysis if possible and compare with the benchmark assessment results. Include bridge runs to sequentially document each change from the previously accepted model to the updated model.

The trend and scale of the estimates from the model run with the original upper bound on M (1.0) was very similar to the results of the 2016 benchmark and the 2019 update, although adding additional years of data resulted in a lower estimate of M from late-1990s to early 2000 (Figure 5). This caused lower estimates of recruitment and SSB (Figure 6) and higher estimates of F for this period (Figure 5). These patterns were also seen in the 2019 update, as new years of data were added to the 2016 assessment. All models estimated high values of M from the late 2000s onward, all close to the upper bound of 1.0, suggesting that the bound is too low.

Runs were conducted with an upper bound of 1.5 and an upper bound of 3.0. Increasing the bound on M resulted in estimates that started diverging more significantly from the early 2000s onwards. The models with these higher bounds on M estimated higher M from the mid-2000s forward (Figure 7). As a result, estimates of F were lower (Figure 7) and estimates of recruitment and SSB (Figure 8) were higher from the early 2000s onwards, compared to both the 2025 model with the bound of 1.0 and the 2016 and 2019 assessments. However, estimates of total mortality were similar across all runs (Figure 7).

This exploration of model sensitivity and the empirical estimate of M from Krause et al. (2020) suggest that the current configuration of the Bayesian model with M bounded at 1 is underestimating M in recent years, and the TC does not recommend using the results for management. The ASMFC Benchmark Assessment Process framework specifies that changes to M require a benchmark assessment, due to how influential this parameter is on population scale and reference point estimates. The initial exploratory runs conducted during this update indicate that changing the bound on M is effectively changing the scale of M within the assessment, making it a change that is more appropriate for a benchmark. In addition, this change would likely affect model performance in other areas, particularly related to the assumption of spatial heterogeneity in the indices. The amount of work needed to fully explore this issue and understand the impacts of increasing the bound on M on model performance is beyond the scope of an update.

Additionally, a sensitivity run was conducted to evaluate the effect of the change in the commercial discards estimation method, which was minimal and did not cause the differences in between the 2019 and 2025 estimates (Figure 9).

TOR 5. Stock Status

Update the biological reference points or trend-based indicators/metrics for the stock. Determine stock status.

The SSB threshold is defined as $SSB_{30\%}$, equivalent to 30% of the projected SSB under the time-series average natural mortality and no fishing. When SSB is below that threshold, the stock is considered depleted.

Currently, total mortality (Z) benchmarks are used to prevent an increase in fishing pressure when F is low but M is high. When Z is below the Z target, F reference points can be used to assess overfishing status. The Z and F targets and thresholds were calculated based on the time-series average natural morality estimate. The Z target is $Z_{30\%SPR}$ and the Z threshold is $Z_{20\%SPR}$. $F_{30\%SPR}$ and $F_{20\%SPR}$ are the F target and threshold, respectively.

Given the results of the Bayesian model and the reliance of the reference point definitions on average M, the TC did not update the reference points or provide a quantitative evaluation of stock status.

There have been some positive signs in the fishery-independent and fishery-dependent data, with slight increases in commercial and recreational catch in recent years, albeit from very low values, and increases in some indices. However, other indices have varied without trend, and the age structure of the catch and adult indices has not expanded. The data suggest the status of weakfish has likely not changed significantly since the last assessment update, and the TC does not believe management changes are warranted at this time.

TOR 6. Projections
Conduct short term projections when appropriate. Discuss assumptions if different from the benchmark and describe alternate runs.

Projections were not conducted for this update.

TOR 7. Research Recommendations
Comment on research recommendations from the benchmark stock assessment and note which have been addressed or initiated. Indicate which improvements should be made before the stock undergoes a benchmark assessment.

The TC recommends that a benchmark assessment for weakfish be initiated in 2026 and peer-reviewed in 2028, or as soon as possible thereafter.

A high priority for this benchmark will be evaluating the ability of the model to estimate M in the current low removals scenario, as well as exploring potential other parameterizations or frameworks including an age-varying as well as time-varying M.

The TC continued to support the research recommendations from the benchmark assessment; the highest priority recommendations are listed here.

- Increase observer coverage to identify the magnitude of discards for all commercial gear types from both directed and non-directed fisheries.
- Evaluate predation of weakfish with a more advanced multispecies model (e.g., the ASMFC MSVPA or Ecopath with Ecosim).
- Develop a bioenergetics model that encompasses a broader range of ages than Hartman and Brandt (1995) and use it to evaluate diet and growth data.
- Analyze the spawner-recruit relationship and examine the effects of the relationship between adult stock size and environmental factors on year class strength.
- Develop a coastwide tagging program to identify stocks and determine migration, stock mixing, and characteristics of stocks in over wintering grounds. Determine the relationship between migratory aspects and the observed trend in weight at age.
- Monitor weakfish diets over a broad regional and spatial scale.
- Continue to investigate the geographical extent of weakfish hybridization.

Of these, only one, *Evaluate predation of weakfish with a more advanced multispecies model*, has had any significant progress, with weakfish included as part of the NWCAS-MICE Ecopath with Ecosim model that the Commission used to develop ecological reference points for Atlantic menhaden (SEDAR 2020). However, that model has not been very informative about weakfish dynamics, as weakfish is not well-fit within the model and predators on weakfish like bottlenose dolphin are not explicitly included. More work, both model-based and empirical, is needed to identify the causes of increased M on weakfish.

The TC recognizes the difficulties in achieving the current biological sampling targets for weakfish, but notes that these are important data for the assessment and recommends maintaining current sampling targets and efforts.

Literature Cited

Atlantic States Marine Fisheries Commission (ASMFC). 2016. Weakfish Benchmark Stock Assessment and Peer Review Report. Arlington, VA. 270p. Available online at: https://asmfc.org/wp-content/uploads/2025/01/2016WeakfishStockAssessment_PeerReviewReport_May2016.pdf

ASMFC. 2019. Weakfish Stock Assessment Update Report. Arlington, VA. 93p. Available online at: https://asmfc.org/wp-content/uploads/2025/01/Oct_2019WeakfishAssessmentUpdate.pdf

Krause, J. R., Hightower, J. E., Poland, S. J., and Buckel, J. A. 2020. An integrated tagging and catch-curve model reveals high and seasonally-varying natural mortality for a fish population at low stock biomass. Fisheries Research 232: 105725.

Southeast Data, Assessment, and Review (SEDAR). 2020. SEDAR 69 – Atlantic Menhaden Ecological Reference Point Benchmark Assessment and Peer Review Report. SEDAR, North Charleston, SC. 560 pp.

Tringali, M.D, Seyoum, S., Higham, M., Wallace, E.M. 2011. A dispersal-dependent zone of introgressive hybridization between weakfish, *Cynoscion regalis*, and sand seatrout, *C. arenarius*, (Sciaenidae) in the Florida Atlantic. Journal of Heredity 102: 416-432.

Tables

Table 1. Weakfish removals by sector in metric tons.

Year	Commercial Landings	Commercial Discards	Recreational Landings	Recreational Release Mortalities
1982	8,835.3	310.4	7,163.9	20.5
1983	7,926.6	385.6	7,694.7	12.3
1984	8,969.3	340.3	3,391.6	9.5
1985	7,690.0	395.9	4,234.2	13.0
1986	9,610.7	316.9	8,365.8	73.9
1987	7,744.0	301.0	9,232.2	32.7
1988	9,310.7	259.6	3,278.1	29.7
1989	6,424.0	211.6	1,807.1	12.4
1990	4,281.0	592.5	965.0	20.8
1991	3,943.1	495.8	1,958.2	76.6
1992	3,381.0	464.2	1,653.1	63.1
1993	3,108.8	512.2	938.0	54.0
1994	2,808.0	356.1	1,198.4	176.7
1995	3,219.9	404.8	1,711.2	205.1
1996	3,147.8	498.5	2,455.7	400.4
1997	3,310.1	270.0	3,201.2	286.7
1998	3,820.9	280.4	3,238.2	293.3
1999	3,132.1	231.7	3,208.6	396.4
2000	2,449.6	156.2	3,806.2	143.1
2001	2,267.7	128.6	2,125.4	187.2
2002	2,165.0	126.1	1,957.1	117.1
2003	907.7	105.4	882.8	85.1
2004	691.2	37.9	1,008.2	77.8
2005	520.4	48.1	1,170.0	94.6
2006	481.6	38.6	822.4	147.8
2007	413.1	42.1	541.7	97.0
2008	212.7	44.1	486.8	135.5
2009	173.8	55.9	194.0	27.9
2010	93.4	40.2	78.4	44.2
2011	66.0	51.9	46.4	29.5
2012	139.4	44.1	304.3	62.3
2013	161.8	28.4	211.4	18.2
2014	92.9	44.7	98.8	34.9
2015	42.4	226.0	204.6	46.5
2016	50.9	137.4	103.5	58.7
2017	60.6	233.9	197.5	28.6
2018	46.1	276.1	31.0	14.1
2019	87.8	356.7	70.2	29.8
2020	95.7	180.2	118.1	21.3
2021	87.8	353.6	121.6	42.5
2022	89.1	118.3	173.0	68.1
2023	113.0	141.8	157.5	71.6

Table 2. Summary of indices used in the assessment.

Index Name	Index Metric	Design	Time of Year	Years	Ages
MRIP HPUE	Harvest per trip	Stratified Random	Mar-Dec	1982-2023	1+
SEAMAP	Mean number per tow	Stratified Random	April-June	1990-2023	1+
NC PSIGNS	Mean number per set	Stratified Random	Feb-Dec	2001-2023	1+
ChesMMAP	Mean number per tow	Stratified Random	Sep & Nov	2002-2023	1+
DE Bay 30' Trawl Survey	Mean number per tow	Fixed station	May-Sep	1990-2023	1+
NJ Ocean Trawl	Mean number per tow	Stratified Random	Aug & Oct	1990-2023	1+
NEFSC Bottom Trawl (Albatross)	Mean number per tow	Stratified Random	Sep-Nov	1982-2008	1+
NEAMAP	Mean number per tow	Stratified Random	Sep-Oct	2007-2023	1+
Composite Young-of-Year Index	Mean number per tow	Combined surveys		1982-2023	YOY
NC P195 Trawl Survey	Mean number per tow	Stratified Random	Sep	1987-2023	YOY
VIMS Chesapeake Bay Juvenile Trawl Survey	Mean number per tow	Stratified Random	Aug-Oct	1982-2023	YOY
MD Coastal Bays Juvenile Trawl Survey	Mean number per tow	Fixed station	Apr-Oct	1989-2023	YOY
DE Bay Juvenile Trawl Survey	Mean number per tow	Fixed station	May-Sep	1990-2023	YOY
NY Peconic Bay Juvenile Trawl Survey	Mean number per tow	Random	Jul-Aug	1985-2023	YOY
CT LISTS	Mean number per tow	Stratified Random	Sep-Oct	1984-2023	YOY
RI Seasonal Trawl Survey	Mean number per tow	Stratified Random + Fixed Stations	Sep-Nov	1982-2023	YOY

Table 3. Model structure and life history information used in the stock assessment.

	Value(s)
Years in Model	1982-2023
Age Plus Group	6+
Fleets	2 (Rec, Commercial)
Selectivity blocks	Rec: 1982-1996, 1997-2023 Comm: 1982-2023
Recreational Release Mortality Rate	10%

	Age Group					
	1	2	3	4	5	6+
Proportion mature-at-age	0.9	1	1	1	1	1
Natural mortality	Age-constant, time-varying					

Figures

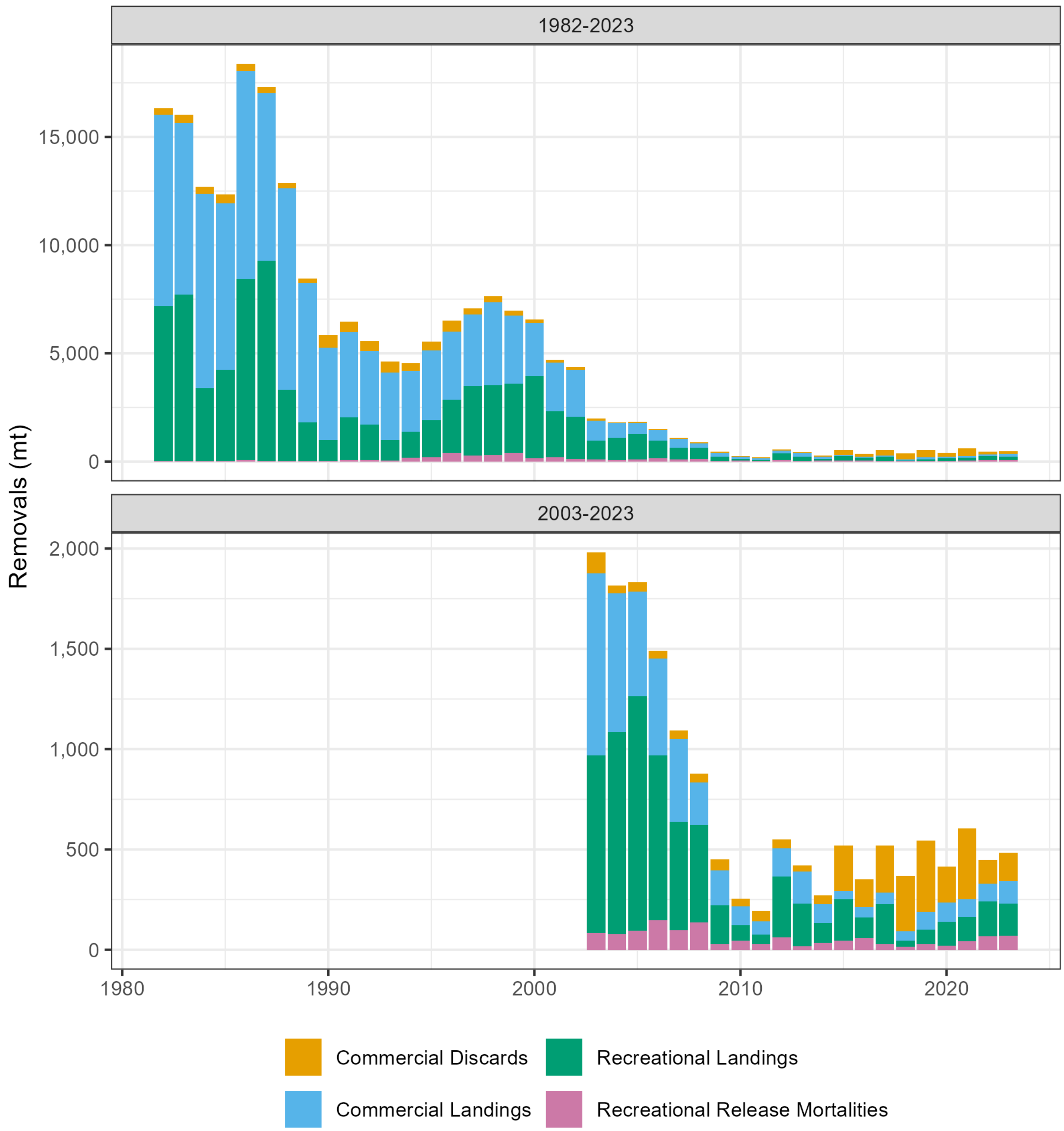


Figure 1. Weakfish removals by sector for 1982-2023 (top) and 2003-2023 (bottom) to show detail in recent years (note difference in scale of y-axis).

