draft working paper for peer review only

Gulf of Maine 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 Gulf of Maine Winter Flounder (Pseudopleuronectes americanus) stock is a management track assessment of the existing 2022 area-swept management track assessment (NEFSC, 2022). Based on the previous assessment the biomass status is unknown but overfishing was not occurring. This assessment updates commercial and recreational fishery catch data, research survey indices of abundance, and the area-swept estimates of 30+ cm biomass based on the fall NEFSC, MDMF, and MENH surveys.

State of Stock: Based on this updated assessment, the Gulf of Maine Winter Flounder (*Pseudopleuronectes americanus*) stock biomass status is unknown and overfishing is not occurring (Figures 1-2). Retrospective adjustments are not possible with this area-swept assessment. Biomass (30+ cm mt) in 2024 was estimated to be 4,537 mt (Figure 1). The 2024 30+ cm exploitation rate was estimated to be 0.044 which is 19% of the overfishing exploitation threshold proxy (E_{MSY} *proxy* = 0.23; Figure 2).

Table 1: Catch and status table for Gulf of Maine Winter Flounder. All weights are in (mt) and E_{Full} is the exploitation rate on 30+ cm fish. Biomass is estimated from survey area-swept for non-overlaping strata from three different fall surveys (MENH, MDMF, NEFSC) using an updated q estimate of 0.79 based on the wing spread from the sweep study (Miller et al., 2023).

	2019	2020	2021	2022	2023	2024
			Data			
Recreational discards	2	1	1	1	1	0
Recreational landings	42	51	43	39	61	23
Commercial discards	8	7	15	16	13	14
Commercial landings	102	79	118	85	117	161
Catch for Assessment	155	138	177	142	192	198
			Model Results			
30+ cm Biomass	2,672	NA	5,195	5,469	4,714	4,537
E_{Full}	0.058		0.034	0.026	0.041	0.044

Table 2: Comparison of reference points estimated in an earlier assessment and from the current assessment update. An $E_{40\%}$ exploitation rate proxy was used for the overfishing threshold and was based on a length-based yield per recruit model from the 2011 SARC 52 benchmark assessment.

	2022	2025
E_{MSY} *proxy*	0.23	0.23
B_{MSY}	Unknown	Unknown
MSY (mt)	Unknown	Unknown
Overfishing	No	No
Overfished	Unknown	Unknown

Projections: Projections are not possible with area-swept based assessments. Catch advice was based on 75% of $E_{40\%}$(75% E_{MSY} *proxy*) using the most recent two year average (2023 and 2024) of the fall area-swept estimates assuming q=0.79 based on the wing spread which was updated using the average efficiency from 2009-2024 from the sweep experiment (Miller et al., 2023). Note that the 2022 management track assessment used the average of 2021 and 2022 spring and fall 2021 fall 30+ cm area-swept biomass to develop catch advice since the 2020 surveys were not available due to disruptions in sampling related to the COVID pandemic. However, catch advice (OFLs and ABCs) from the 2020 management track assessment were based on the average of the last two years of the fall surveys to make better use of the available new information and to help stabilize the catch advice. This management track returns to this approach. Updated 2023-2024 two-year fall 30+ cm area-swept average biomass

(4,626 mt) implies an OFL of 1,064 mt based on the E_{MSY} *proxy* and a catch of 798 mt for 75% of the E_{MSY} *proxy*.

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).

  The largest source of uncertainty with the direct estimates of stock biomass from survey area-swept estimates originate from the survey gear catchability (q). Biomass and exploitation rate estimates are sensitive to the survey q assumption. However, this 2024 update does incorporate the use of a re-estimated q through an average estimate of efficiency from 2009-2024 fall and 2009-2025 spring (q=0.79 fall and q=0.71 spring) from the sweep study for the NEFSC survey. This updated q assumption (0.79) results in a slightly higher estimates of 30+ biomass (4,537 mt in 2024) relative to the 2022 estimate q=0.81 assumption (4,453 mt in 2024) for the fall surveys. More uncertainty is associated with the efficiency in state surveys due to the lack of sweep studies. Therefore, higher confidence is given to the fall survey estimates which possess a higher proportion of the stock in the more offshore NEFSC survey. Another major source of uncertainty with this method is that biomass based reference points cannot be determined and overfished status is unknown.

