draft working paper for peer review only

Southern New England Mid-Atlantic Winter Flounder

2025 Management Track Assessment Report

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National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts

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This assessment of the Southern New England Mid-Atlantic Winter Flounder (Pseudopleuronectes americanus) stock is a management track assessment update of the existing benchmark assessment (NEFSC 2011), and follows management track updates in 2015, 2017, 2020, and 2022. In each assessment since the benchmark, except for 2022, the stock was overfished, but overfishing was not occurring (NEFSC 2015, 2017, 2020, 2022). In the 2022 management track, stock status changed to not overfished due to a change in the recruitment stanza used to calculate biological reference points. The current assessment updates commercial fishery catch data, recreational fishery catch data, research survey indices of abundance, and the analytical ASAP assessment models and reference points through 2024. Additionally, stock projections have been updated through 2028.

State of Stock: Based on this updated assessment, the Southern New England Mid-Atlantic Winter Flounder (*Pseudopleuronectes americanus*) stock is not overfished and overfishing is not occurring (Figures 1-2). Retrospective adjustments were not made to the model results. Spawning stock biomass (SSB) in 2024 was estimated to be 2,787 (mt) which is 89% of the biomass target (3,114 mt), and 179% of the biomass threshold ($SSB_{Threshold}$ = 1557 (mt); Figure 1). The 2024 fully selected fishing mortality was estimated to be 0.048 which is 21% of the overfishing threshold (F_{MSY} = 0.233; Figure 2).

Table 1: Catch and status table for Southern New England Mid-Atlantic Winter Flounder. All weights are in (mt), recruitment is in (000s), and F_{Full} is the fishing mortality on fully selected ages (ages 4 and 5). Model results are from the current updated ASAP assessment.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
					Data					
Recreational discards	13	3	2	4	2	3	1	3	3	2
Recreational landings	39	61	10	10	0	9	5	33	16	2
Commercial discards	82	125	101	108	127	47	117	98	83	89
Commercial landings	654	519	515	337	212	120	87	84	35	76
Catch for Assessment	787	708	629	460	342	179	210	219	136	169
					Model Results					
Spawning Stock Biomass	5,289	4,471	4,035	3,906	3,615	3,486	3,566	3,203	2,747	2,787
F_{Full}	0.145	0.155	0.147	0.115	0.086	0.045	0.059	0.066	0.043	0.048
Recruits	4,633	4,462	2,718	3,995	2,284	2,334	2,517	3,394	4,553	6,211

Table 2: Comparison of reference points estimated in the 2022 management track assessment and from the current assessment update. $F_{40\%}$ was used as a proxy for F_{MSY} and an SSB_{MSY} proxy was calculated from a long-term stochastic projection drawing from the cumulative distribution function of empirical recruitment from 2002 to 2024. Recruitment estimates are median values of the time-series from 2002 to 2024. 90% CI are shown in parentheses.

	2022	2025
F_{MSY} *proxy*	0.265	0.233
SSB_{MSY} (mt)	3,314	3,114 (2,180 - 4,515)
MSY (mt)	1,025	910 (642 - 1,317)
Median recruits (000s)	4,752	4,633
Overfishing	No	No
Overfished	No	No

Projections: Short term projections of biomass were derived by sampling from a cumulative distribution function of recruitment estimates from 2002 to 2024. The annual fishery selectivity, maturity, and mean weights at age used in the projection are the most recent 5 year averages. Catch in 2025 was estimated at 194 (mt) by the NEFMC

Groundfish Plan Development Team. The model exhibited a minor retrospective pattern in F (Mohn's rho = -0.11) and SSB (Mohn's rho = 0.09) so retrospective adjustments were not applied in the projections.

Table 3: Short term projections of total fishery catch and spawning stock biomass for Southern New England Mid-Atlantic Winter Flounder based on a harvest scenario of fishing at F_{MSY} *proxy* between 2026 and 2028. Catch in 2025 was estimated to be 194 (mt). 90% CI are shown in parentheses next to SSB estimates.

Year	Catch (mt)	SSB (mt)	F_{Full}
2025	194	2,991 (2,478 - 3,549)	0.049

Year	Catch (mt)	SSB (mt)	F_{Full}
2026	961	3,456 (2,839 - 3,963)	0.233
2027	922	3,243 (2,773 - 3,799)	0.233
2028	902	3,128 (2,630 - 3,940)	0.233

Special Comments:

- What are the most important sources of uncertainty in this stock assessment? Explain, and describe qualitatively how they affect the assessment results (such as estimates of biomass, F, recruitment, and population projections).