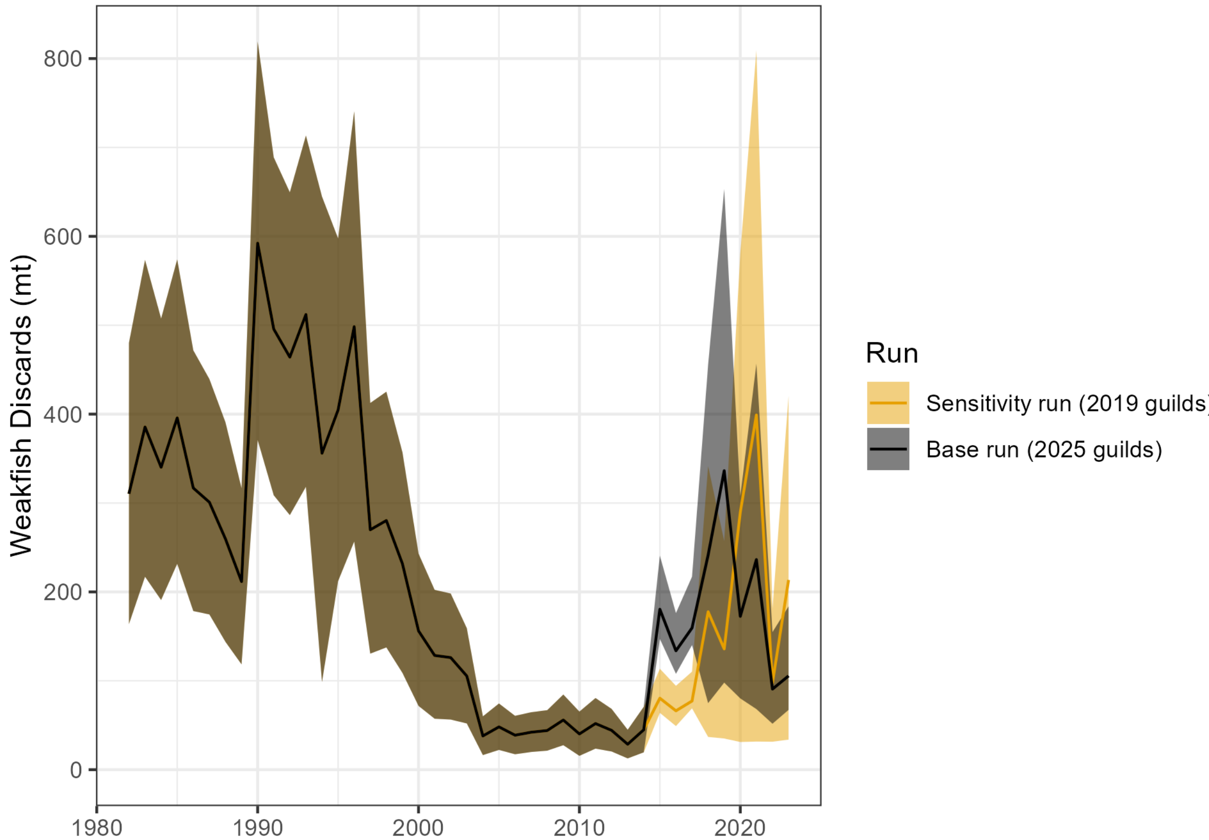


Figure 2. Commercial discard estimates for the base run using the new species guilds for 2015-2023 and the sensitivity run using the 2019 species guilds for that time period.

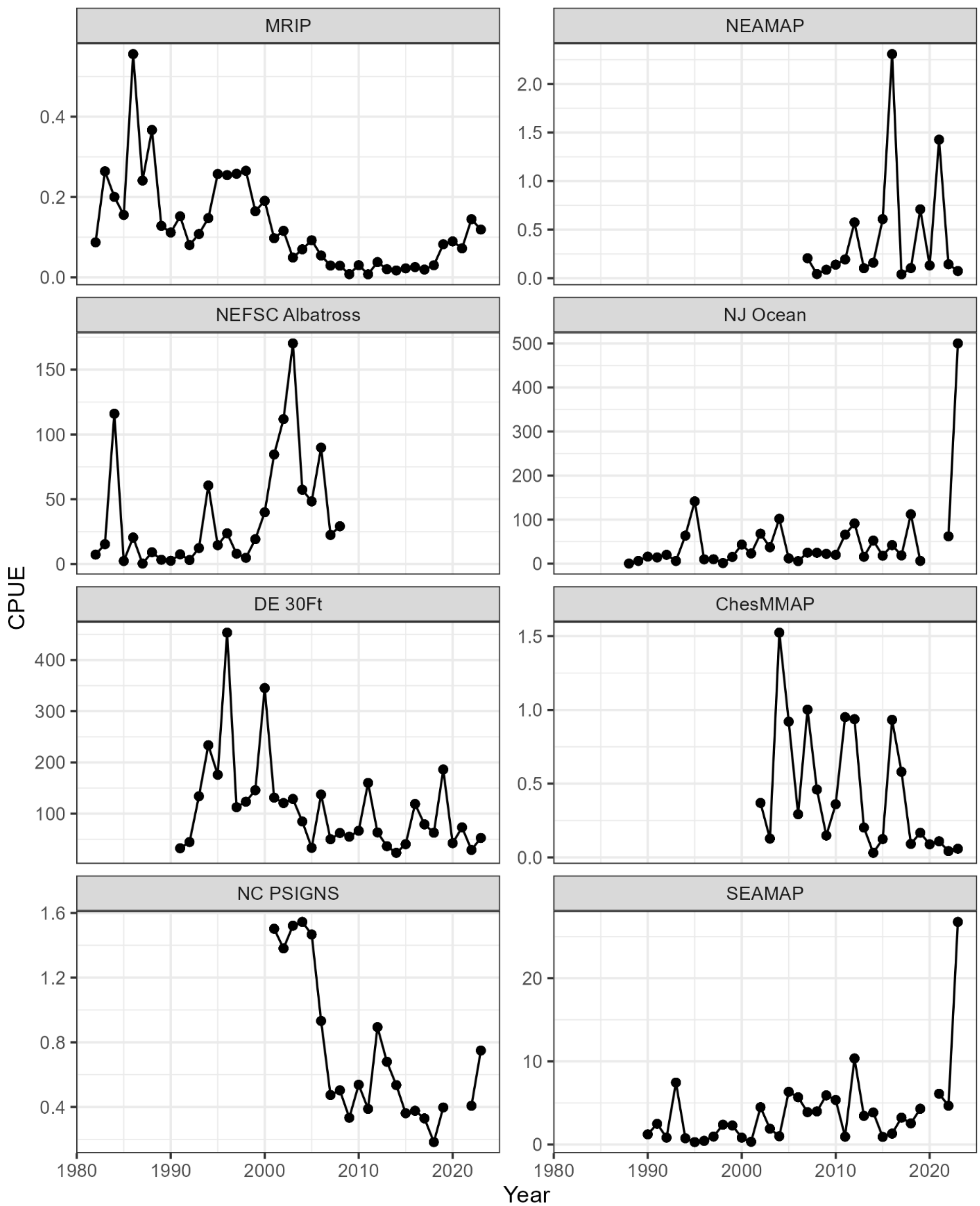


Figure 3. Age-1+ indices of abundance for weakfish.

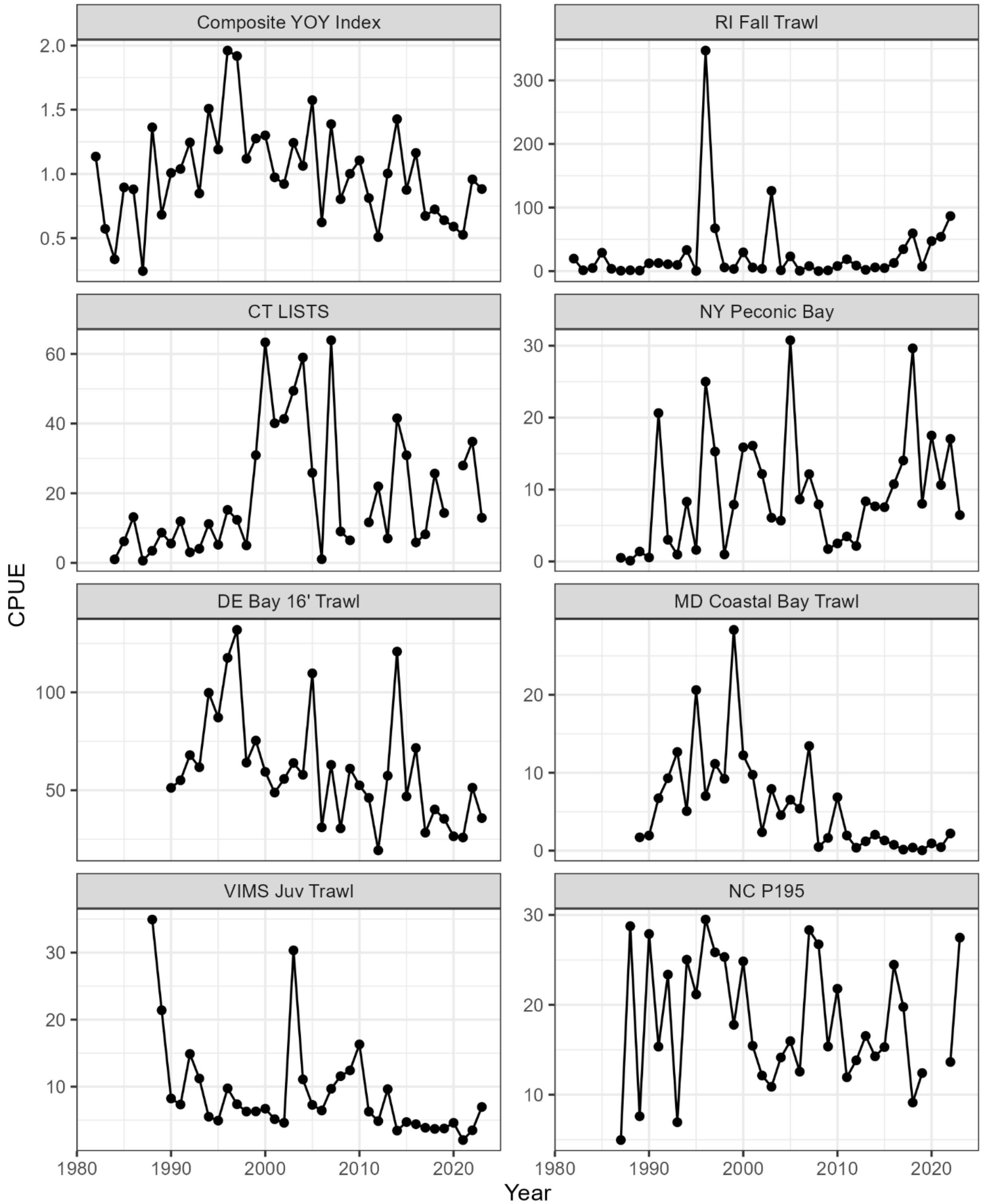


Figure 4. Young-of-year indices for weakfish.

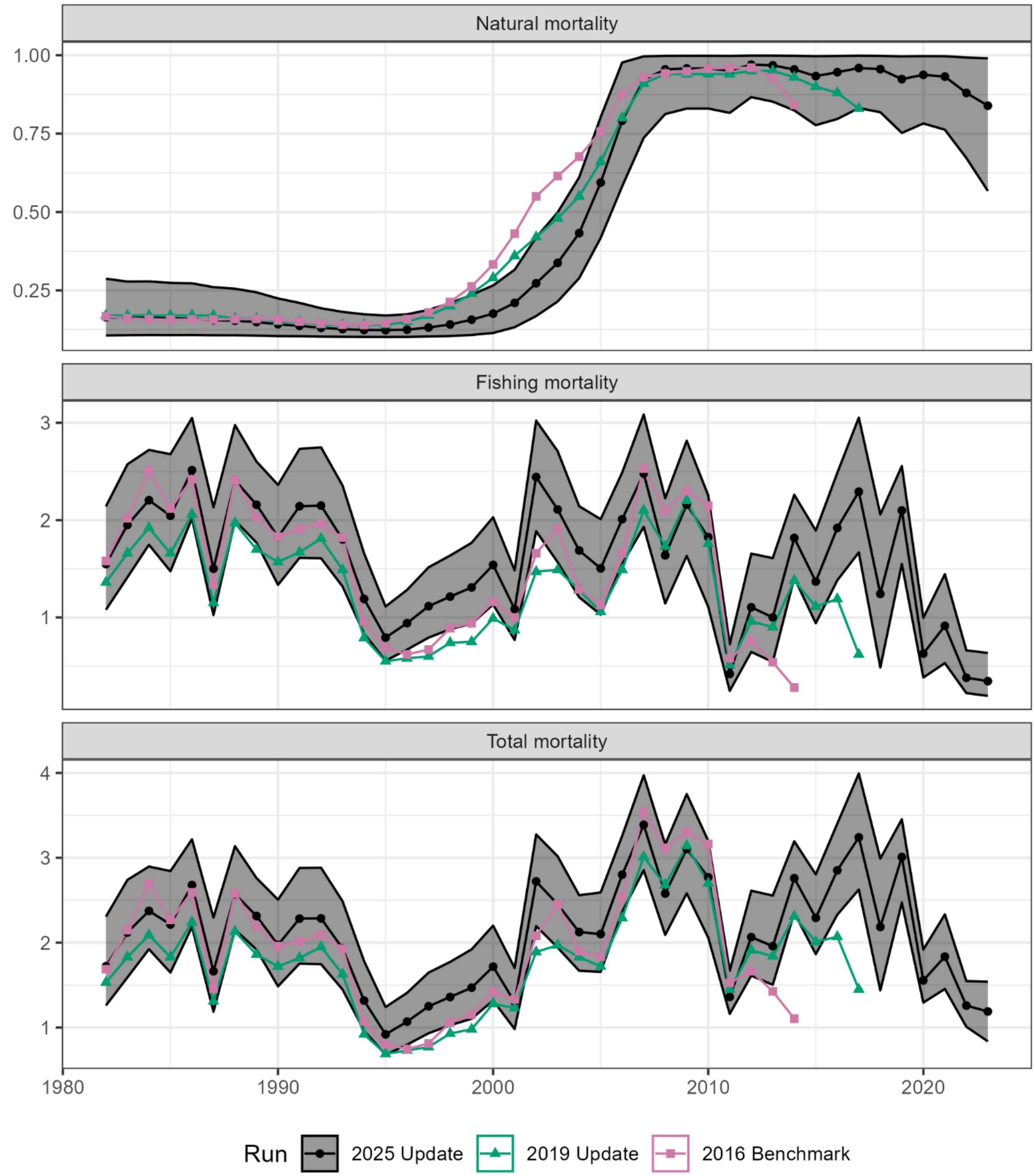


Figure 5. Historical retrospective plot of M, F, and Z estimates from the 2025 update, the 2019 update, and the 2016 benchmark assessment. All models used an upper bound of 1.0 on M. The shaded area indicates the 95% credible intervals of this assessment update.

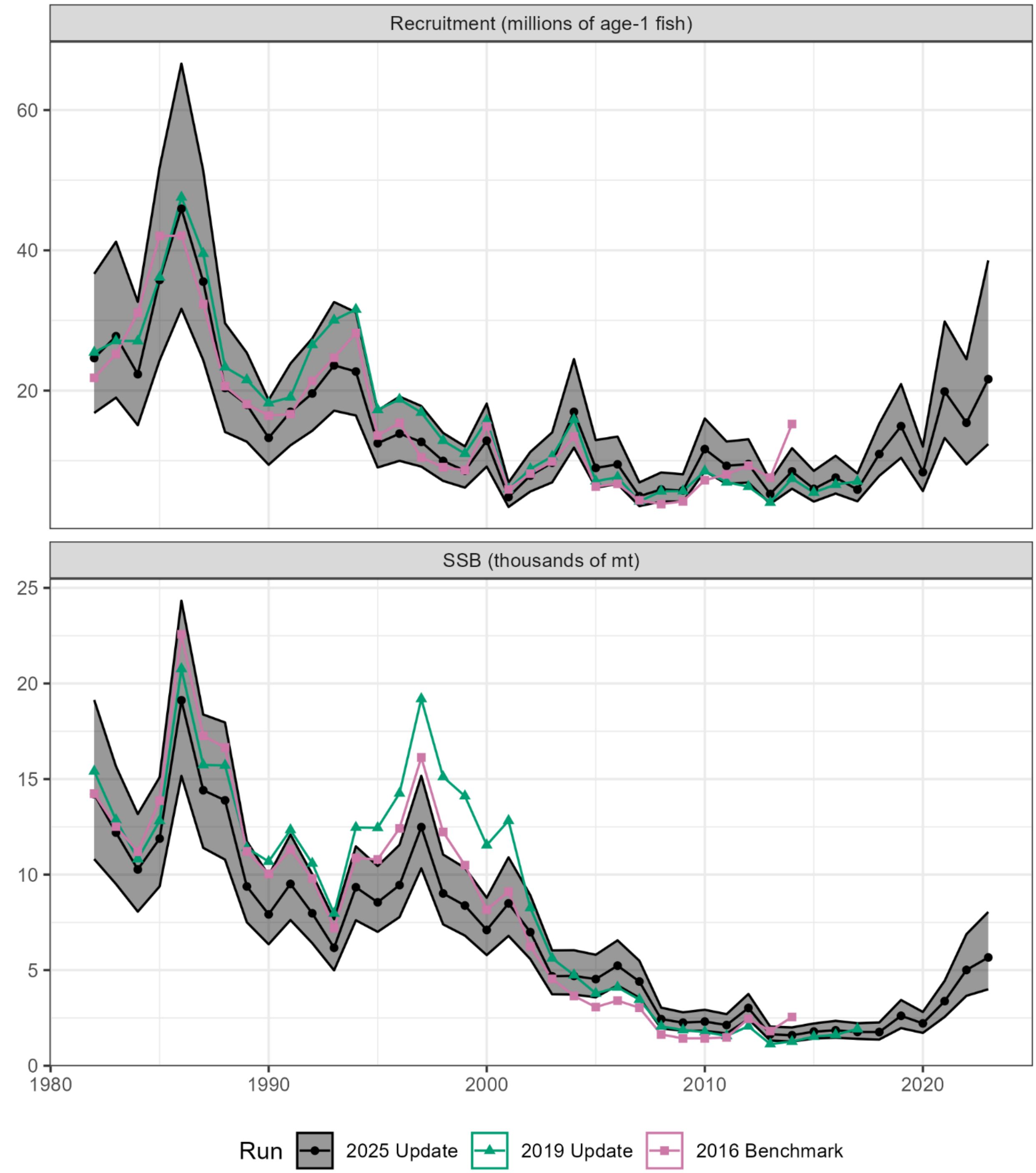


Figure 6. Historical retrospective plot of recruitment (top) and SSB (bottom) from the 2025 update, the 2019 update, and the 2016 benchmark assessment. All models used an upper bound of 1.0 on M. The shaded area indicates the 95% credible intervals of this assessment update.

