draft working paper for peer review only

Summer flounder

2025 Management Track Assessment Report

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts

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This assessment of the summer flounder (Paralichthys dentatus) stock is a level 2 management track assessment updating the previous 2023 management track assessment (NEFSC 2023). Based on the previous assessment the stock was not overfished, but overfishing was occurring. This assessment updates commercial fishery catch data, research survey indices of abundance, the ASAP assessment model and reference points through 2024. Additionally, stock projections have been updated through 2027.

State of Stock: Based on this updated assessment, the summer flounder (*Paralichthys dentatus*) 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 40,516 (mt) which is 83% of the biomass target (SSB_{MSY} *proxy* = 48,571; Figure 1). The 2024 fully selected fishing mortality was estimated to be 0.35 which is 74% of the overfishing threshold proxy (F_{MSY} *proxy* = 0.47; Figure 2).

Table 1: Catch and status table for summer flounder. All weights are in (mt) recruitment is in (000s) and F_{Full} is the fishing mortality on fully selected ages (age 4). Model results are from the current updated ASAP assessment.

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
						Data					
Commercial landings	4,989	4,858	3,537	2,644	2,787	4,109	4,152	4,819	5,750	5,930	4,063
Commercial discards	830	703	772	906	979	783	1,166	887	686	652	759
Recreational landings	7,364	5,366	6,005	4,565	3,447	3,537	4,571	3,092	3,916	3,880	2,494
Recreational discards	2,092	1,572	1,482	1,496	1,003	1,379	1,141	997	1,336	1,045	1,149
Removals for Assessment	15,275	12,499	11,796	9,611	8,216	9,808	11,030	9,795	11,688	11,507	8,465
						Model Results					
Spawning Stock Biomass	48,094	42,624	39,304	37,081	37,882	39,387	43,082	40,493	38,171	38,034	40,516
F_{Full}	0.435	0.424	0.426	0.342	0.302	0.368	0.411	0.362	0.468	0.475	0.35
Recruits (age 0)	38,945	26,547	30,704	40,350	44,336	37,778	31,435	34,123	42,112	52,873	49,649

Table 2: Comparison of reference points estimated in the 2023 assessment and from the current assessment update. An $F_{35\%}$ proxy was used for the overfishing threshold and the spawning stock biomass target was based on long-term stochastic projections.

	2023	2025
F_{MSY} *proxy*	0.451	0.47
SSB_{MSY} (mt)	49,561	48,571 (38,595 - 61,021)
MSY (mt)	14,097	14,512 (11,514 - 18,265)
Median recruits (age 0) (000s)	46,966	46,626
Overfishing	Yes	No
Overfished	No	No

Projections: Short term projections of catch (OFL) and spawning stock biomass (SSB) were derived by sampling from an empirical cumulative distribution function of the 14 most recent recruitment estimates from the ASAP model results (2011-2024). The annual fishery selectivity, maturity ogive, and mean weights at age used in projections are the most recent 5 year averages; no retrospective adjustments were applied in the projections.

Table 3: Short term projections of total fishery catch and spawning stock biomass for summer flounder based on a harvest scenario of fishing at F_{MSY} *proxy* between 2026 and 2027. Catch in 2025 was assumed to be 8,761 (mt), the 2025 ABC.

Year	Catch (mt)	SSB (mt)	F_{Full}
2025	8,761	48,301 (41,709 - 55,909)	0.31

Year	Catch (mt)	SSB (mt)	F_{Full}
2026	14,466	48,290 (42,476 - 55,004)	0.47
2027	14,439	45,618 (40,819 - 51,183)	0.47

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).

  Sex-based differences in growth that cause differential mortality are a source of uncertainty; during the last benchmark assessment sex-specific models were examined but could not be implemented. In addition, growth and maturity schedules have changed over time and the responsible mechanisms are 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 7-year Mohn's ρ, relative to SSB, was 0.06 in the 2023 assessment and was 0.09 in 2024. The 7-year Mohn's ρ, relative to F, was 0.03 in the 2023 assessment and was 0 in 2024. This model did not require a retrospective adjustment for advice because the adjusted estimates for F and SSB were within the terminal year 90% confidence limits for the unadjusted values.

- 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 summer flounder are reasonably well determined.