  One important source of uncertainty is the estimate of natural mortality based on longevity, which is not well studied in Southern New England Mid-Atlantic Winter Flounder. Natural mortality affects the scale of the biomass and fishing mortality estimates. Natural mortality was adjusted upwards from 0.2 to 0.3 during the last benchmark assessment (2011), assuming a maximum age of 16. Since the 2011 benchmark, numerous fish older than 16 have been sampled by the NEFSC survey, as old as age 20. There is still uncertainty in the true max age of the population and the resulting natural mortality estimate. A full re-evaluation of natural mortality, including testing model estimation within a state-space model framework, is on-going as part of a graduate research project.

  Other sources of uncertainty include the length distribution of the recreational discards. The recreational discards are a small component of the total catch, but the assessment suffers from very little length information used to characterize the recreational discards. For this assessment a cumulative discard length distribution over all years was used to characterize the recreational discards. Reduced sampling of recreational fishery information could be an issue for this assessment moving forward.

  The population projections are sensitive to the recruitment model chosen, as well as the temporal period selected from which recruitment estimates are drawn. In addition, recruitment and natural mortality are both likely to be dependant on environmental conditions, which can not be explored within the ASAP framework. Investigations of environmental covariates within a state-space model framework are ongoing.

- Does this assessment model have a retrospective pattern? If so, is the pattern minor, or major? (A major retrospective pattern occurs when the adjusted SSB or F_{Full} lies outside of the approximate joint confidence region for SSB and F_{Full}

  The retrospective patterns for both F_{Full} (Mohn's rho = -0.11) and SSB (Mohn's rho = 0.09) are minor and a retrospective adjustment in 2024 was not required.

- Based on this stock assessment, are population projections well determined or uncertain? If this stock is in a rebuilding plan, how do the projections compare to the rebuilding schedule?

  Population projections for Southern New England Mid-Atlantic Winter Flounder are uncertain, and

project higher than realized SSB from the model.

The stock was recently in a rebuilding plan with a rebuild date of 2023. The projections and BRP calculations for the 2022 assessment update used a truncated stanza for recruitment, incorporating values from 2002-2021 (last 20 years). Previous assessments had used the entire time-series of recruitment, with historical recruitments that were well beyond the current productivity of the stock. The truncated recruitment stanza used in the 2022 management track led to a much reduced biomass target and as a result the overfished status of the stock changed. While the perception of the stock did not change, the stock was considered rebuilt by the 2023 deadline.

- Describe any changes that were made to the current stock assessment, beyond incorporating additional years of data and the effect these changes had on the assessment and stock status.

No changes were made to the data structure, model settings or assumptions for this assessment. Data were updated through 2024 and the model was run.

- If the stock status has changed a lot since the previous assessment, explain why this occurred.

The stock status of Southern New England Mid-Atlantic Winter Flounder has not changed since the previous management track update.

- Provide qualitative statements describing the condition of the stock that relate to stock status.

The Southern New England Mid-Atlantic Winter Flounder stock shows an overall declining trend in SSB over the time series, with the current estimate (2,787 mt) at the second lowest in the time series. Estimates of fishing mortality have been declining since 2015 and the current value (0.048) is among the lowest of the time-series. Recruitment has remained low and steady over the past decade with a slight increase at the end of the time series. The 2024 estimate of 6.2 million fish is slightly above the average since 2002 (6.1 million).

- Indicate what data or studies are currently lacking and which would be needed most to improve this stock assessment in the future.

The Southern New England Mid-Atlantic Winter Flounder assessment could be improved with additional studies on maximum age, as well as improved recreational discard length information. In addition, further investigation into the localized struture and genetics of the stock is warranted. Finally, a future shift to WHAM could provide the ability to model environmental factors that may influence recruitment and mortality, and help develop more informed population projections.

- Are there other important issues?