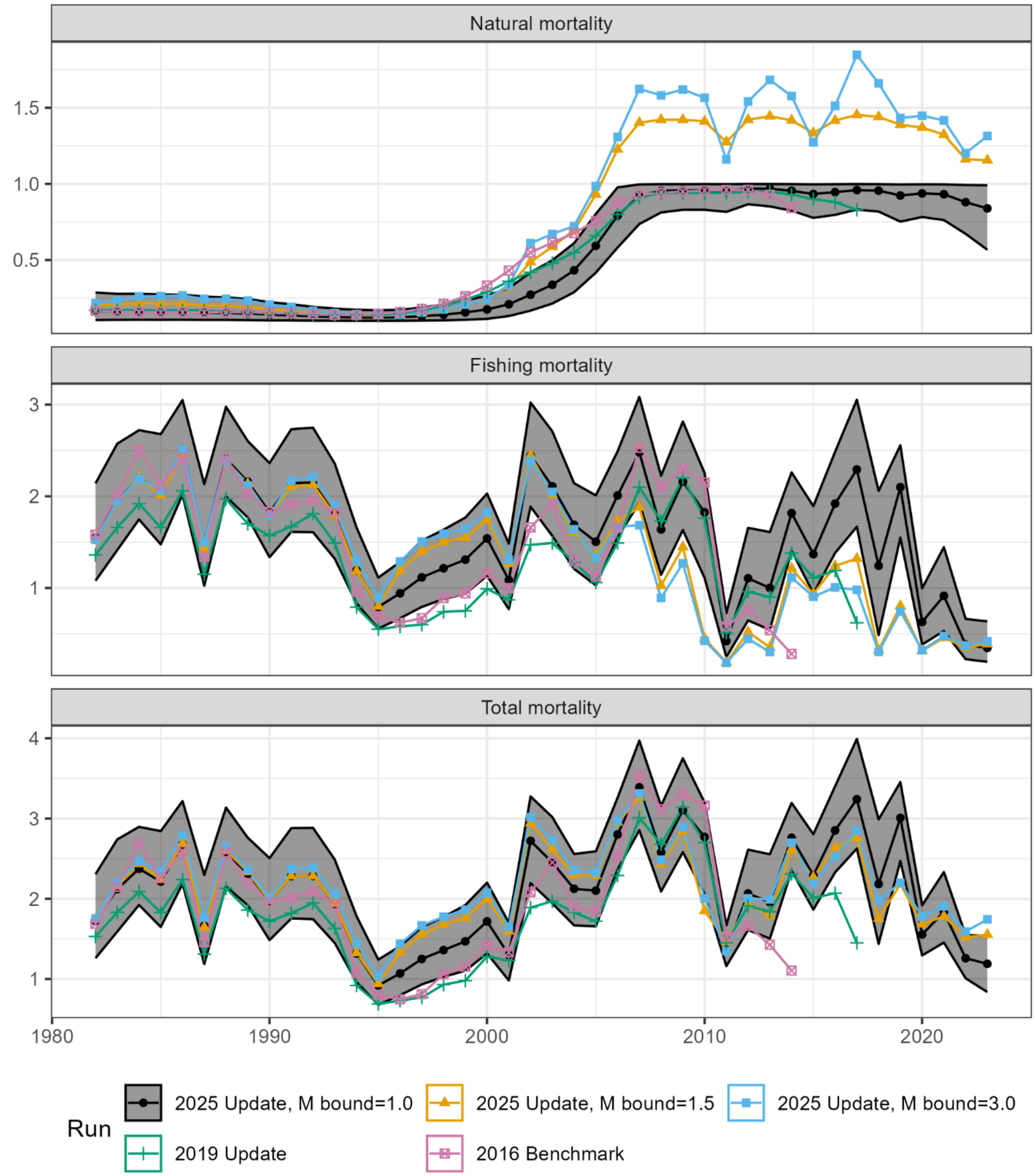


Figure 7. Comparison of M, F, and Z estimates from the 2025 update with different bounds on M and the 2016 and 2019 assessments. Shaded areas indicated the 95% credible interval of the 2025 update with the bound of 1.0.

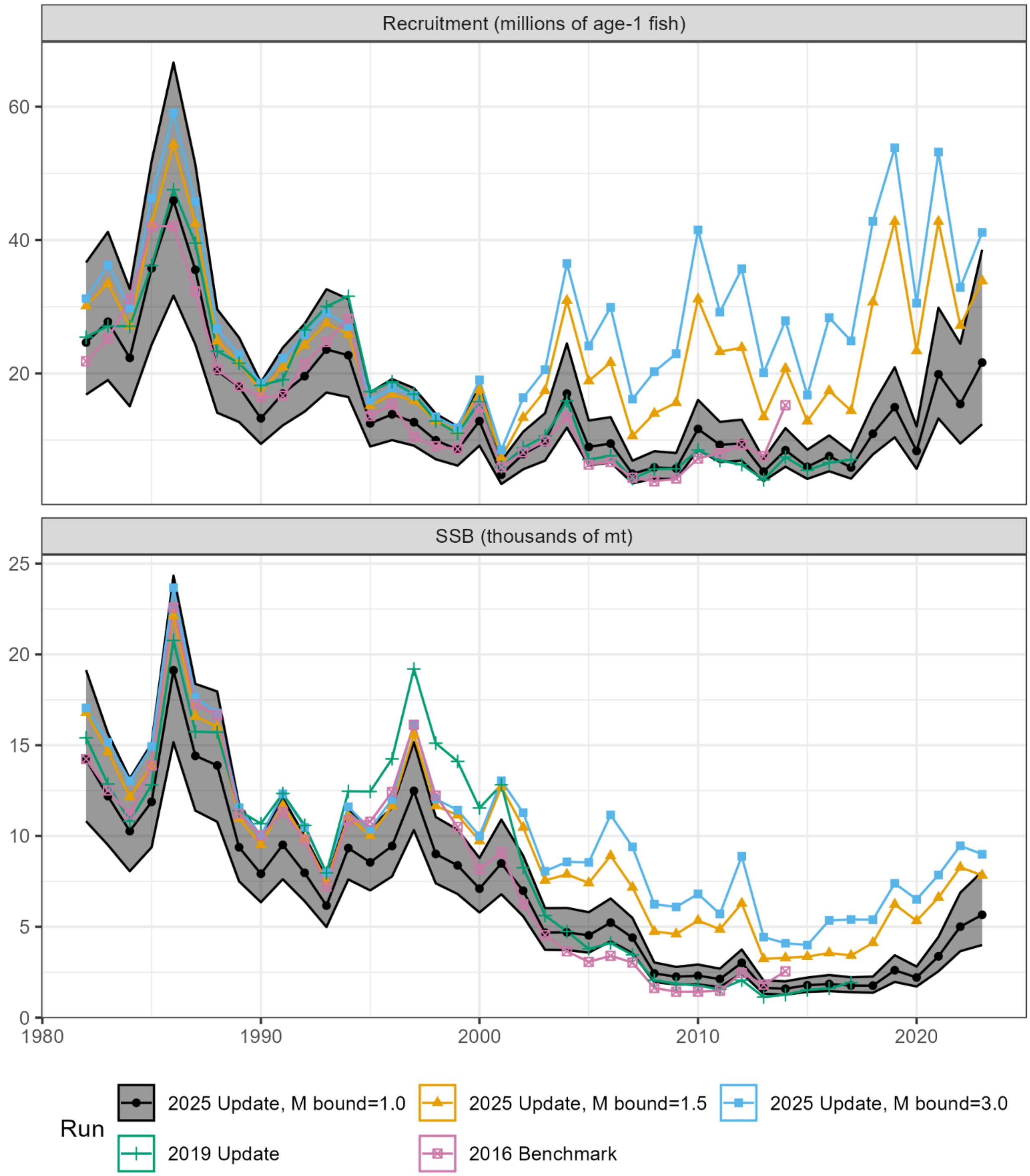


Figure 8. Estimate of recruitment and SSB from the 2025 update with different bounds on M and the 2016 and 2019 assessments. Shaded areas indicated the 95% credible interval of the 2025 update with the bound of 1.0.

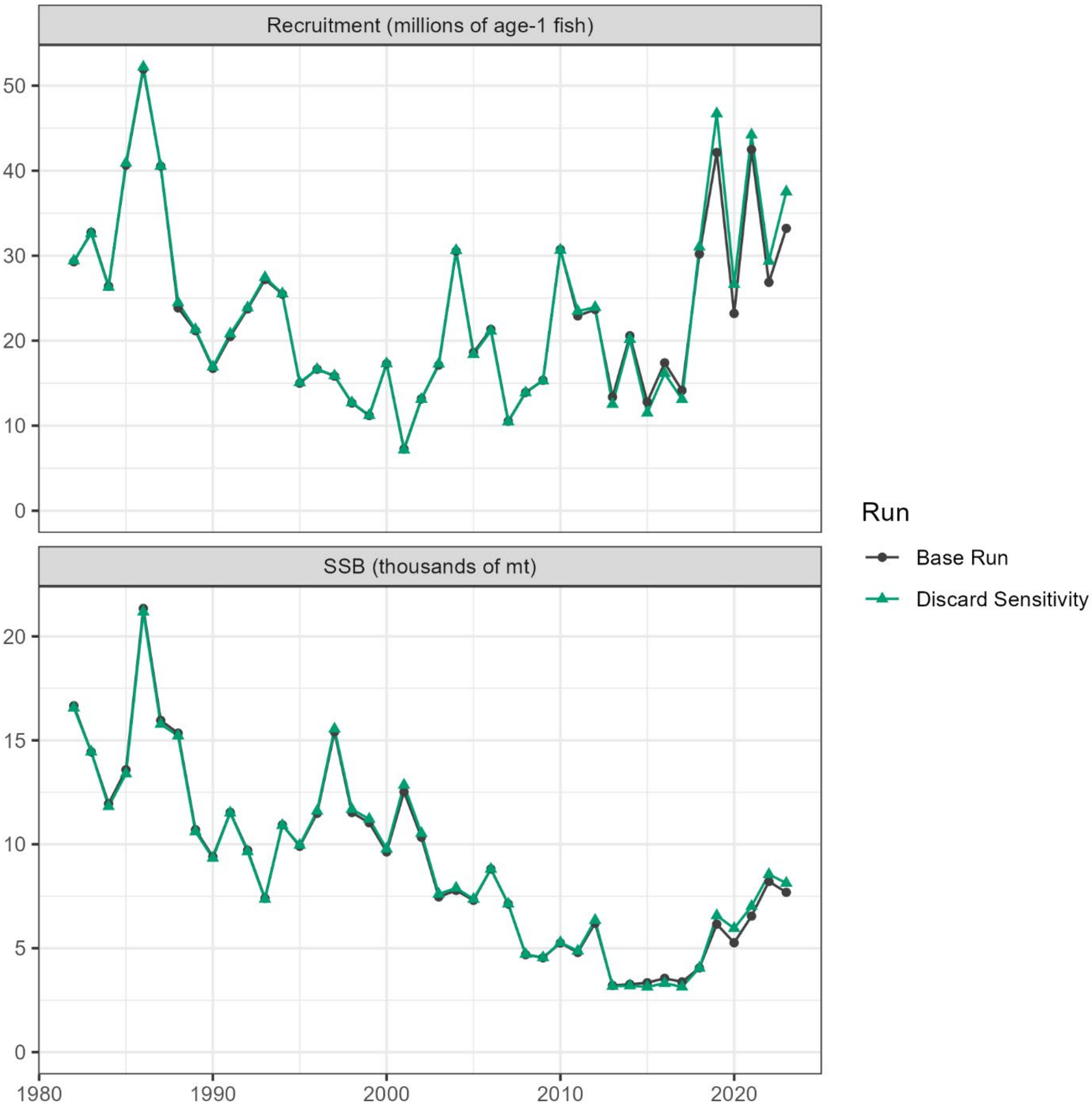
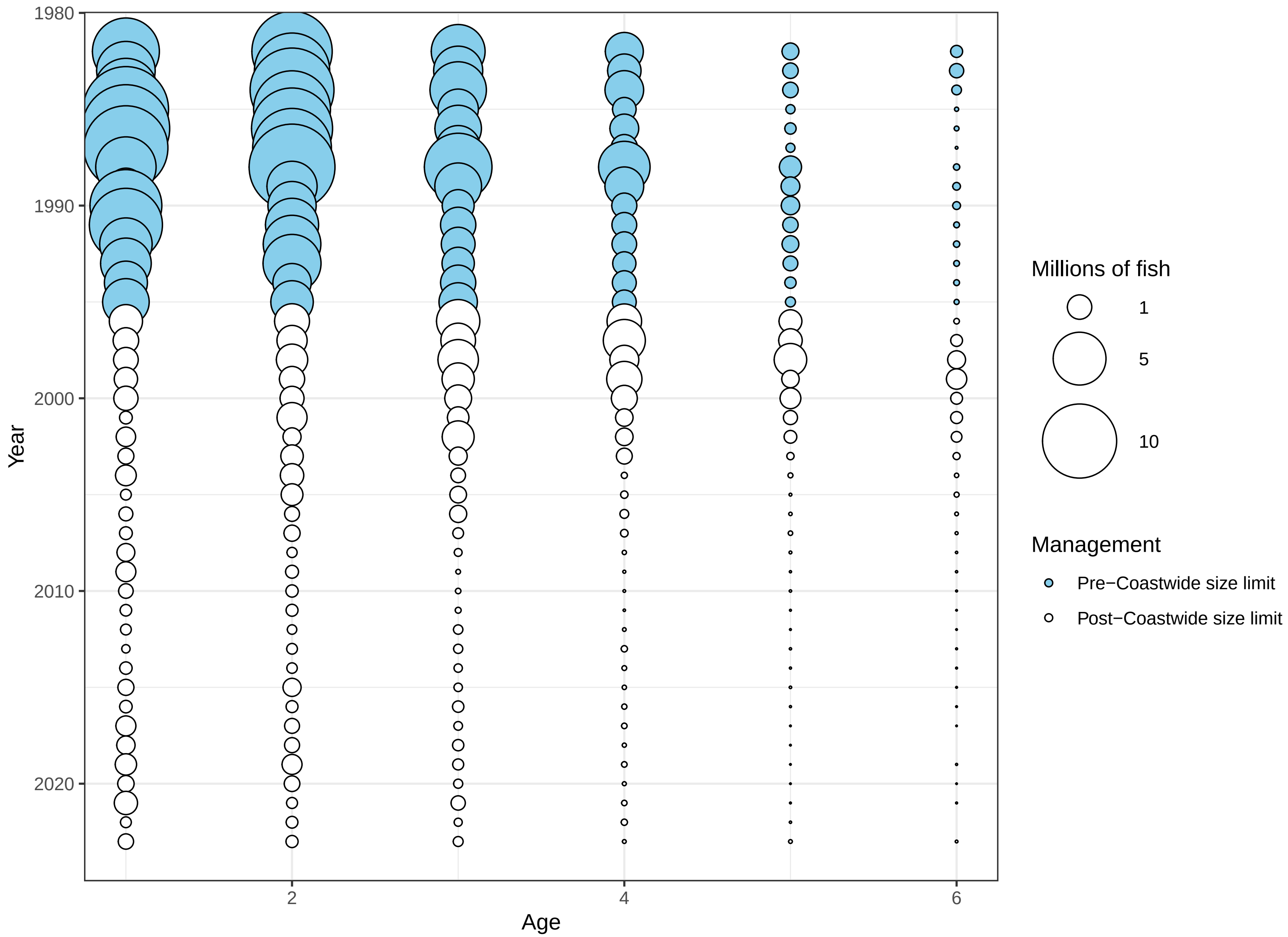