- 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 major changes, other than the incorporation of new data were made to the summer flounder assessment for this update. Minor changes included discontinuing the use of likelihood constants, updating some historical values in the weight-at-age matrices, adjusting the weight-at-age matrix associated with two indices and using updated ChesMMAP and VIMS Juvenile Trawl Survey historical data. These changes had only minor impacts on the model results.

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

  The overfishing status of summer flounder has changed. The 2023 management track assessment determined that overfishing was occurring; overfishing is not occurring according to the 2025 management track. A decline in total harvest paired with an increase in spawning stock biomass in the terminal year explains this change.

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

  More recent mortality rates have been low enough to allow for age structure expansion relative to the 1980s and 1990s. Recent recruitment has generally been lower than prior to 2010. Weight-at-age and maturity schedules have declined relative to the early 2000s.

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

The summer flounder assessment could be improved with more intensive and comprehensive sampling of the fishery catch by sex to allow for applications of sex-based models that are grounded in sex-based biological observations of catch.

- Are there other important issues?
  Sufficient length and age sampling of the fishery catch needs to be maintained. Updated historical MRIP estimates are expected to have a substantial impact on scale and should be available in time for the 2027 managment track assessment.

References:

Northeast Fisheries Science Center. 2023. Management Track Assessments Spring 2023. US Dept Commer Northeast Fish Sci Cent Tech Memo 308. 80 p. <https://repository.library.noaa.gov/view/noaa/55439>.