During the 2022 management track assessment, an important and impactful change was made to the stanza of recruitment used in the projections. The new recruitment stanza used the last 20 years of estimates (2002-2021) for both short term projections, and to estimate the biomass target (SSB_{MSY}) from a long term (100 year) projection. This was a shift from previous assessments that used the entire time-series of recruitment (1981-present), which included historical recruitment estimates that were overly optimistic for the recent stock size and productivity. Some of the early recruitment estimates are 20 times the levels seen in recent years. This adjustment was supported by guidance from previous peer review panels, with the main recommendation from the 2020 management track review being:

'The Peer Review Panel notes, as had been done in previous reviews, that recruitment had been declining throughout the period and was currently very low. As for several other stocks under the purview of the NEFSC it would be helpful to evaluate if the previously observed high recruitment are possible; i.e., is it simply a matter of building back SSB and recruits will follow, or are there other factors at play. If the productivity of the resource(s) has decreased, it would be helpful to adjust reference points accordingly. This would be unlikely to change fisheries yield much but would be more realistic in terms of setting expectations.'

It is also important to recognize that extensive work has been carried out to evaluate the effects of the environment on recruitment for Southern New England Mid-Atlantic Winter Flounder. Two assessment models that include environmental covariates have been developed: an environmental ASAP model (Bell et al.

2018) and the transition of this environmental model into the state space Woods Hole Assessment Model (WHAM). Research should continue to move to one of these alternative models for management. To help bridge the gap until environmentally linked reference points can be developed, a time-series of winter mean estuary temperature is being used as support to select an appropriate time period of recruitment for the projections and reference points.

References:

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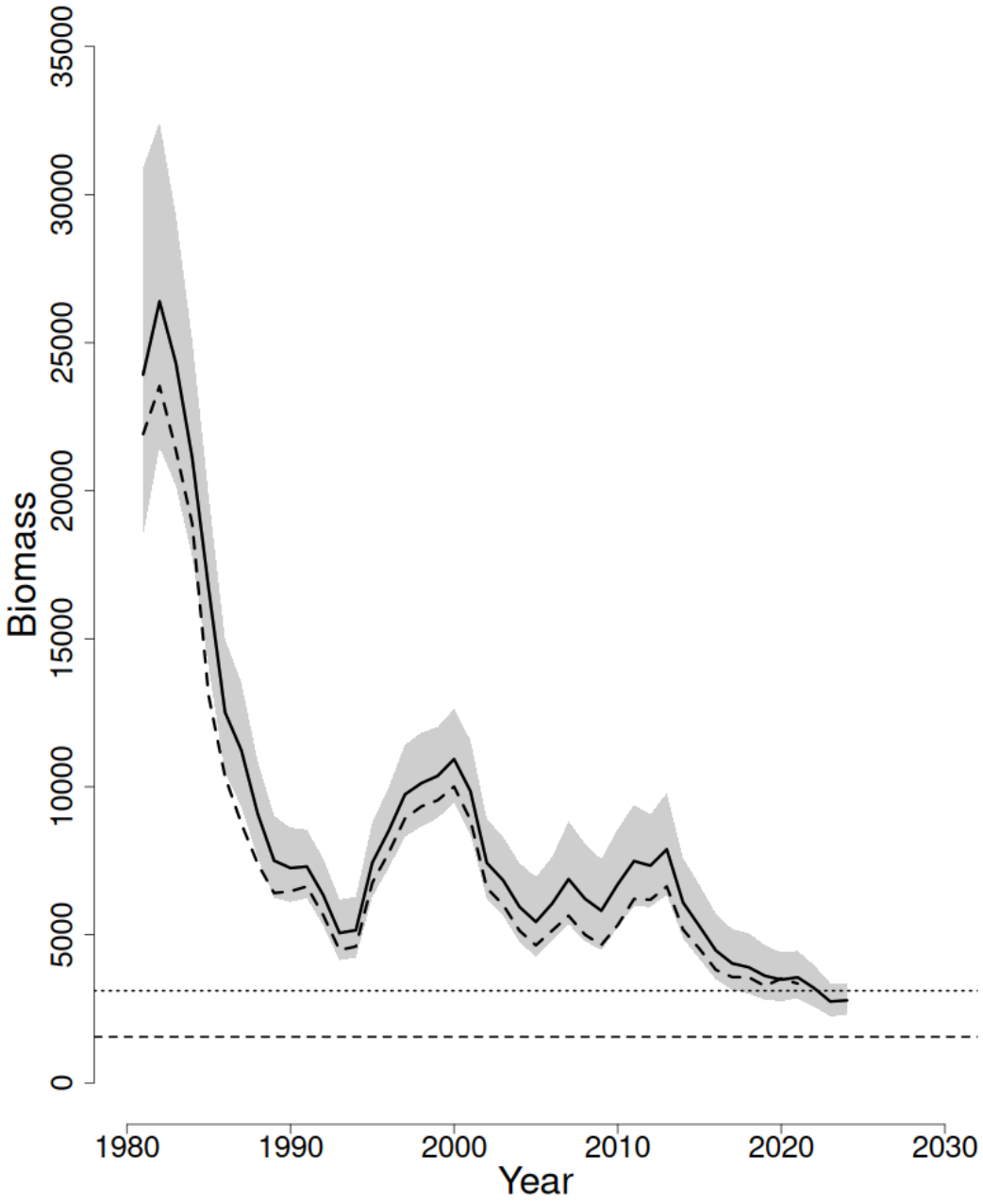