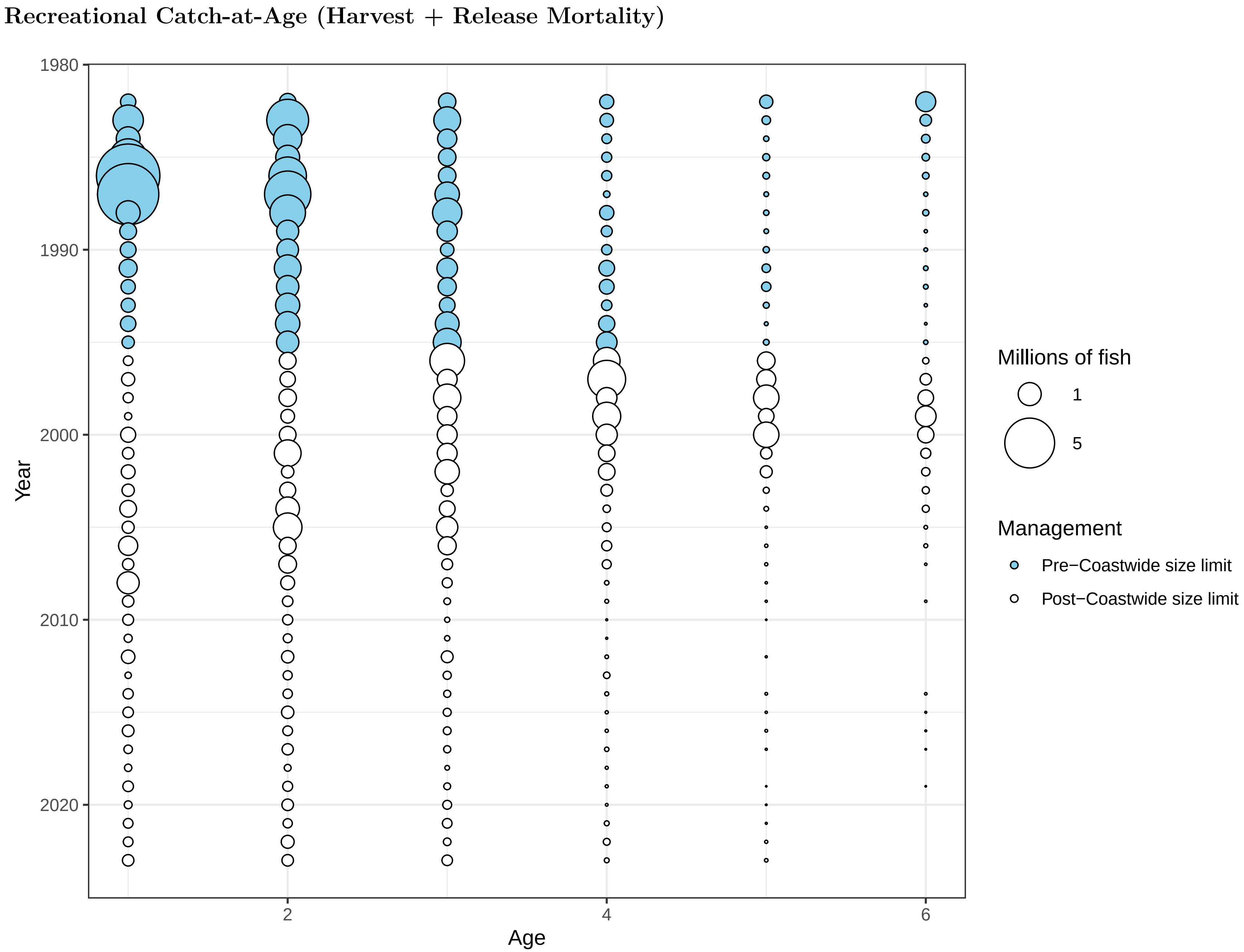
Figure 9. Recruitment (top) and SSB (bottom) for the 2025 assessment run with the updated species guilds and the sensitivity run with commercial discards calculated using the 2019 species guilds.

Appendix I: Input and Diagnostic Plots

- Input Data Plots
  - Catch-at-Age
  - Index-at-Age
- Diagnostic Plots
  - Observed vs. Predicted
    - Indices
    - Total catch
    - Catch-at-age

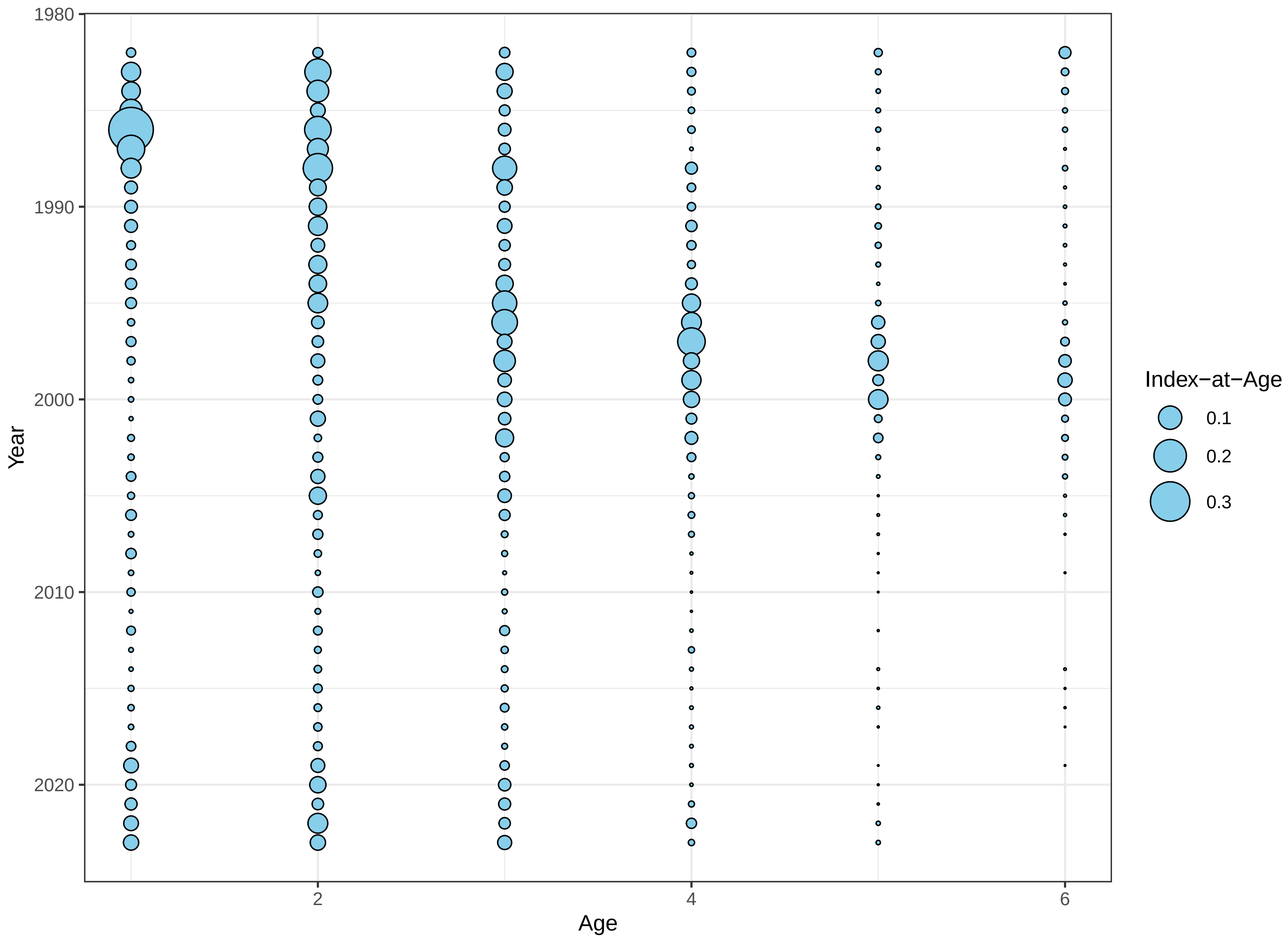
Commerical Age Composition (Harvest + Discards)



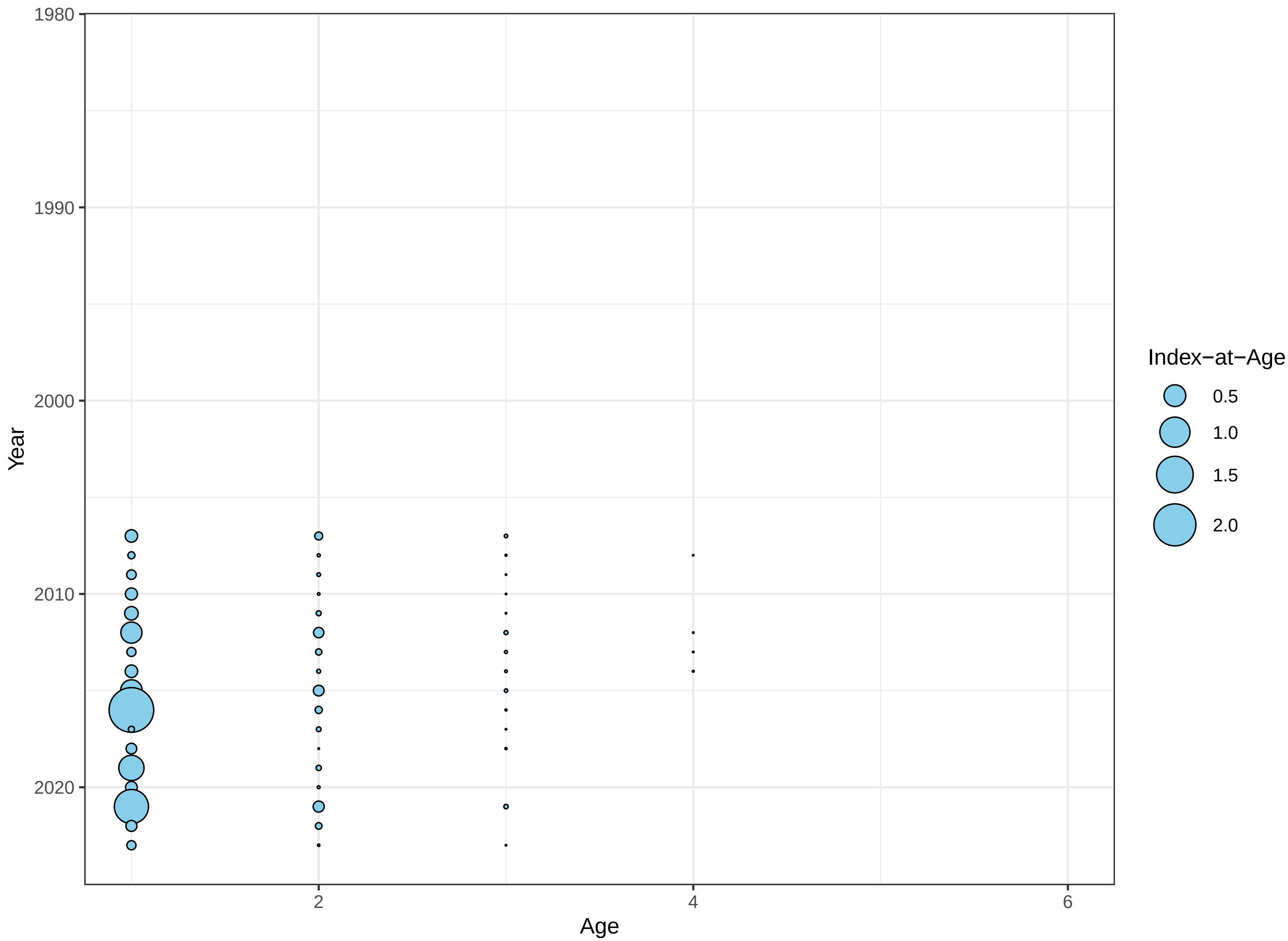


Recreational Catch-at-Age (Harvest + Release Mortality)
1980
1990
2000
2010
2020
Year
2
4
6
Age
Millions of fish
1
5
Management
Pre−Coastwide size limit
Post−Coastwide size limit