- 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 model used to determine status of this stock does not allow estimation of a retrospective pattern. An analytical stock assessment model is not currently available for Gulf of Maine Winter Flounder. The previous analytical model was determined to be no longer valid to be used for stock status determination at SARC 52 (2011) due to concerns with a strong retrospective pattern. Models for this stock have difficulty reconciling the apparent lack of a relationship between a large decrease in the catch with little change in the indices and age and/or size structure over time.

- 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 are not available for area-swept assessments and stock biomass status of Gulf of Maine Winter Flounder is unknown. This stock was never declared as overfished. Catch advice from area-swept estimates tend to vary with interannual variability in the surveys. A two-year average of the most recent fall surveys is used to help stabilize the biomass estimates and catch advice. The fall survey is also thought to be a better estimate of the exploitable biomass due to concerns of missing fish within the estuaries during the spawning late winter/early spring season.

- 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.

  The assumption on q changed from 0.81 to 0.79 for the fall and from 0.70 to 0.71 for the spring using information from the updated average q's from the NEFSC surveys (Miller et al., 2023).

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

  The overfishing status of Gulf of Maine Winter Flounder has not changed. Overfished status remains unknown.

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

  Gulf of Maine Winter Flounder has relatively flat survey indices with little change in the size structure over time. There have been large declines in the commercial and recreational removals since the 1980s. This large decline over the time series does not appear to have resulted in a clear response in the stock's size structure within the catch and surveys nor has it resulted in a change in the survey indices of abundance. However, there have been some general more recent increases in the fall and the spring area-swept biomass estimates. If increasing biomass trends continue then perhaps this is the beginning of a response to time series lows in exploitation rates.

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

  Direct area-swept assessments could be improved with additional studies on state survey gear efficiency. Quantifying the degree of herding between the doors and escapement under the footrope and/or above the headrope for state surveys is needed to improve the area-swept biomass estimates. Studies quantifying winter flounder abundance and distribution among habitat types and within estuaries could improve the biomass estimate. However, development of state space analytical models that incorporate process error which can account for conflicting data trends may ultimately be needed to improve our understanding and more appropriately quantify the stock population dynamics.

- Are there other important issues?

  The general lack of a response in survey indices and age/size structure are the primary sources of concern with catches remaining far below the overfishing level. However, recent increases in the overall biomass (2021-2024) could perhaps be the beginning of a response to removals being at record lows over the last few years (2019-2024 average = 167 mt). If recent increases in biomass is a response to the low catches then continuation of keeping the catch near recent levels may result in further increases in biomass.

References:

Miller, T.J., Richardson, D,E. Politis, P.J.; Roebuck, C.D., Manderson, J.P., Martin, M.H., and Jones, A.W. 2023. Estimation of survey efficiency and biomass for commercially important species from industry-based paired gear experiments. Fisheries Research, 259, 106565. https://doi.org/10.1016/j.fishres.2022.106565