Figure 1: Trends in spawning stock biomass of Southern New England Mid-Atlantic Winter Flounder between 1981 and 2024 from the current (solid line) and previous (dashed line) assessment and the corresponding $SSB_{Threshold}$ ($\frac{1}{2}$ SSB_{MSY} *proxy*; horizontal dashed line) as well as SSB_{Target} (SSB_{MSY} *proxy*; horizontal dotted line) based on the 2025 assessment. The approximate 90% lognormal confidence intervals are shown.

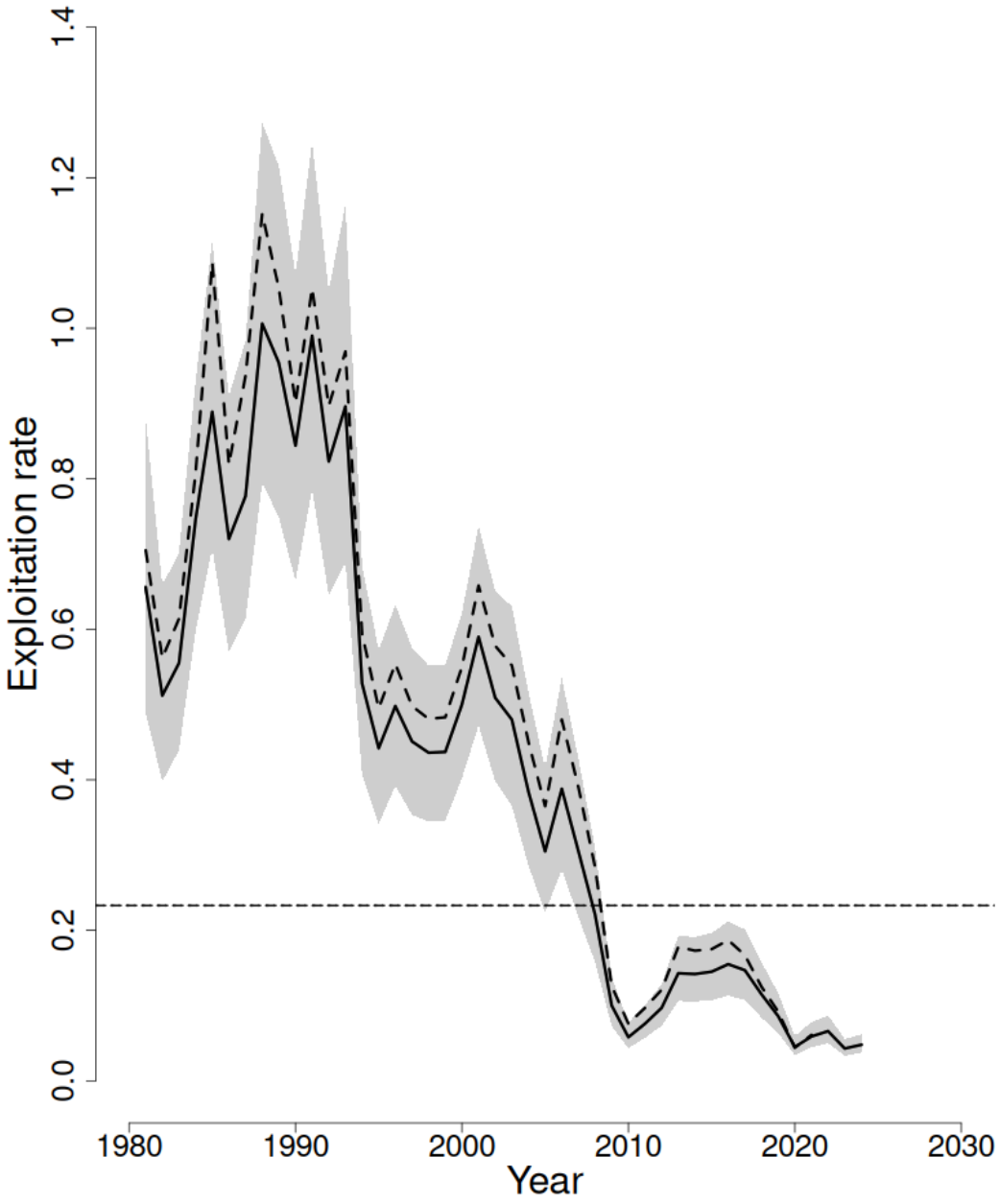

Figure 2: Trends in the fully selected fishing mortality (F_{Full}) of Southern New England Mid-Atlantic Winter Flounder between 1981 and 2024 from the current (solid line) and previous (dashed line) assessment and the corresponding $F_{Threshold}$ ($F_{MSY} = 0.233$; horizontal dashed line) based on the 2025 assessment. The approximate 90% lognormal confidence intervals are shown.