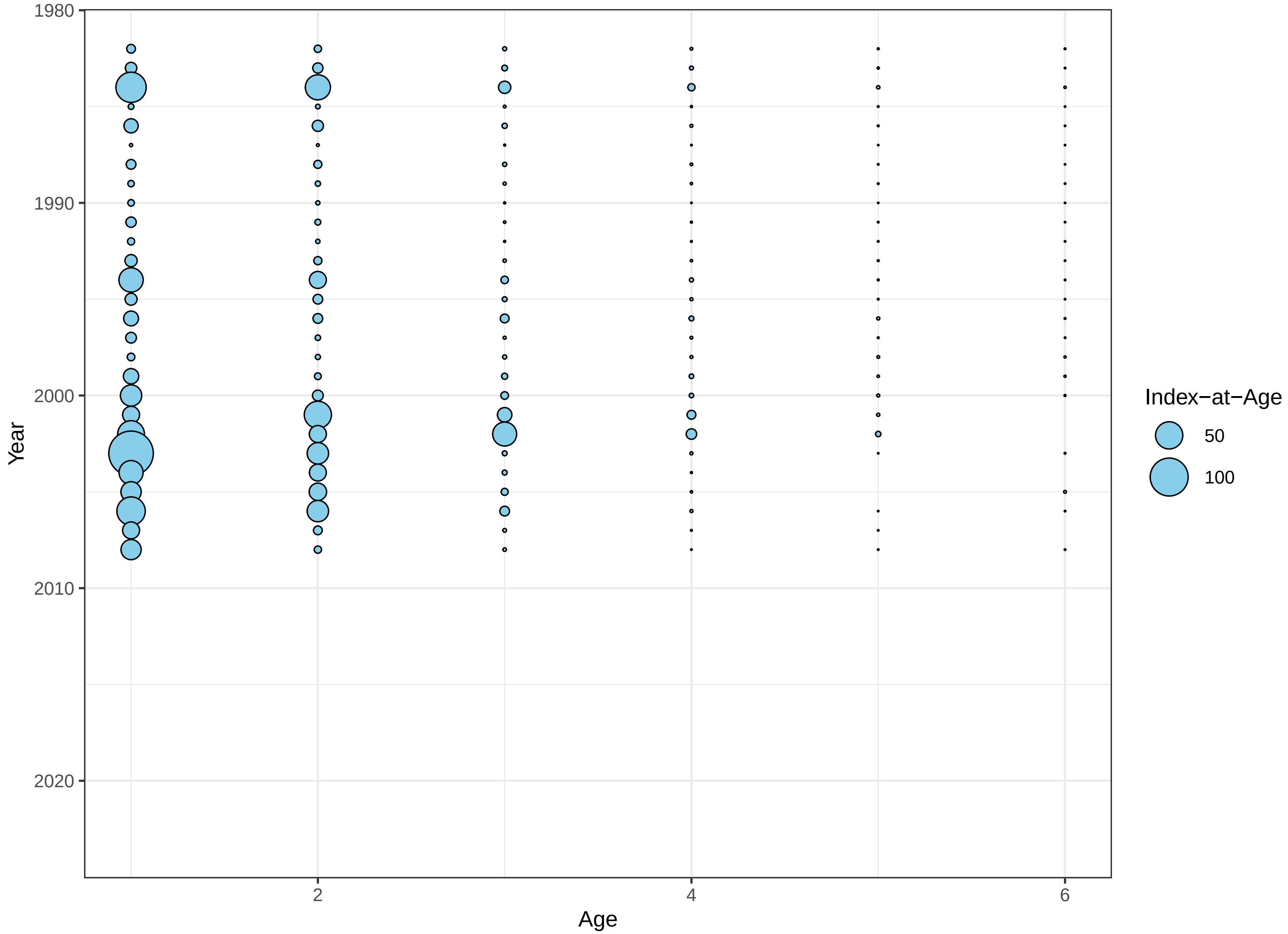
MRIP



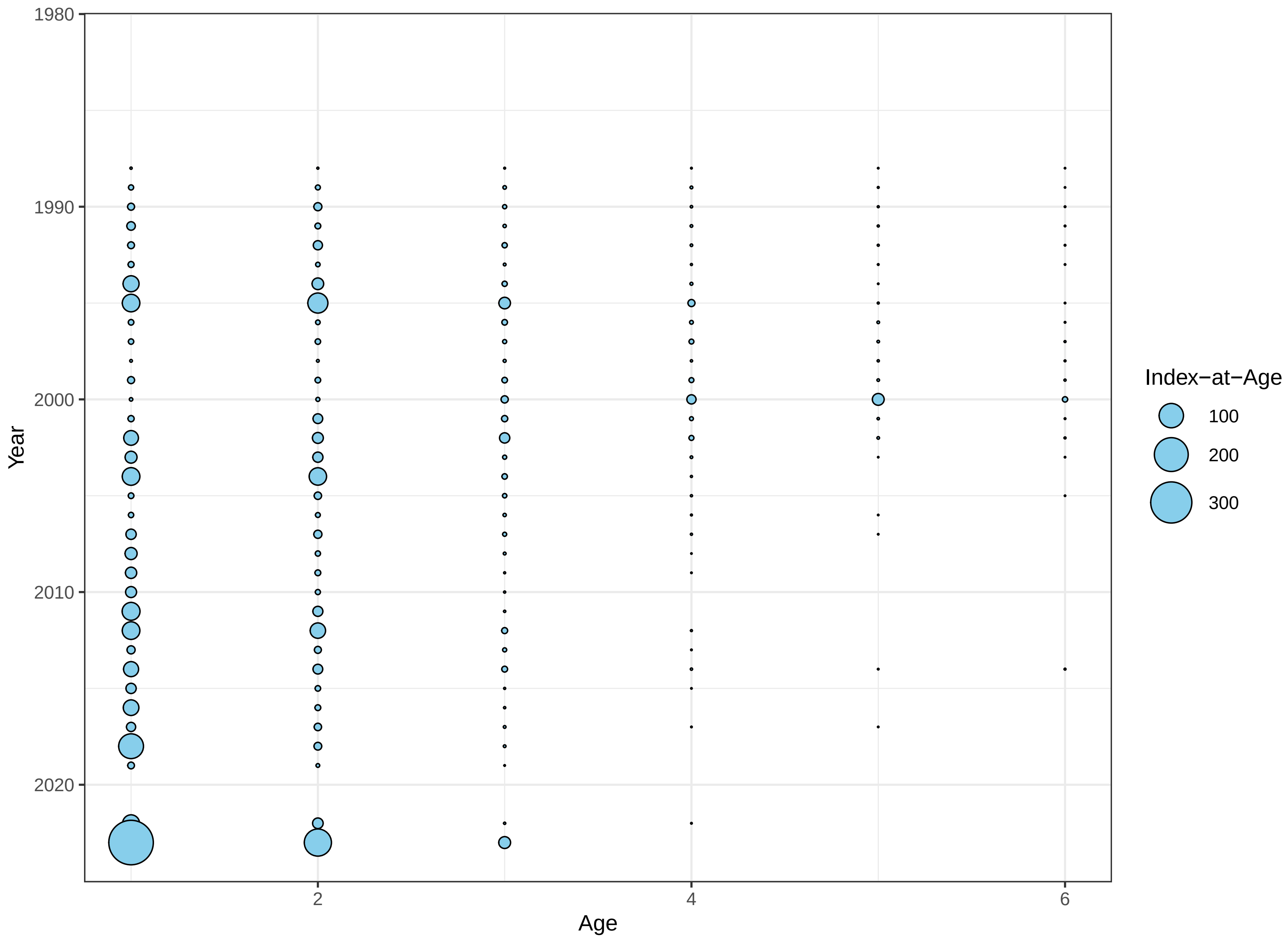
NEAMAP

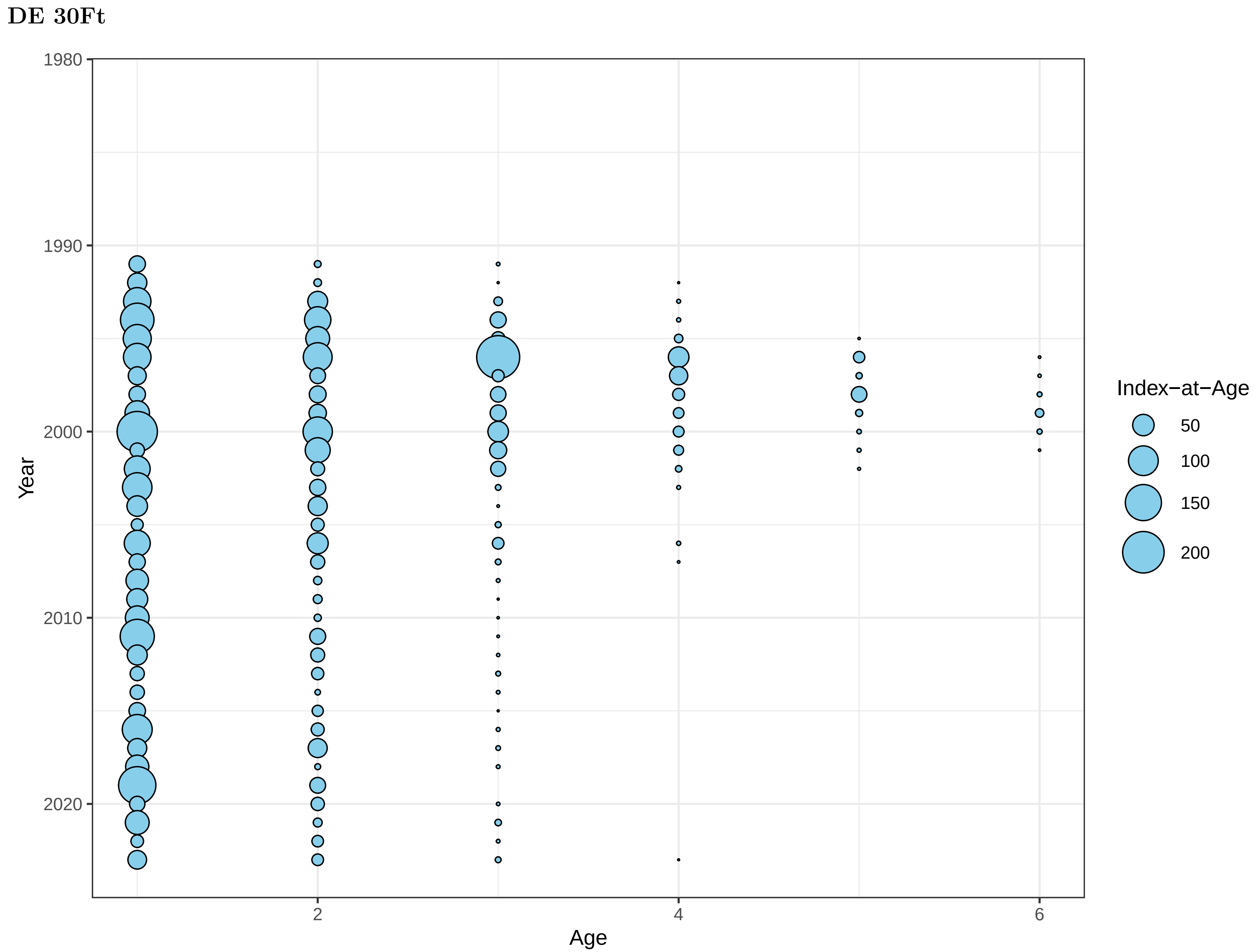


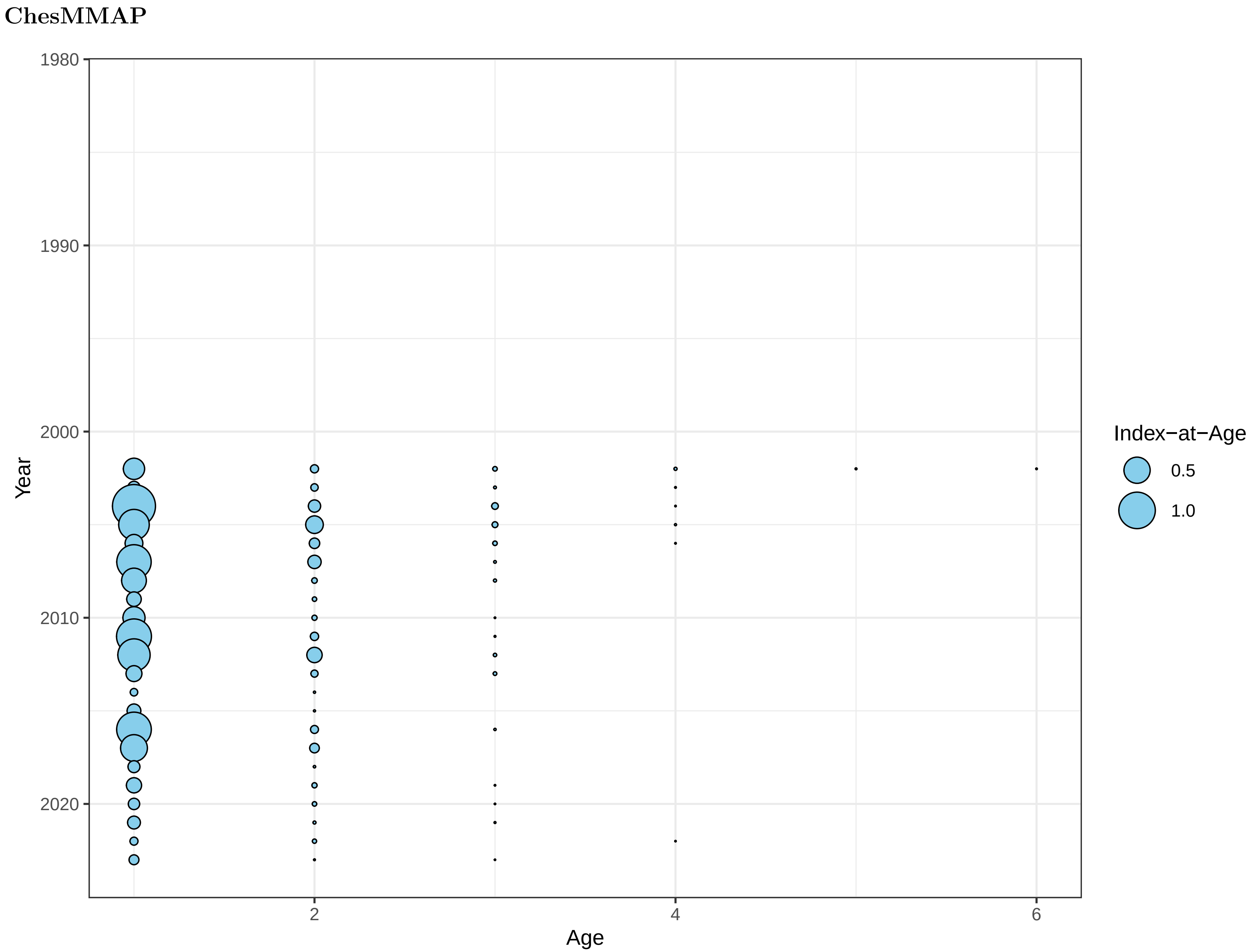
NEFSC Albatross



NJ Ocean

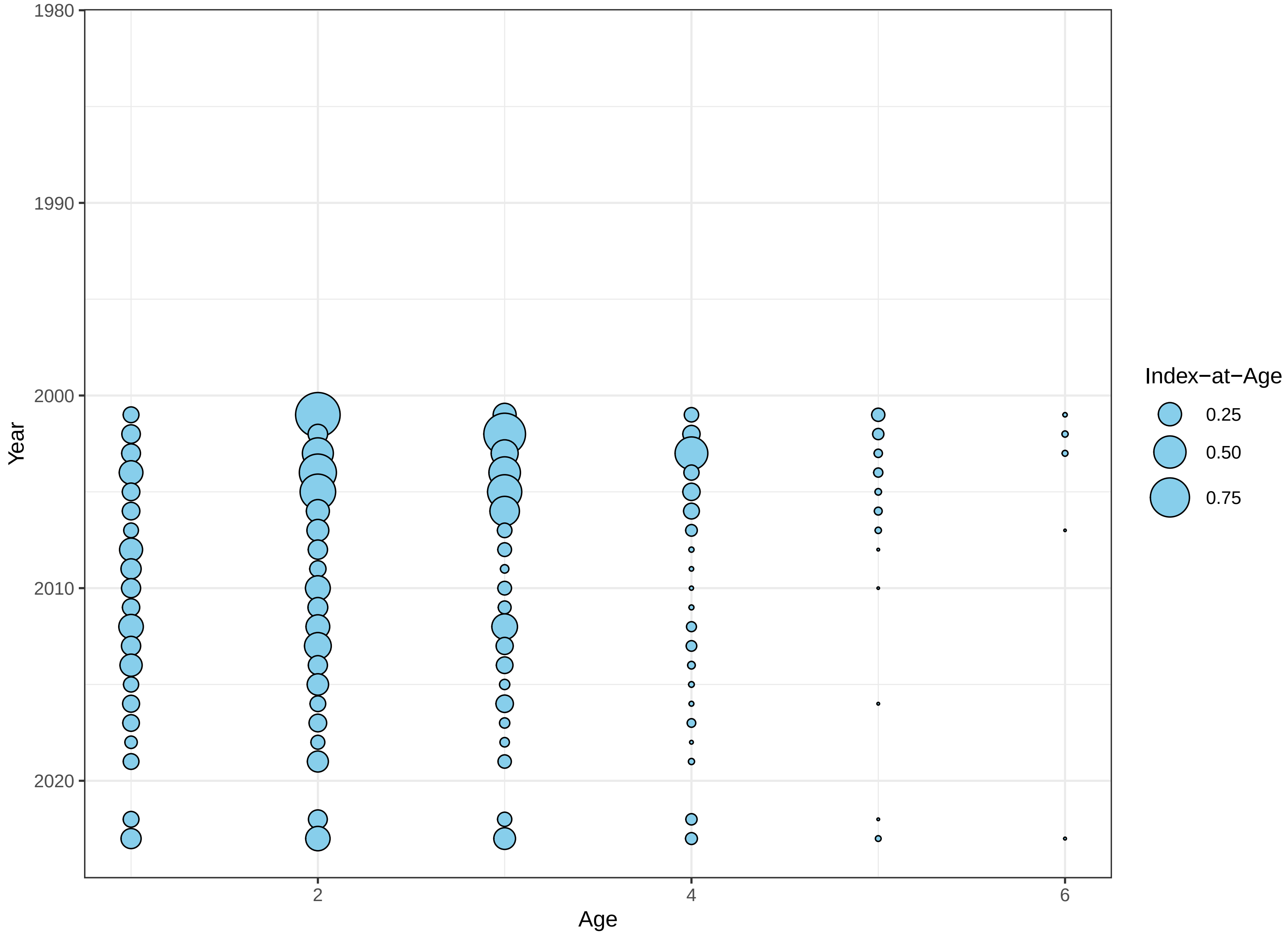



DE 30Ft
1980
1990
2000
2010
2020
Year
2
4
6
Age
Index−at−Age
50
100
150
200

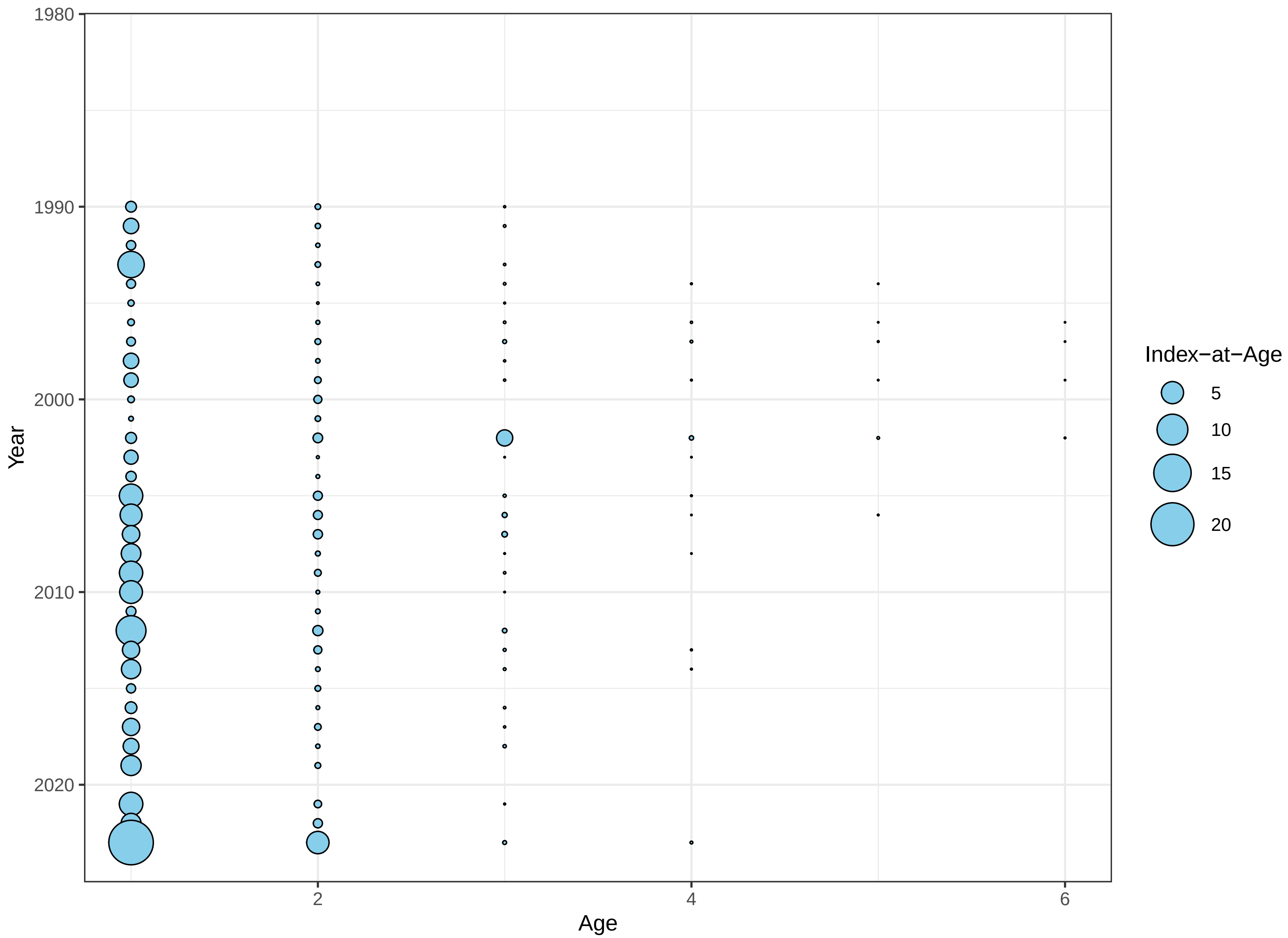


ChesMMAP
1980
1990
2000