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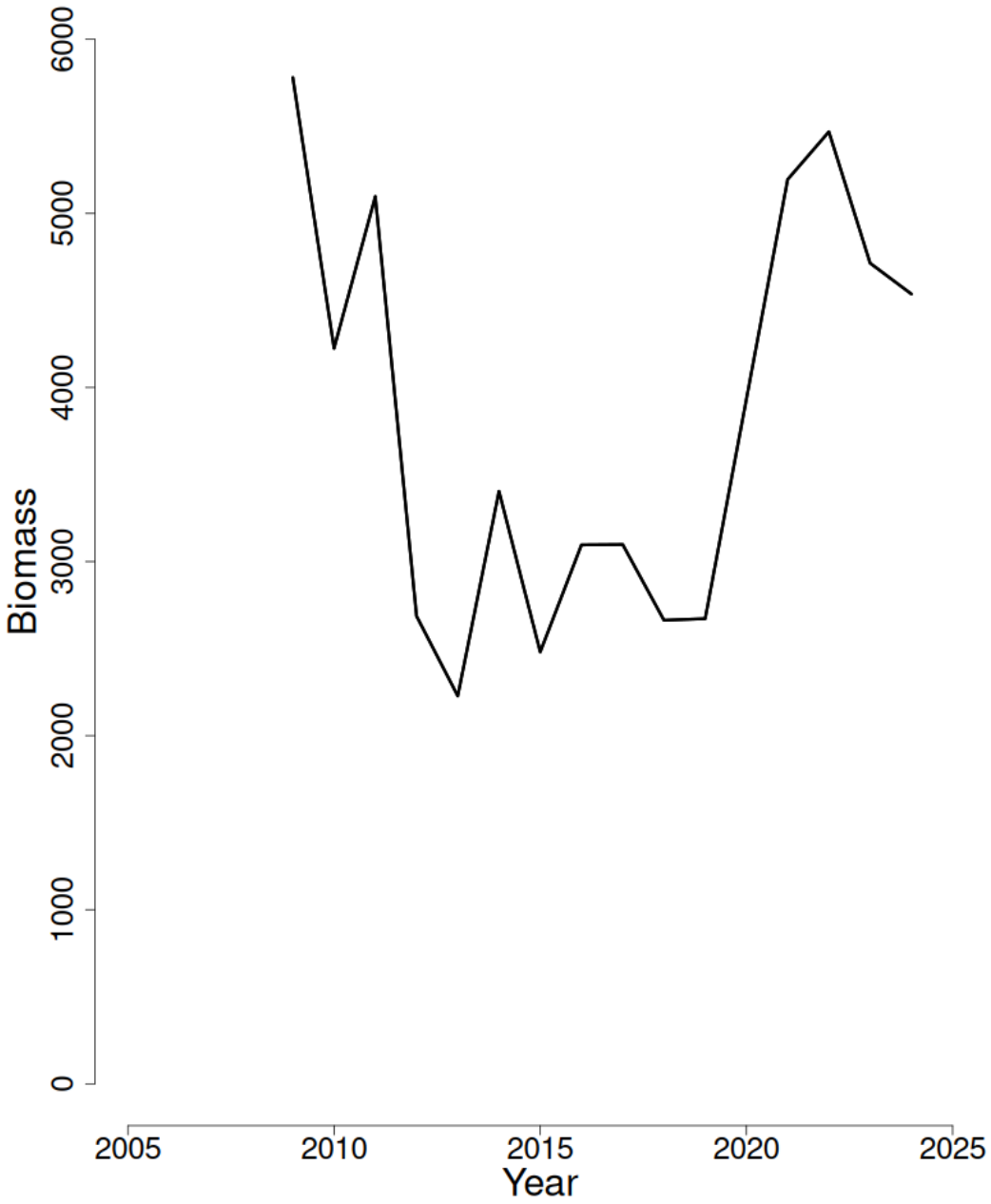

Figure 1: Trends in 30+ cm area-swept biomass of Gulf of Maine Winter Flounder between 2009 and 2024 from the current assessment based on the fall (MENH, MDMF, NEFSC) surveys.