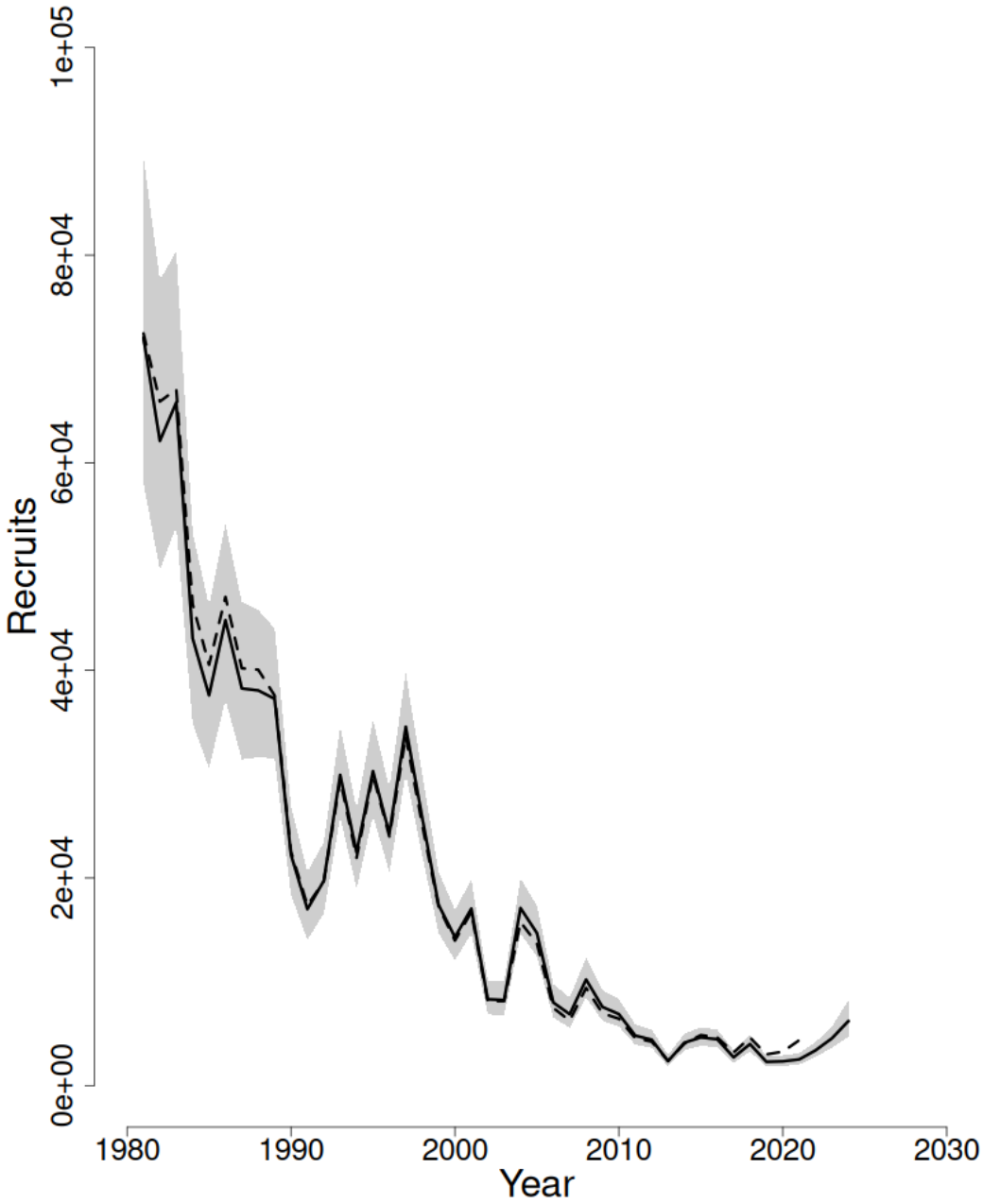

Figure 3: Trends in Recruits (000s) of Southern New England Mid-Atlantic Winter Flounder between 1981 and 2024 from the current (solid line) and previous (dashed line) assessment. The approximate 90% lognormal confidence intervals are shown.