2010
2020
Year
2
4
6
Age
Index−at−Age
0.5
1.0

NC PSIGNS

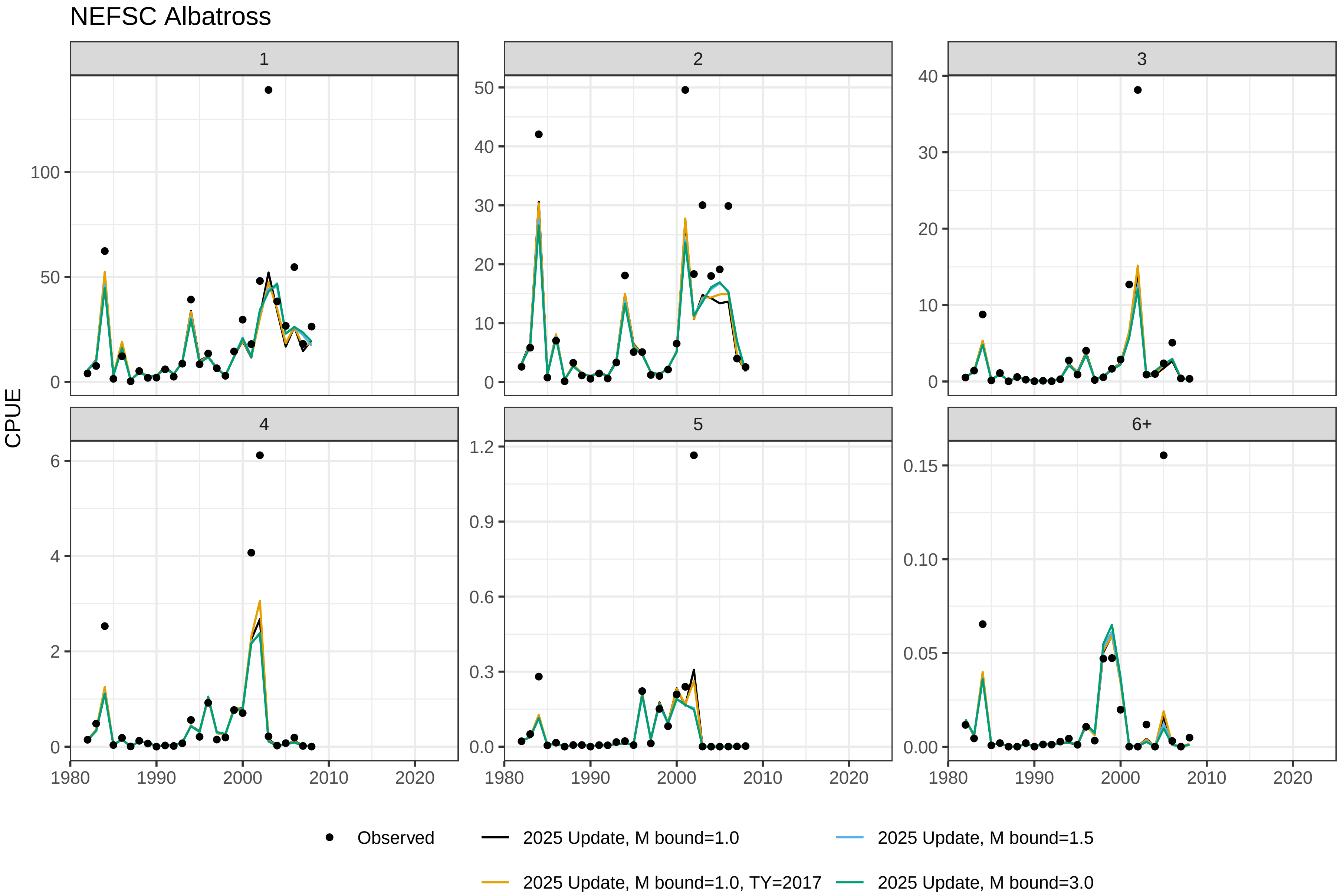


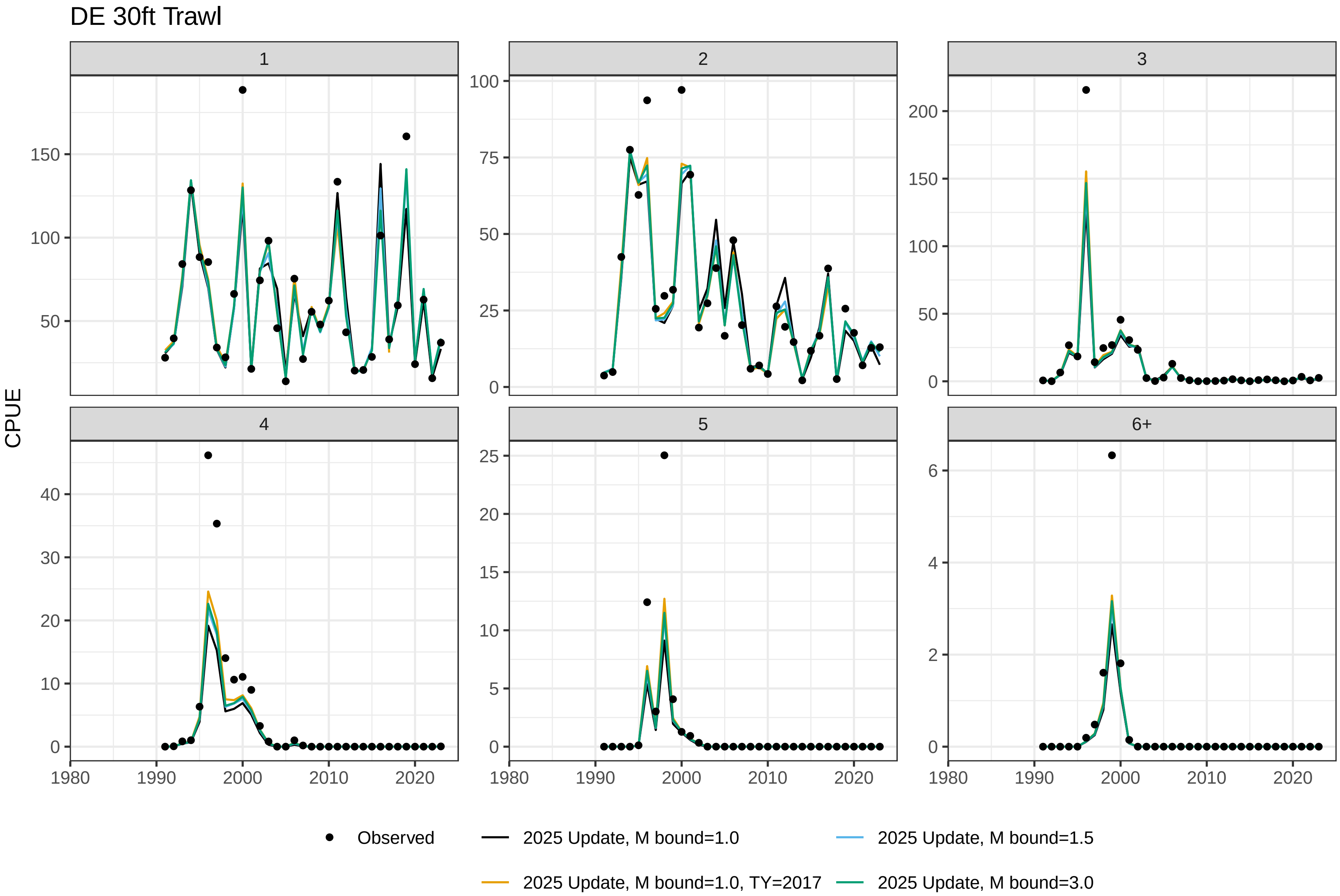
SEAMAP

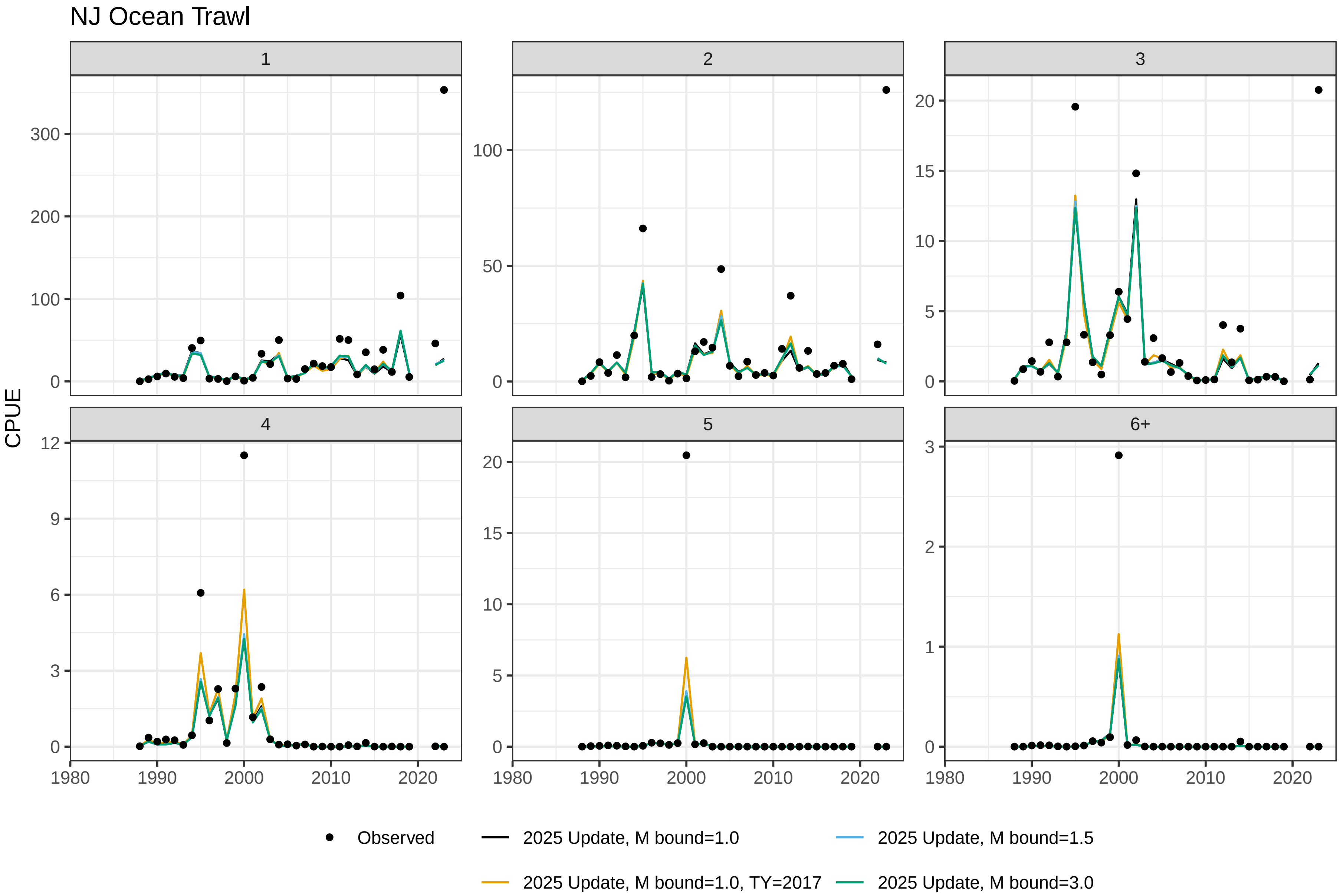


Diagnostic Plots: Observed vs. Predicted

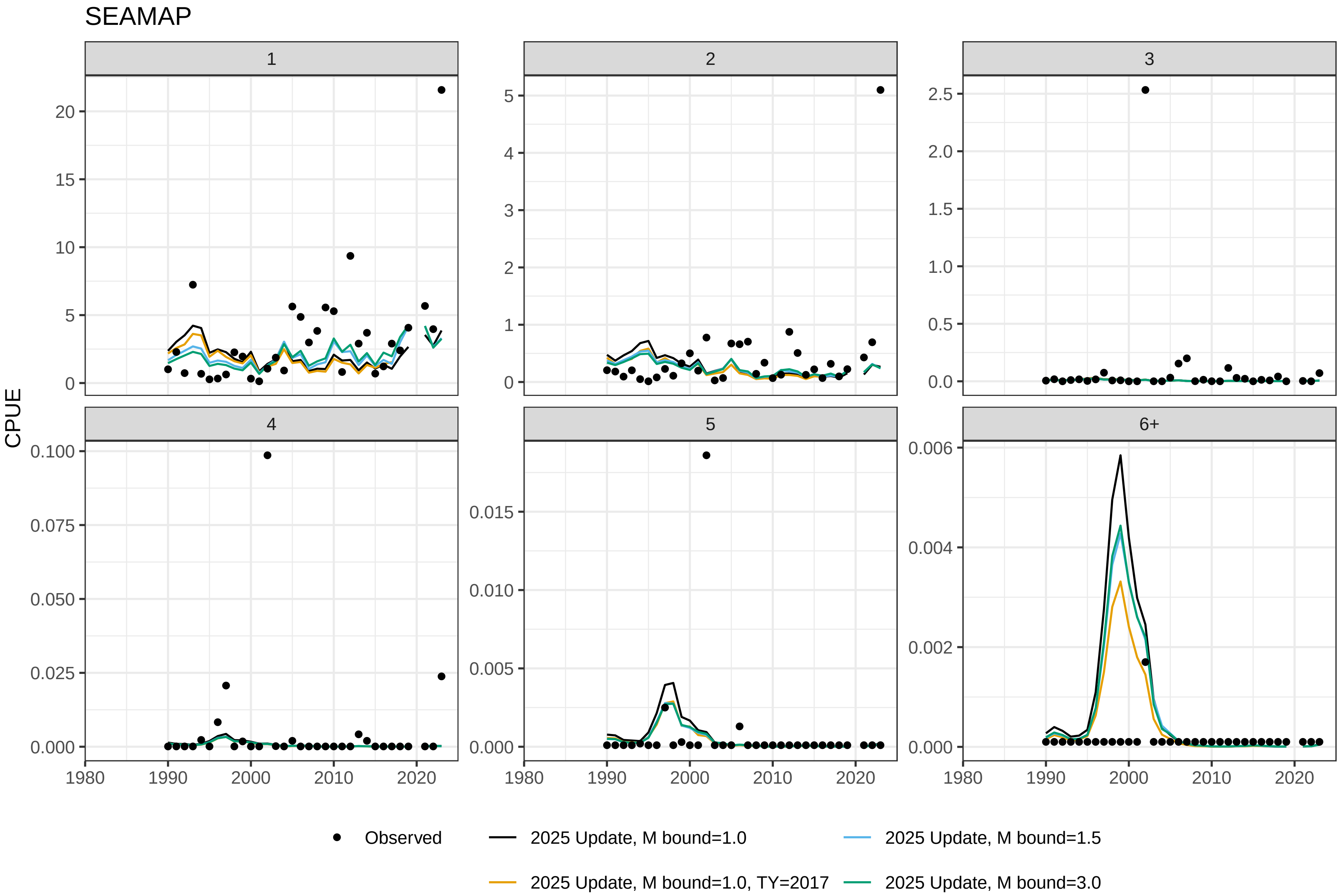
Indices


NEFSC Albatross
CPUE
1
2
3
4
5
6+
1980
1990
2000
2010
2020
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0