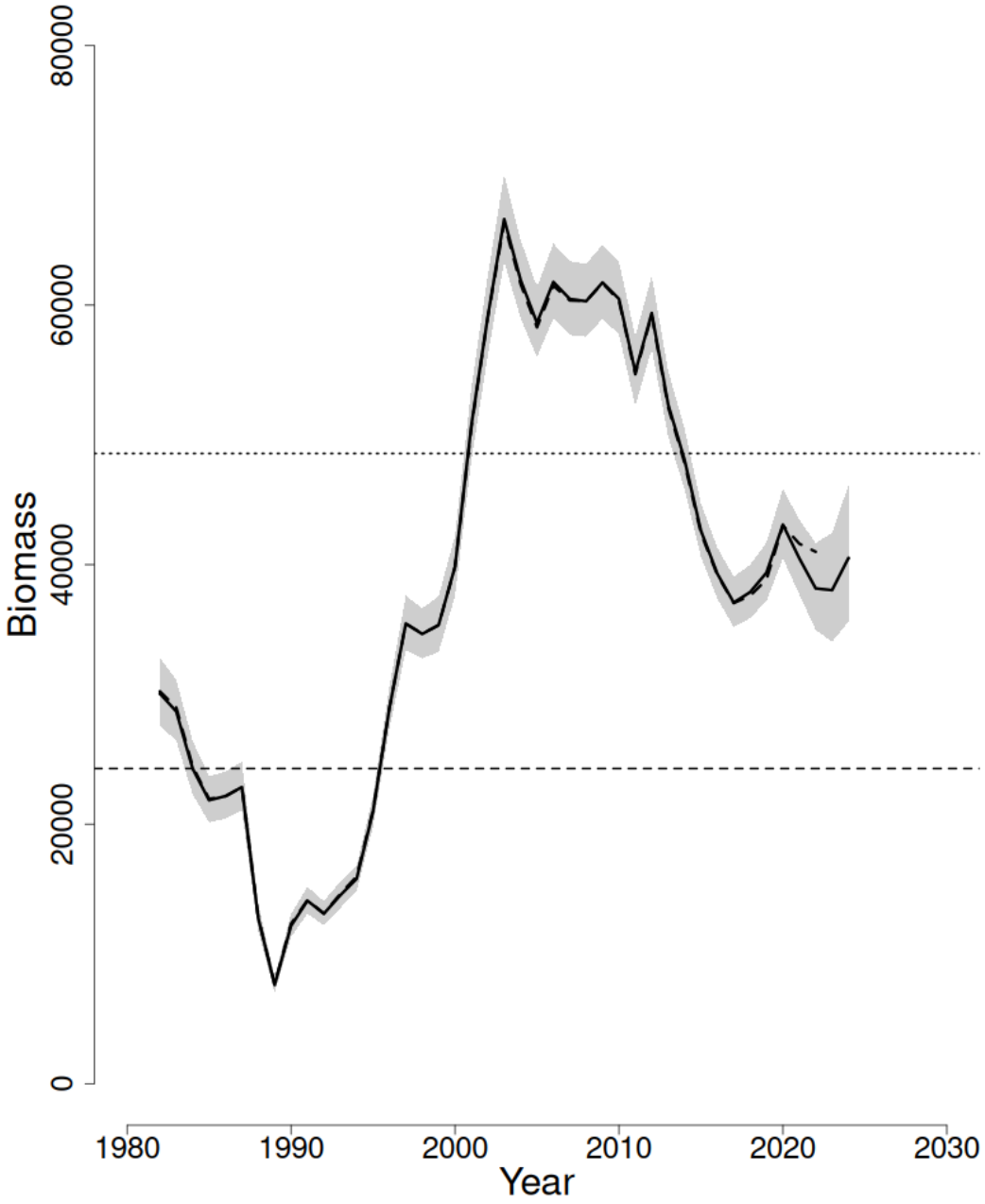

Figure 1: Trends in spawning stock biomass of summer flounder between 1982 and 2024 from the current (solid line) and previous (dashed line) assessment and the corresponding $SSB_{Threshold}$ ($\frac{1}{2}$ SSB_{MSY} *proxy*; horizontal dashed line) as well as SSB_{Target} (SSB_{MSY} *proxy*; horizontal dotted line) based on the 2025 assessment. The approximate 90% lognormal confidence intervals are shown.