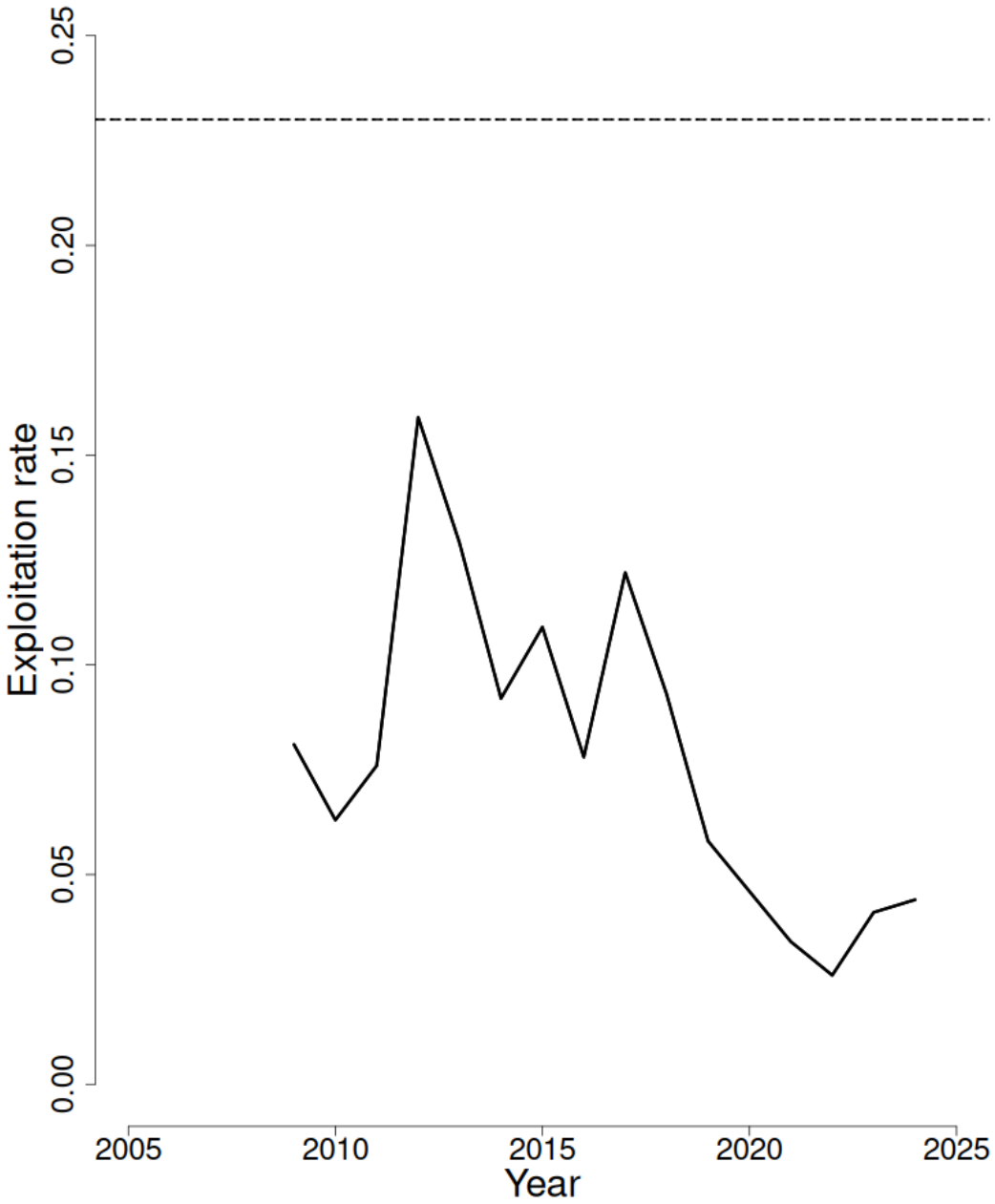

Figure 2: Trends in the exploitation rates (E_{Full}) of Gulf of Maine Winter Flounder between 2009 and 2024 from the current assessment based on the fall (MENH, MDMF, NEFSC) surveys and the corresponding $F_{Threshold}$ (E_{MSY} *proxy*=0.23; horizontal dashed line).

