9 Southern New England Mid-Atlantic winter flounder

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This assessment of the Southern New England Mid-Atlantic winter flounder (Pseudopleuronectes americanus) stock is an operational assessment of the existing 2011 banchmark assessment (NEFSC 2011). This assessment follows a previous operational update in 2015 where the stock was overfished, but overfishing was not occurring (NEFSC 2015). This assessment updates commercial fishery catch data, recreational fishery catch data, and research survey indices of abundance, and the analytical ASAP assessment models and reference points through 2016. Additionally, stock projections have been updated through 2020.

State of Stock: Based on this updated assessment, the Southern New England Mid-Atlantic winter flounder (*Pseudopleuronectes americanus*) stock is overfished but overfishing is not occurring (Figures 44-45). Retrospective adjustments were not made to the model results. Spawning stock biomass (SSB) in 2016 was estimated to be 4,360 (mt) which is 18% of the biomass target (24,687 mt), and 36% of the biomass threshold for an overfished stock ($SSB_{Threshold}$ = 12343.5 (mt); Figure 44). The 2016 fully selected fishing mortality was estimated to be 0.21 which is 62% of the overfishing threshold (F_{MSY} = 0.34; Figure 45).

Table 29: 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.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
				Data						
Recreational discards	5	3	9	8	18	2	4	1	2	2
Recreational landings	116	73	87	28	65	31	7	30	10	33
Commercial discards	118	109	165	153	298	483	206	64	82	124
Commercial landings	1,628	1,113	271	174	150	134	857	658	655	519
Catch for Assessment	1,867	1,298	532	363	531	650	1,074	753	749	678
				Model Results						
Spawning Stock Biomass	6,710	5,801	5,178	5,878	6,932	6,964	6,763	5,661	5,090	4,360
F_{Full}	0.36	0.28	0.12	0.07	0.1	0.12	0.21	0.19	0.2	0.21
Recruits (age 1)	6,157	9,140	7,075	6,532	4,873	4,464	2,390	4,102	5,742	7,549

Table 30: Comparison of reference points estimated in the 2015 operational assessment and from the current assessment update. F_{MSY} was generated assuming a Beverton-Holt S-R relationship and an SSB_{MSY} proxy was used for the overfished threshold and was based on long-term stochastic projections. Recruitment estimates are median values of the time-series. 90% CI are shown in parentheses.

	2011	2017
F_{MSY}	0.325	0.34
SSB_{MSY} (mt)	26,928	24,687 (16,919 - 36,693)
MSY (mt)	7,831	7,532 (4,991 - 11,570)
Median recruits (age 1) (000s)	16,448	15,802
Overfishing	No	No
Overfished	Yes	Yes

Projections: Short term projections of biomass were derived by sampling from a cumulative distribution function of recruitment estimates assuming a Beverton-Holt stock recruitment relationship. The annual fishery selectivity, maturity ogive, and mean weights at age used in the projection are the most recent 5 year averages; The model exhibited a minor retrospective pattern in F and SSB so no retrospective adjustments were applied in the projections.

Table 31: 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} between 2018 and 2020. Catch in 2017 was assumed to be 625 (mt), a value provided by GARFO (Dan Caless pers. comm.). 90% CI are shown next to SSB estimates.

Year	Catch (mt)	SSB (mt)	F_{Full}
2017	625	4,058 (3,238 - 5,029)	0.190

Year	Catch (mt)	SSB (mt)	F_{Full}
2018	1,228	4,336 (3,490 - 5,327)	0.340
2019	1,326	4,177 (3,411 - 5,091)	0.340
2020	1,736	4,889 (3,647 - 7,192)	0.340

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).

  A large 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, and assumed constant over time. 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 max age of 16. However, there is still uncertainty in the true max age of the population and the resulting natural mortality estimate. Other

sources of uncertainty include 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 (1 to 2 lengths in recent years).

- 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}; see Table 8).

  The retrospective patterns for both Ffull and SSB are minor and no retrospective adjustment in 2016 was 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 reasonably well determined. There is uncertainty in the estimates of M. In addition, while the retrospective pattern is considered minor (within the 90% CI of both F and SSB), the rho adjusted terminal value of F is close to falling outside of the bounds which would indicate a major retrospective pattern. This would lead to retrospective adjustments being needed for the projections. The stock is in a rebuilding with a rebuild date of 2023. A projection using assumed catch in 2017 and F = 0 through 2023 indicated a less than 1% chance of reaching the SSB target.

- 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, other than the incorporation of new data, were made to the Southern New England Mid-Atlantic winter flounder assessment for this update.

- 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 operational update in 2015 and remains the same as during the last benchmark assessment in 2011.

- 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 current estimates near the time series low. Estimates of fishing mortality have remained steady since 2012 and recruitment has steadily increased since an all time low in 2013. Current recruitment estimates are above the ten year average and are the highest since 2008.