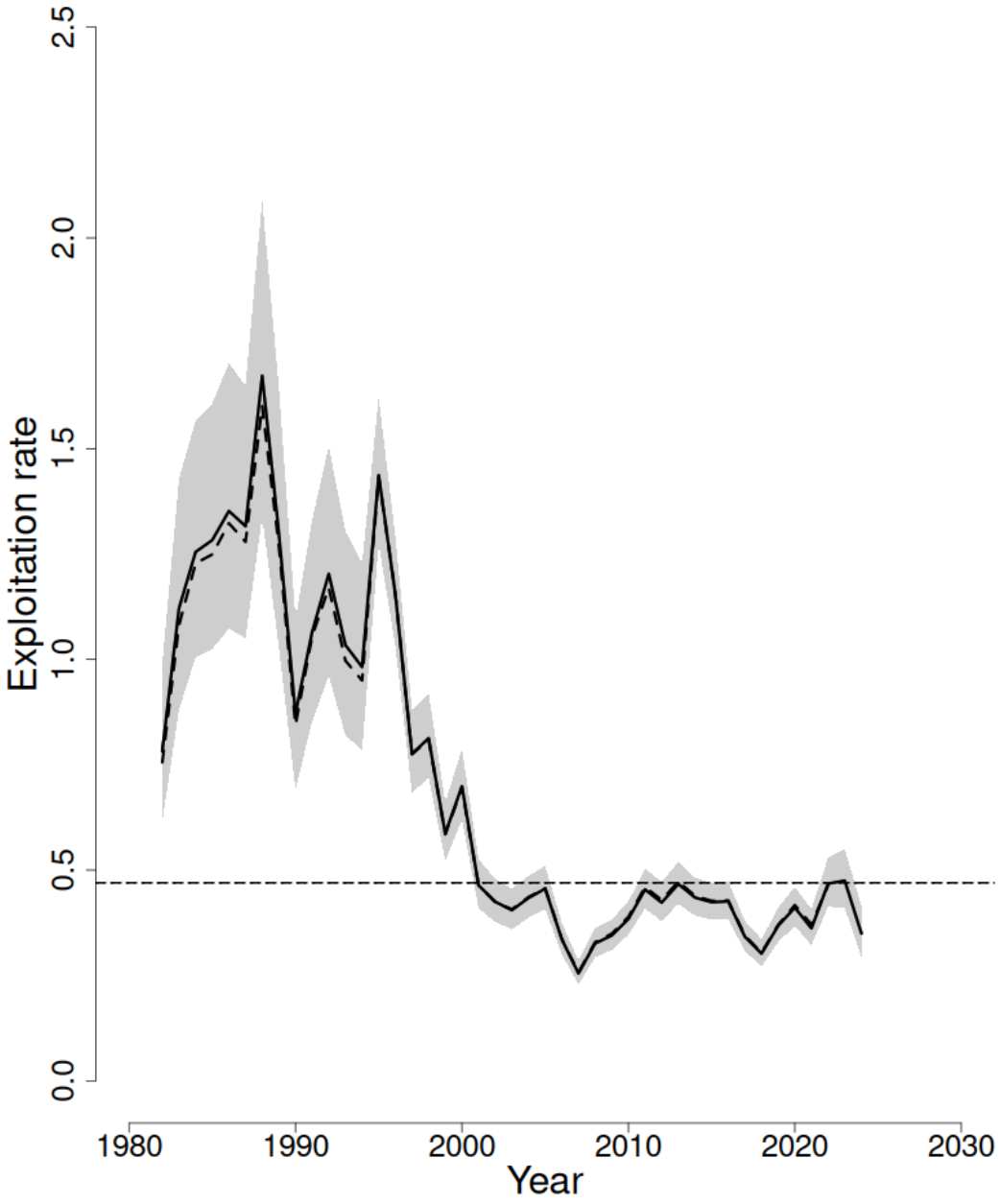

Figure 2: Trends in the fully selected fishing mortality (F_{Full}; 'Exploitation rate') of summer flounder between 1982 and 2024 from the current (solid line) and previous (dashed line) assessment and the corresponding $F_{Threshold}$ (F_{MSY} *proxy*=0.47; horizontal dashed line) based on the 2025 assessment. The approximate 90% lognormal confidence intervals are shown.