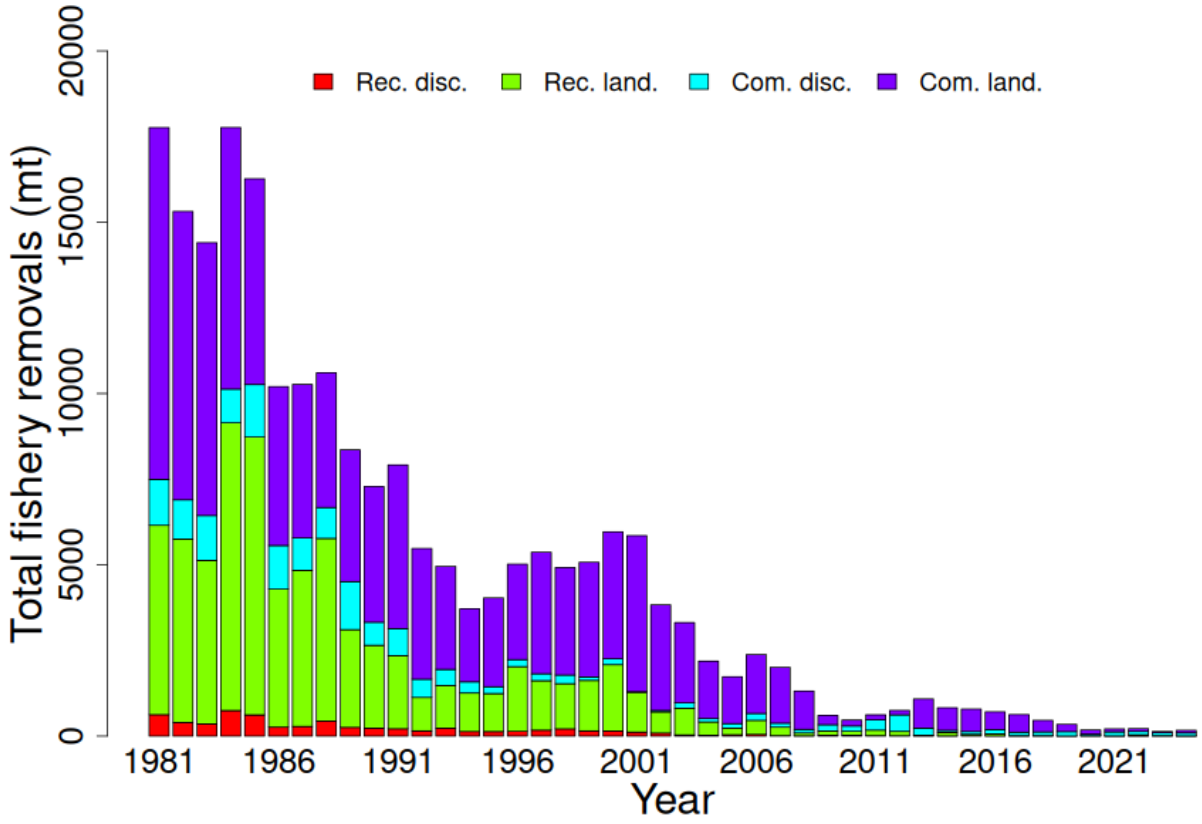

Figure 4: Total catch of Southern New England Mid-Atlantic Winter Flounder between 1981 and 2024 by fleet (commercial, recreational) and disposition (landings and discards).