- 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 additional recreational discard lengths. In addition, further investigation into the localized struture/genetics of the stock is warranted. Also, a future shift to ASAP version 4 will provide the ability to model envirionmental factors that may influence both survey catchability and the modeled S-R relationship.

- Are there other important issues?
  None.

9.1 Reviewer Comments: Southern New England Mid-Atlantic winter flounder

Assessment Recommendation:

The panel concluded that the operational assessment with no adjustment for retrospective bias was acceptable as a scientific basis for management advice.

Alternative Assessment Approach:

Not applicable

Status Recommendation:

Based on this operational assessment, the panel supports the conclusion that the Southern New England Mid-Atlantic winter flounder stock is overfished but overfishing is not occurring. The Southern New England Mid-Atlantic winter flounder stock shows an overall declining trend in spawning stock biomass over the time series, with current estimates near the time series low. Estimates of fishing mortality have remained steady since 2012 and recruitment has steadily increased since an all-time low in 2013. Current recruitment estimates are above the ten year average and are the highest since 2008. The stock is currently in a rebuilding plan with a deadline of 2023; however, this assessment suggests a low probability of meeting the rebuilding deadline.

Key Sources of Uncertainty:

A large 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, and assumed constant over time. There is still uncertainty in the true max age of the population and the resulting natural mortality estimate. Other sources of uncertainty include the fixed steepness value assumed in the stock-recruit relationship, and the length distribution of the recreational discards. 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 (1 to 2 lengths in recent years).

Research Needs:

The panel recommends additional studies to improve estimates of natural mortality, including studies on maximum age. The panel suggests considering the incorporation of additional recreational discard lengths. In addition, studies to update and investigate migration and movement rates and patterns, as well as further investigation into the localized structure/genetics of the stock is warranted. Also, a future shift to a model that will provide the ability to model environmental factors that may influence both survey catchability and the modeled stock-recruitment relationship. Finally, the panel recommends further examination of the patterns observed in the residuals from fits to the survey indices.

References:

Northeast Fisheries Science Center. 2011. 52nd Northeast Regional Stock Assessment Workshop (52nd SAW) Assessment Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 11-17; 962 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

Northeast Fisheries Science Center. 2015. Operational Assessment of 20 Northeast Groundfish Stocks, Updated through 2014. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 15-24; 251 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