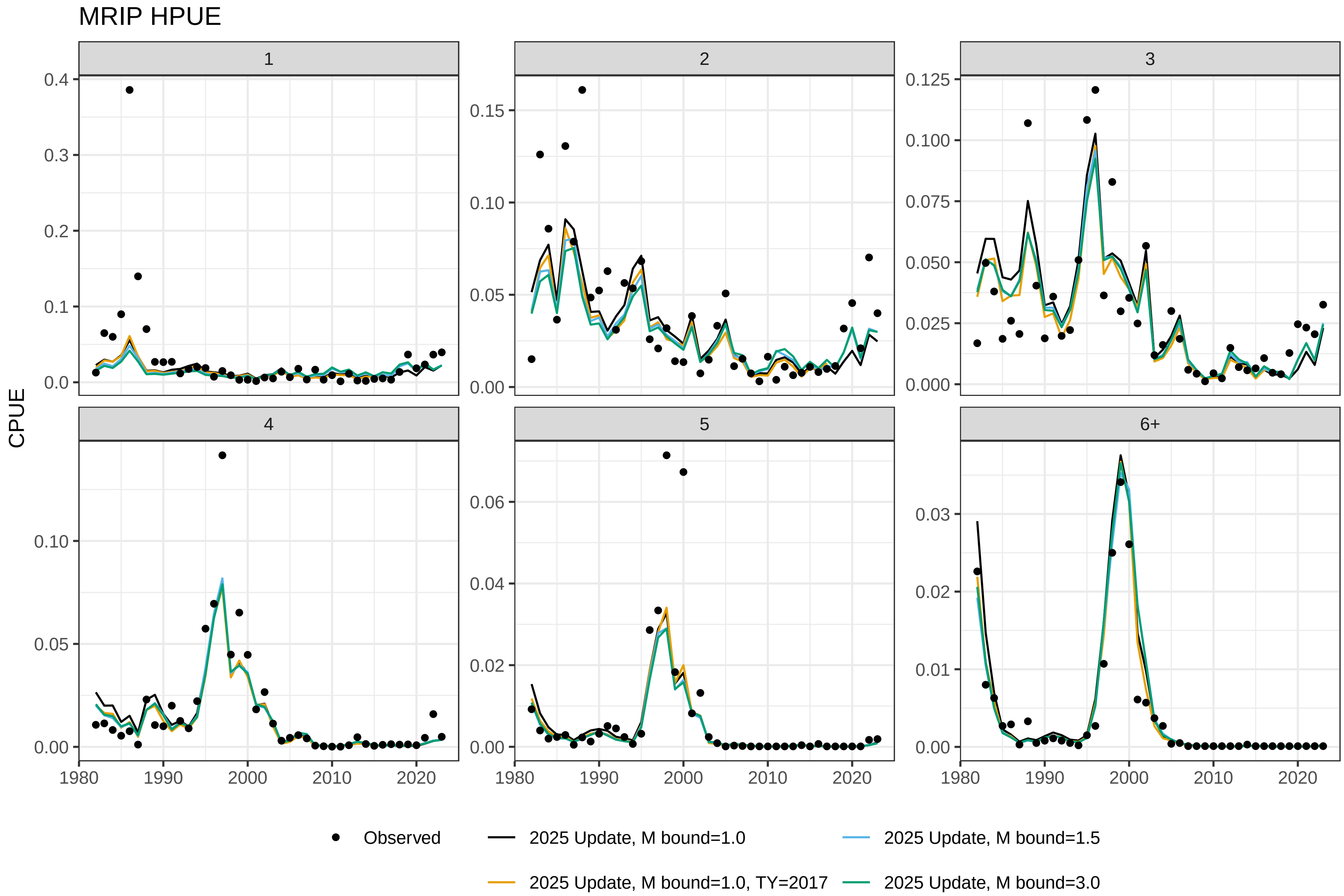

DE 30ft Trawl
1
2
3
4
5
6+
CPUE
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0

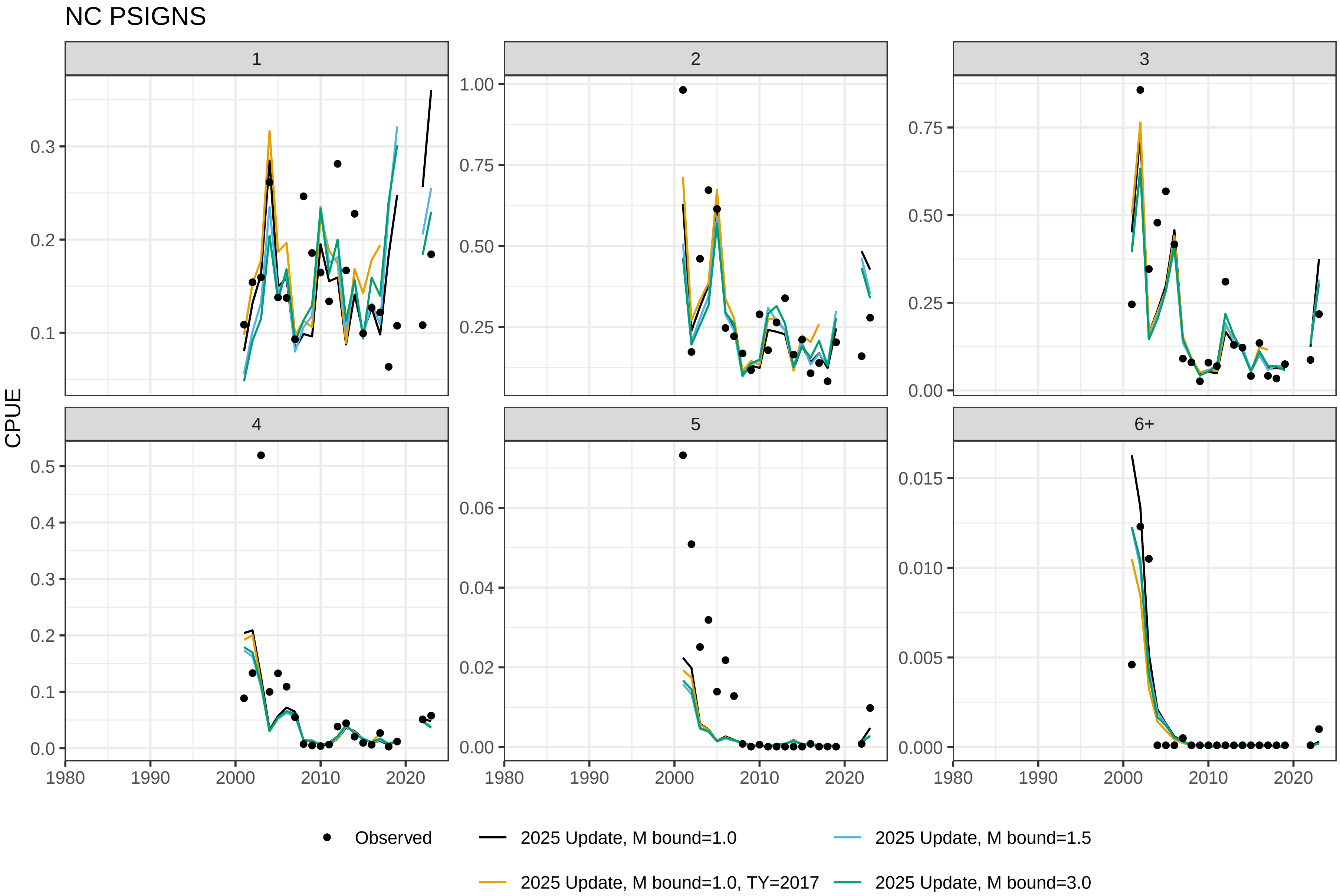


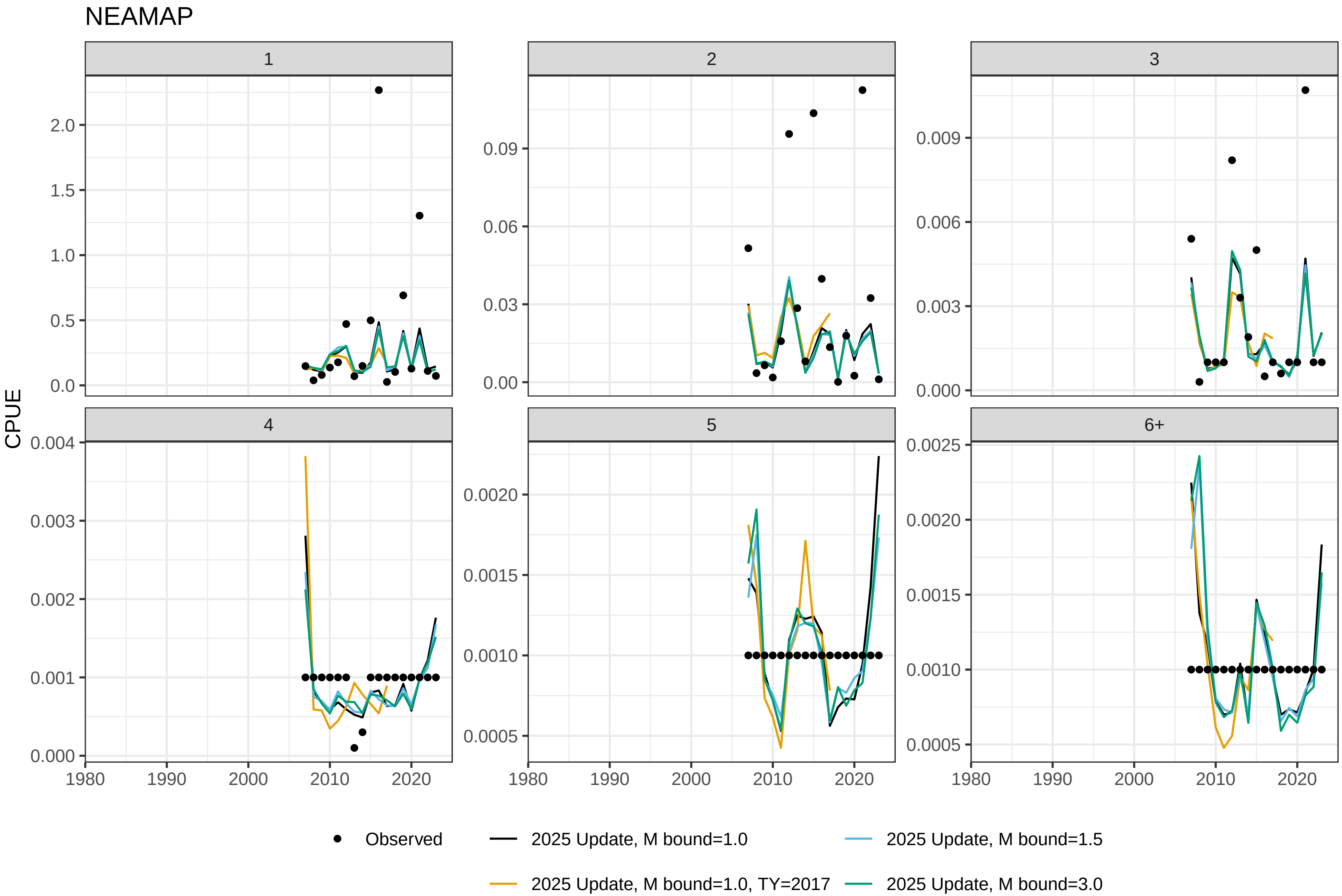
NJ Ocean Trawl
CPUE
1
2
3
4
5
6+
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0