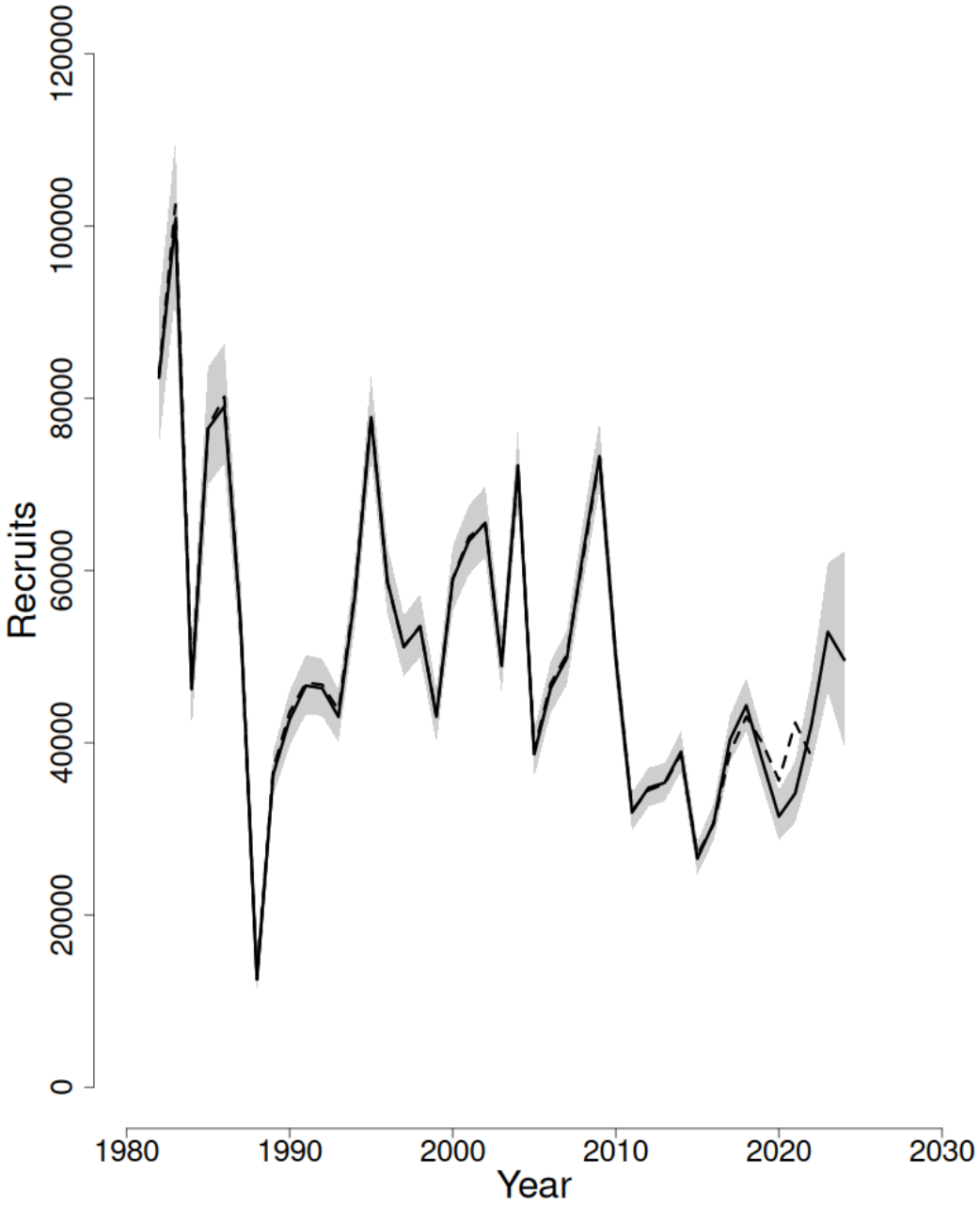

Figure 3: Trends in recruits (age 0) (000s) of summer flounder between 1982 and 2024 from the current (solid line) and previous (dashed line) assessment. The approximate 90% lognormal confidence intervals are shown.

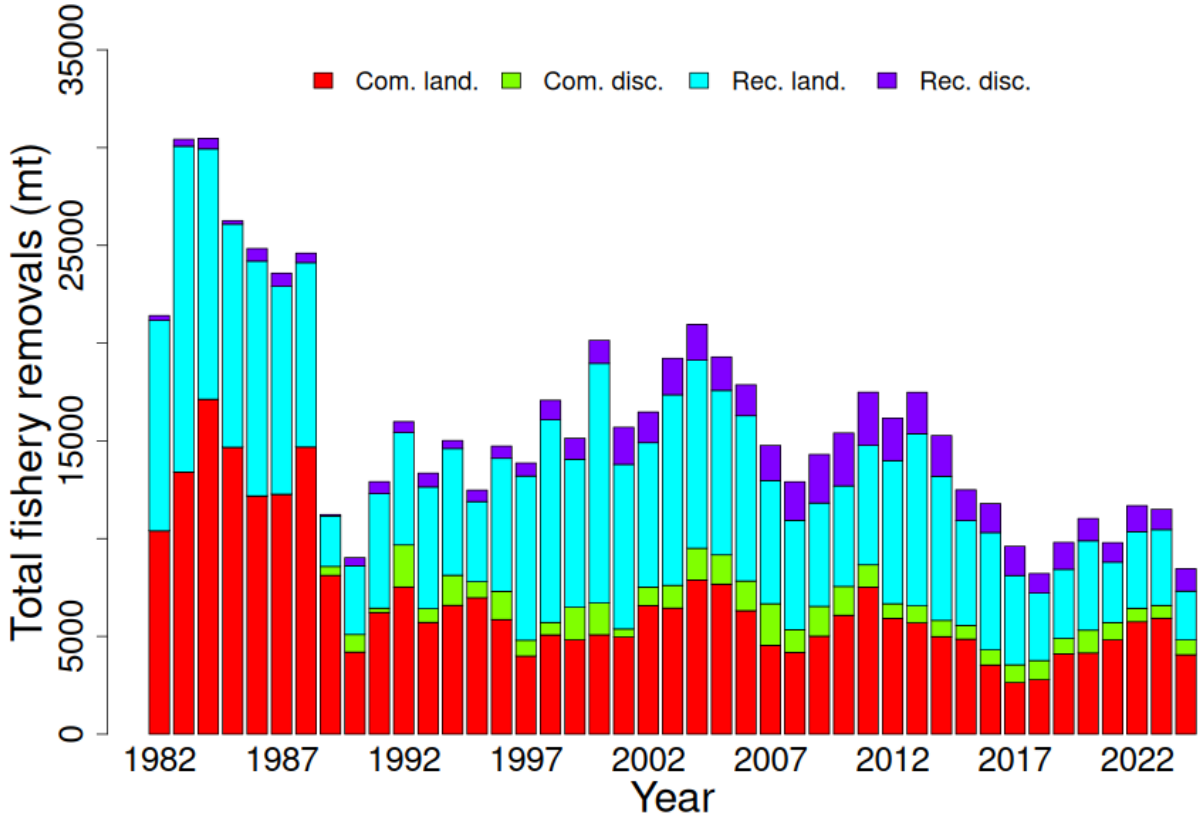

Figure 4: Total catch of summer flounder between 1982 and 2024 by fleet (commercial, recreational) and disposition (landings, discards).