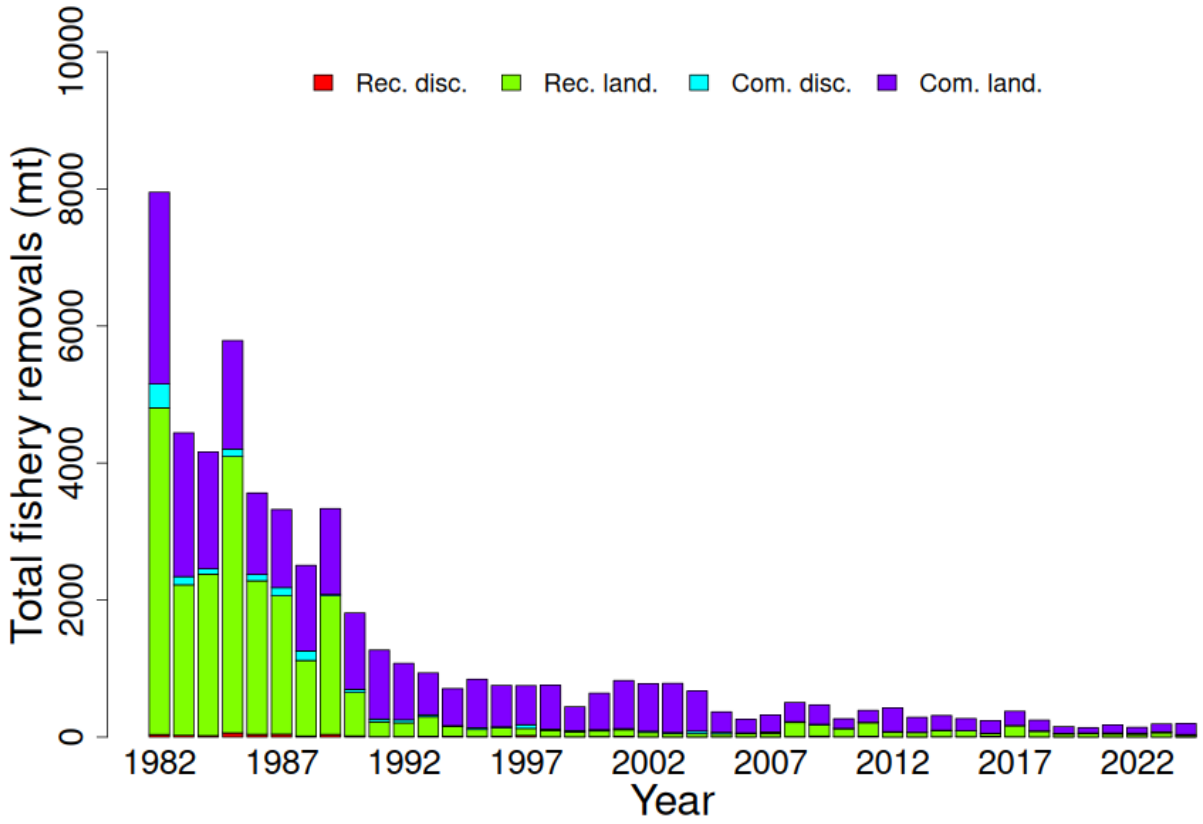

Figure 3: Total catch of Gulf of Maine Winter Flounder between 2009 and 2024 by fleet (commercial and recreational) and disposition (landings and discards). A 15% mortality rate is assumed on recreational discards and a 50% mortality rate on commercial discards.