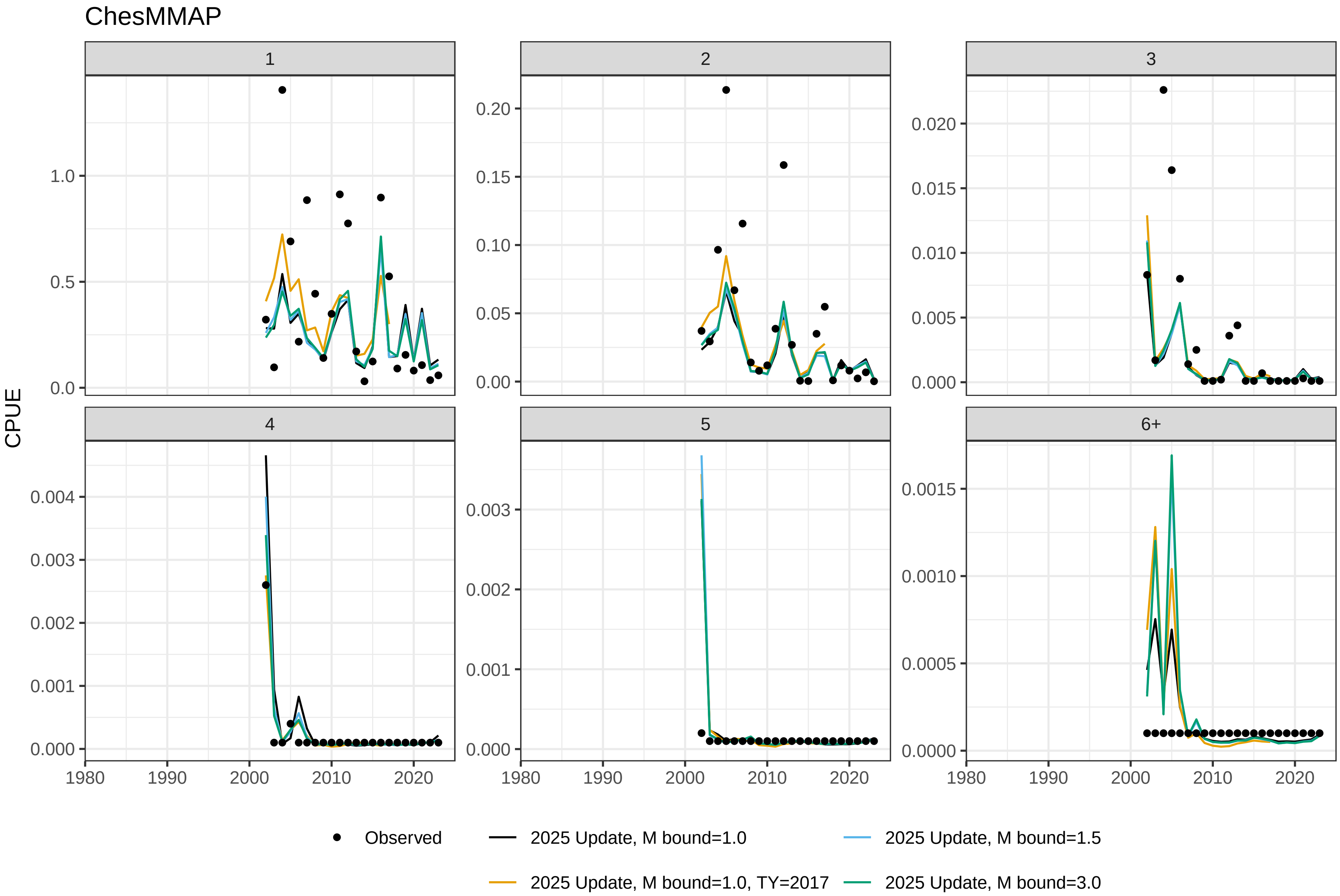


SEAMAP
1
2
3
4
5
6+
CPUE
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0

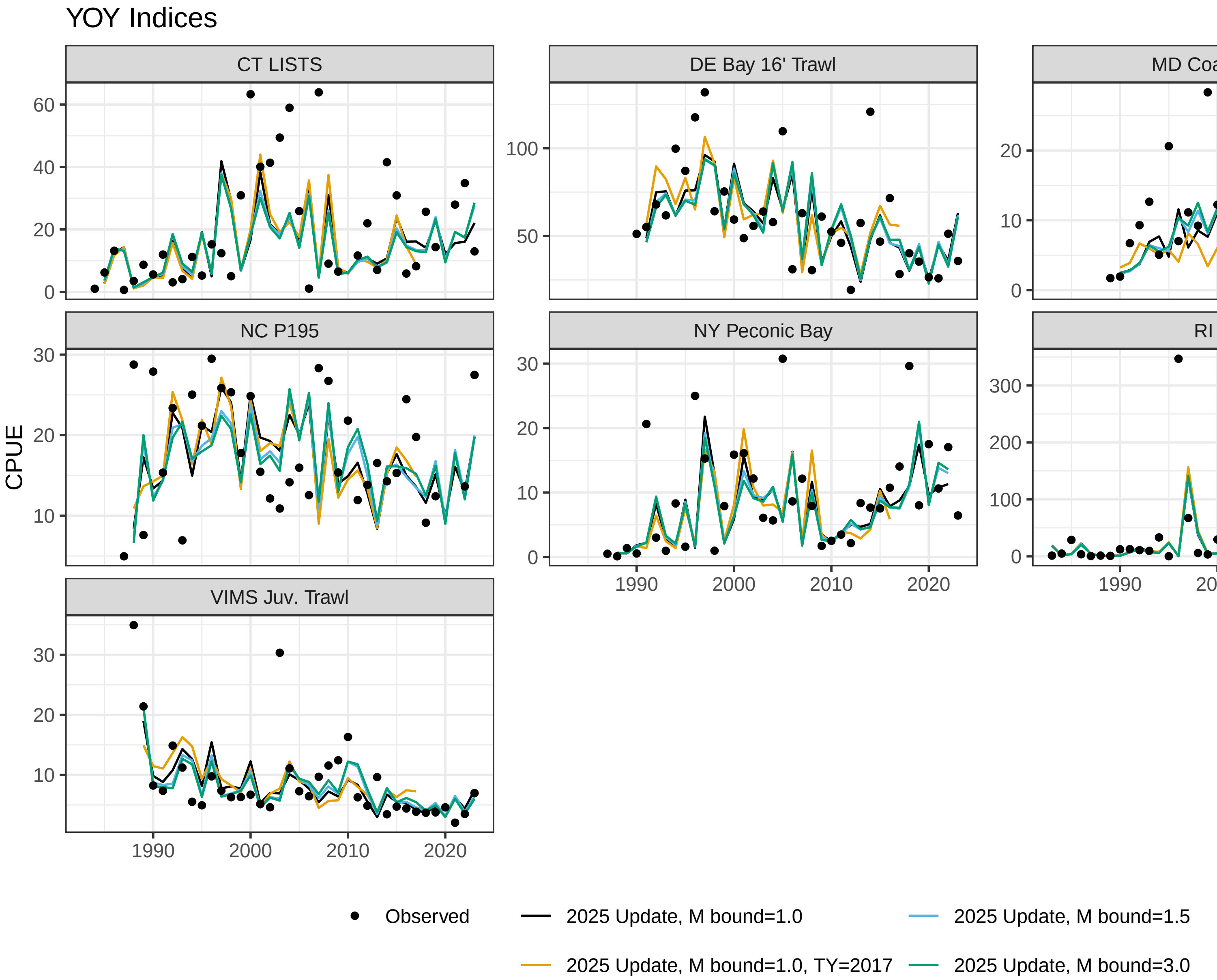

MRIP HPUE
1
2
3
4
5
6+
CPUE
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0


NC PSIGNS
1
2
3
4
5
6+
CPUE
0.1
0.2
0.3
0.25
0.50
0.75
1.00
0.00
0.25
0.50
0.75
0.0
0.1
0.2
0.3
0.4
0.5
0.00
0.02
0.04
0.06
0.000
0.005
0.010
0.015
1980
1990
2000
2010
2020
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0

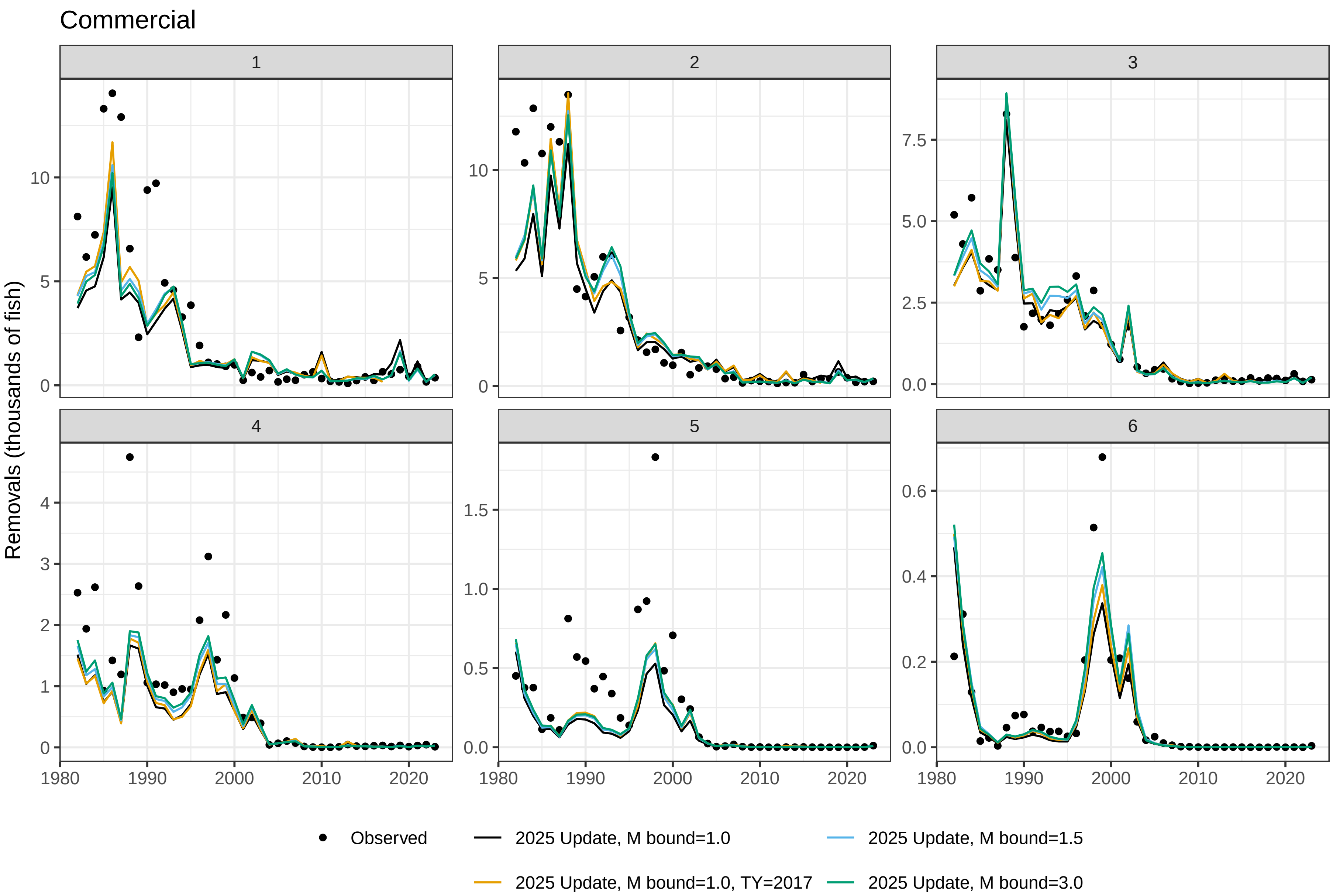

NEAMAP
1
2
3
4
5
6+
CPUE
0.0
0.5
1.0
1.5
2.0
0.00
0.03
0.06
0.09
0.000
0.003
0.006
0.009
0.000
0.001
0.002
0.003
0.004
0.0005
0.0010
0.0015
0.0020
0.0005
0.0010
0.0015
0.0020
0.0025
1980
1990
2000
2010
2020
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0



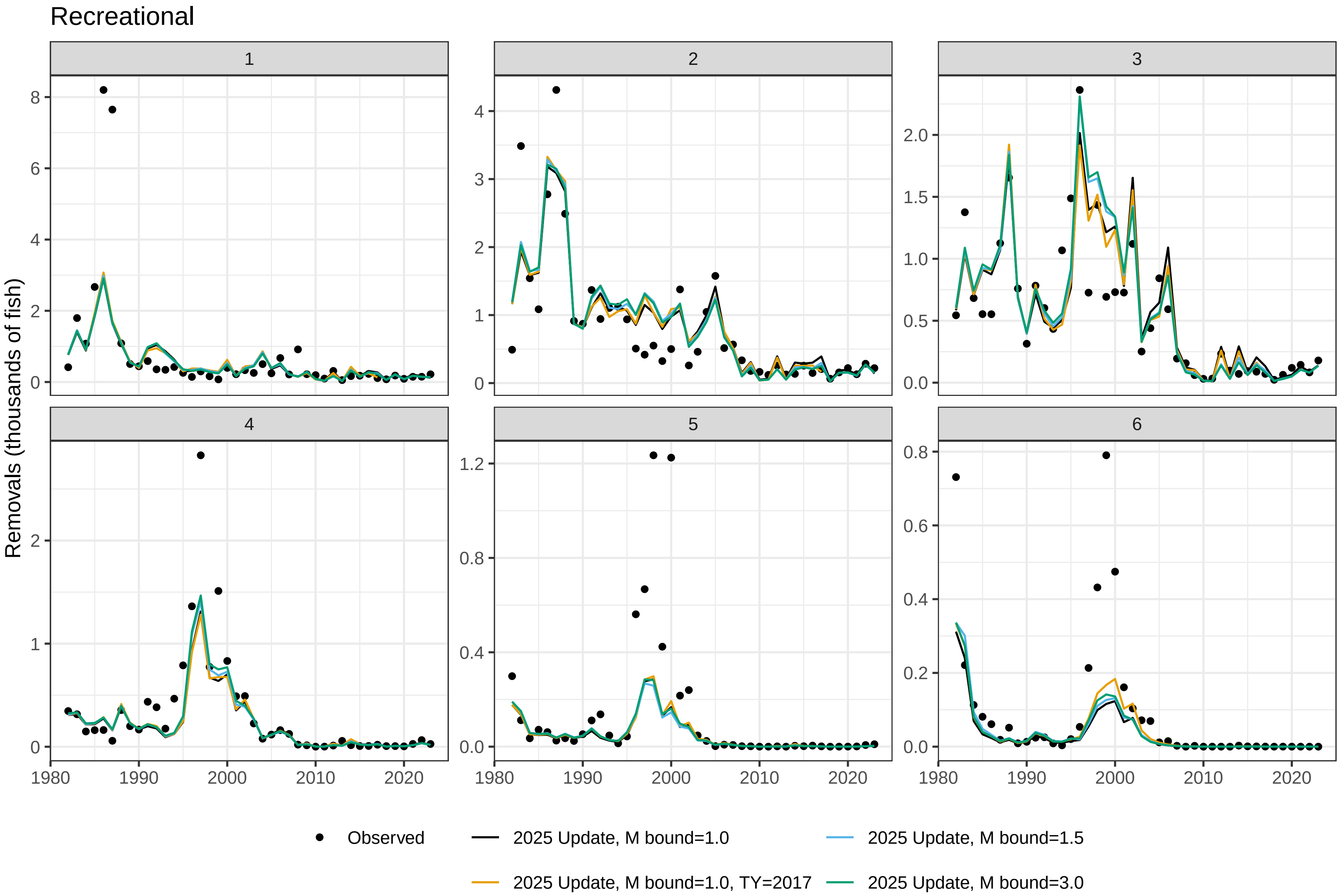
ChesMMAP
1
2
3
4
5
6+
CPUE
0.0
0.5
1.0
0.00
0.05
0.10
0.15
0.20
0.000
0.005
0.010
0.015
0.020
0.000
0.001
0.002
0.003
0.004
0.000
0.001
0.002
0.003
0.0000
0.0005
0.0010
0.0015
1980
1990
2000
2010
2020
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0


YOY Indices
CT LISTS
DE Bay 16' Trawl
MD Coastal Bay Trawl
NC P195
NY Peconic Bay
RI Fall Trawl
VIMS Juv. Trawl
CPUE
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0

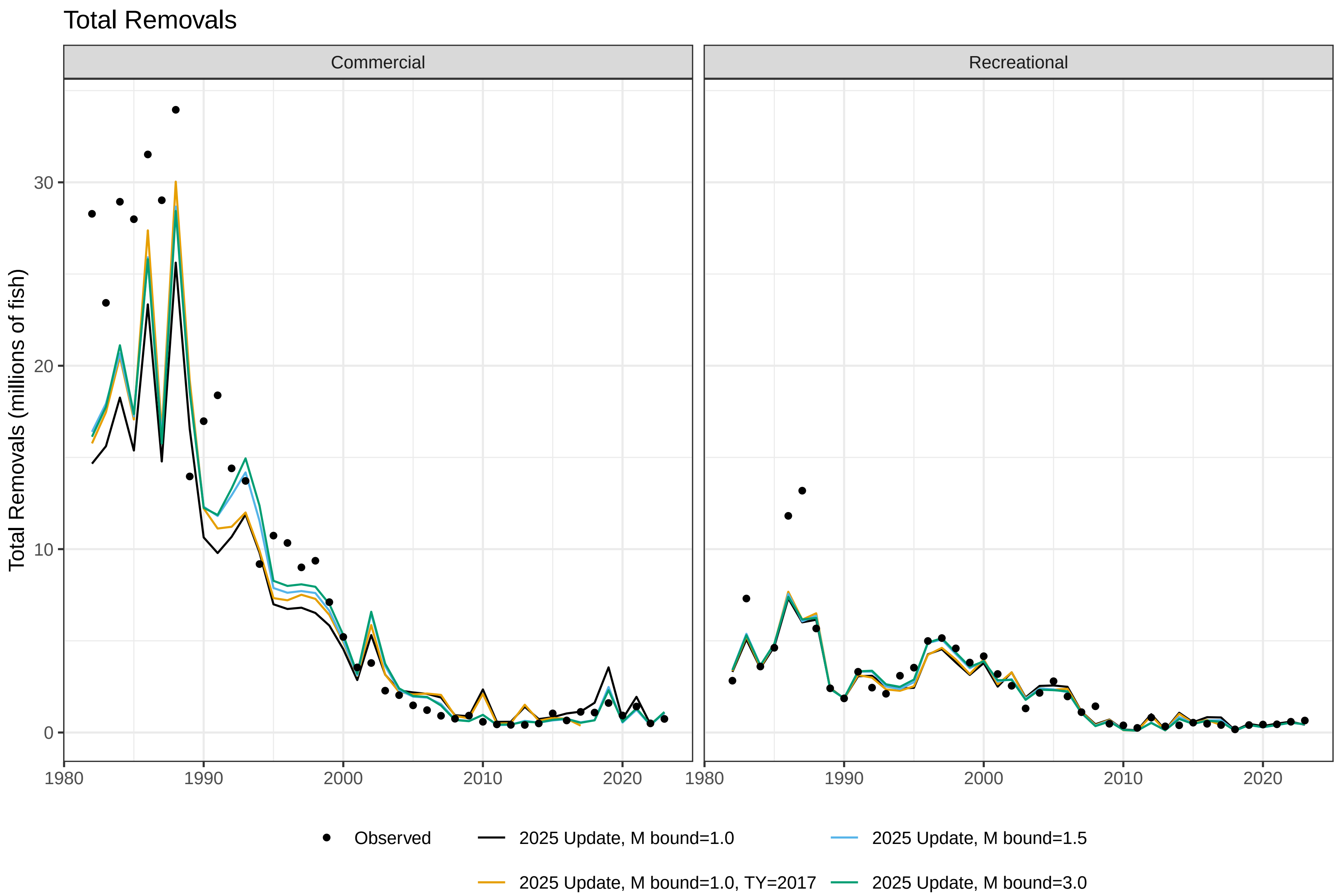
Total Catch



Commercial
1
2
3
4
5
6
Removals (thousands of fish)
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0



Recreational
1
2
3
4
5
6
Removals (thousands of fish)
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0



Total Removals
Commercial
Recreational
Total Removals (millions of fish)
0
10
20
30
1980
1990
2000
2010
2020
Observed
2025 Update, M bound=1.0
2025 Update, M bound=1.5
2025 Update, M bound=1.0, TY=2017
2025 Update, M bound=3.0