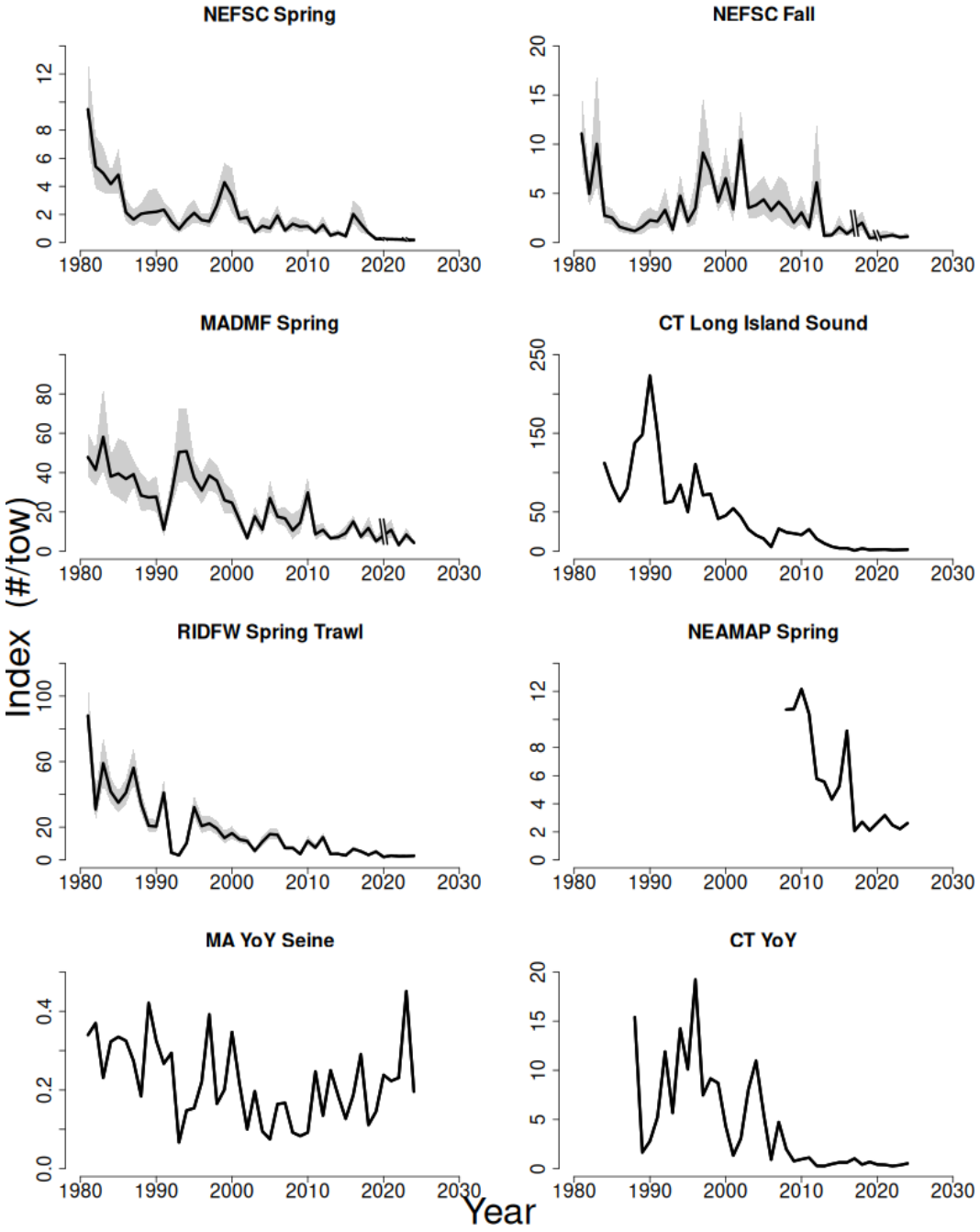

Figure 5: Indices of biomass for the Southern New England Mid-Atlantic Winter Flounder between 1981 and 2024 for the Northeast Fisheries Science Center (NEFSC) spring and fall bottom trawl surveys, the MADMF spring survey, the CT LISTS survey, the RIDFW Spring Trawl survey, the NEAMAP Spring Trawl survey, and two young of the year (YoY) surveys from MADMF and CTDEEP. Where available, the approximate 90% lognormal confidence intervals are shown. Slashes through the solid line indicate a hole in the survey time series.