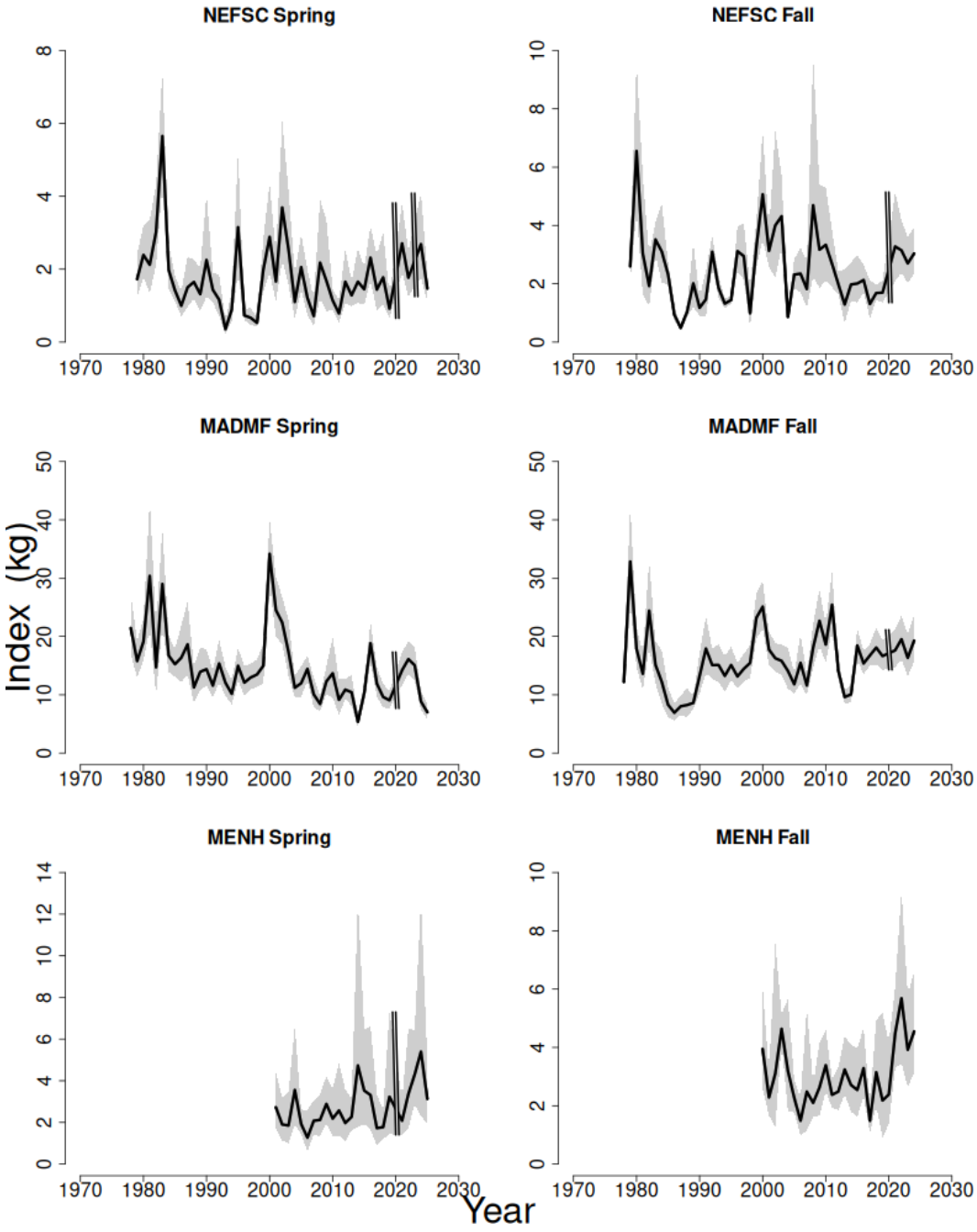

Figure 4: Indices of biomass for the Gulf of Maine Winter Flounder between 1978 and 2025 for the Northeast Fisheries Science Center (NEFSC), Massachusetts Division of Marine Fisheries (MDMF), and the Maine-New Hampshire (MENH) spring and fall bottom trawl surveys. NEFSC indices are calculated with gear and vessel conversion factors where appropriate. The approximate 90% lognormal confidence intervals are shown.