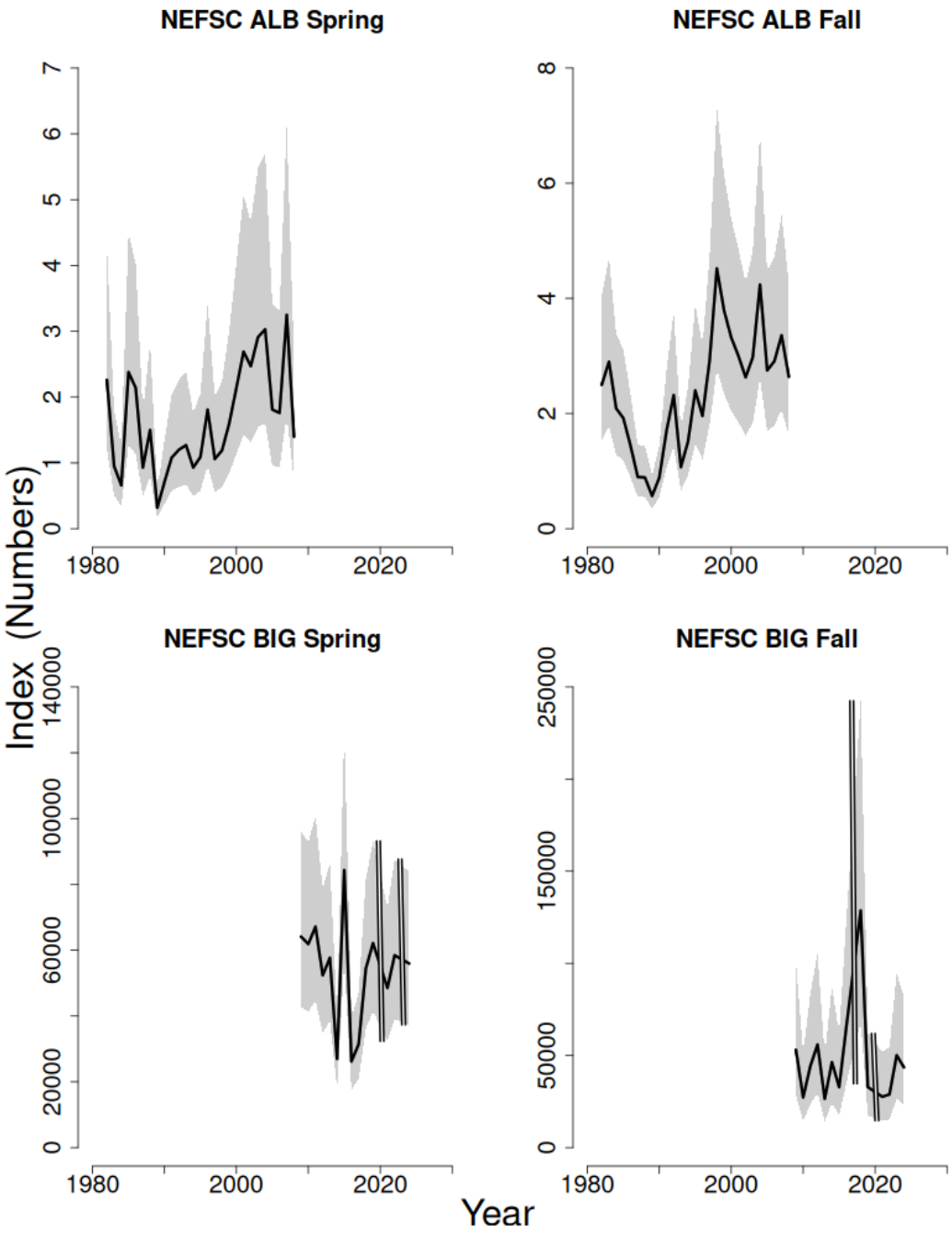

Figure 5: Abundance indices for summer flounder between 1982 and 2024 for the Northeast Fisheries Science Center (NEFSC) spring and fall Albatross IV (ALB) and Henry B. Bigelow (BIG) bottom trawl surveys. The approximate 90% lognormal confidence intervals are shown. Survey results were not available for use in 2017 and 2020 for the Bigelow fall trawl survey and in 2020 and 2023 for the Bigelow spring survey; these are shown as breaks in the figure.