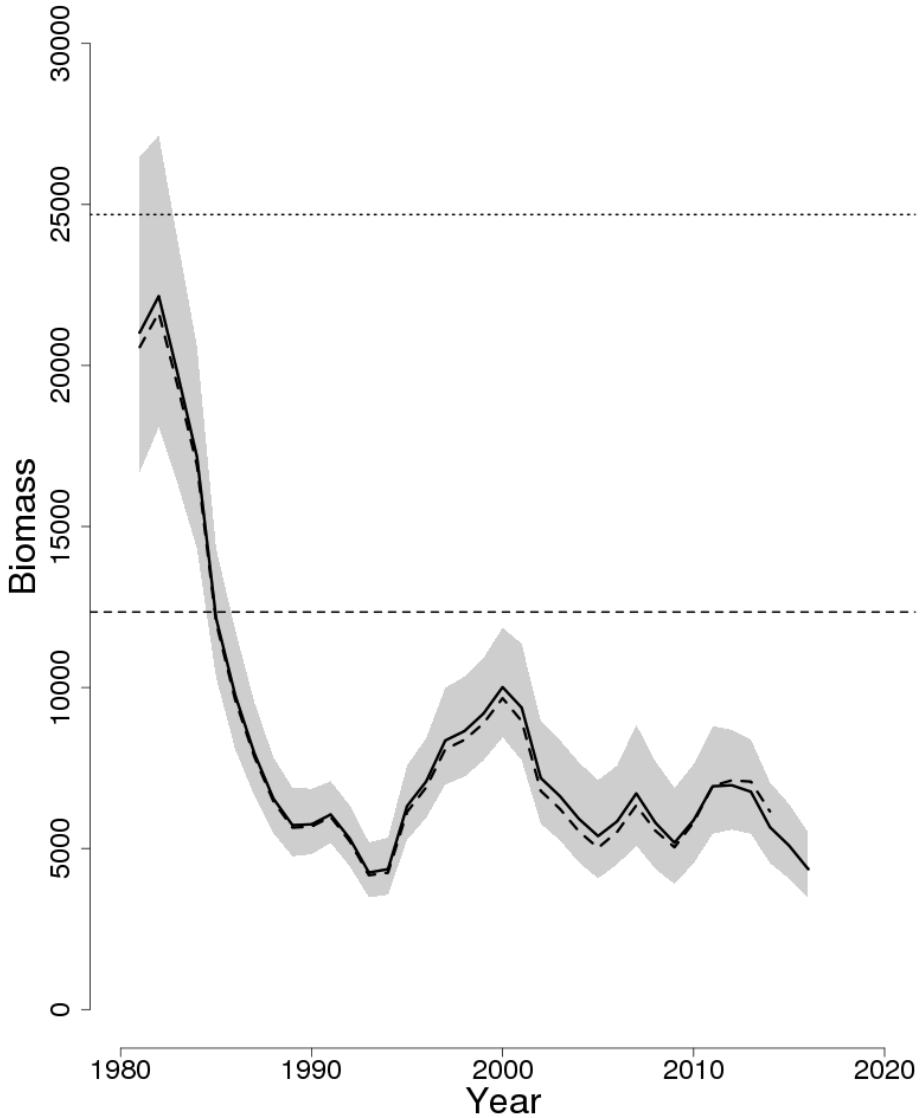

Figure 44: Trends in spawning stock biomass of Southern New England Mid-Atlantic winter flounder between 1981 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding $SSB_{Threshold}$ ($\frac{1}{2}$ SSB_{MSY} *proxy*; horizontal dashed line) as well as SSB_{Target} (SSB_{MSY} *proxy*; horizontal dotted line) based on the 2017 assessment. The approximate 90% lognormal confidence intervals are shown.

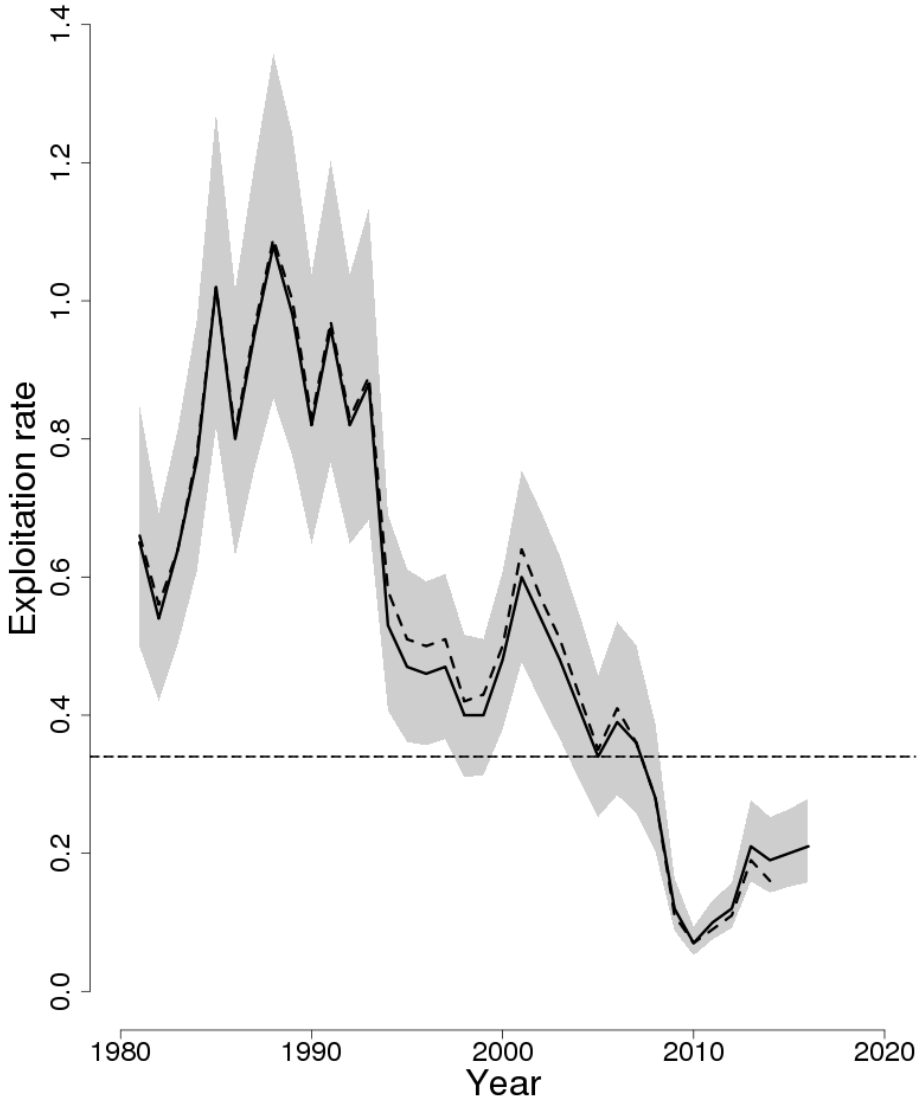

Figure 45: Trends in the fully selected fishing mortality (F_{Full}) of Southern New England Mid-Atlantic winter flounder between 1981 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding $F_{Threshold}$ (F_{MSY}=0.34; horizontal dashed line) based on the 2017 assessment. The approximate 90% lognormal confidence intervals are shown.

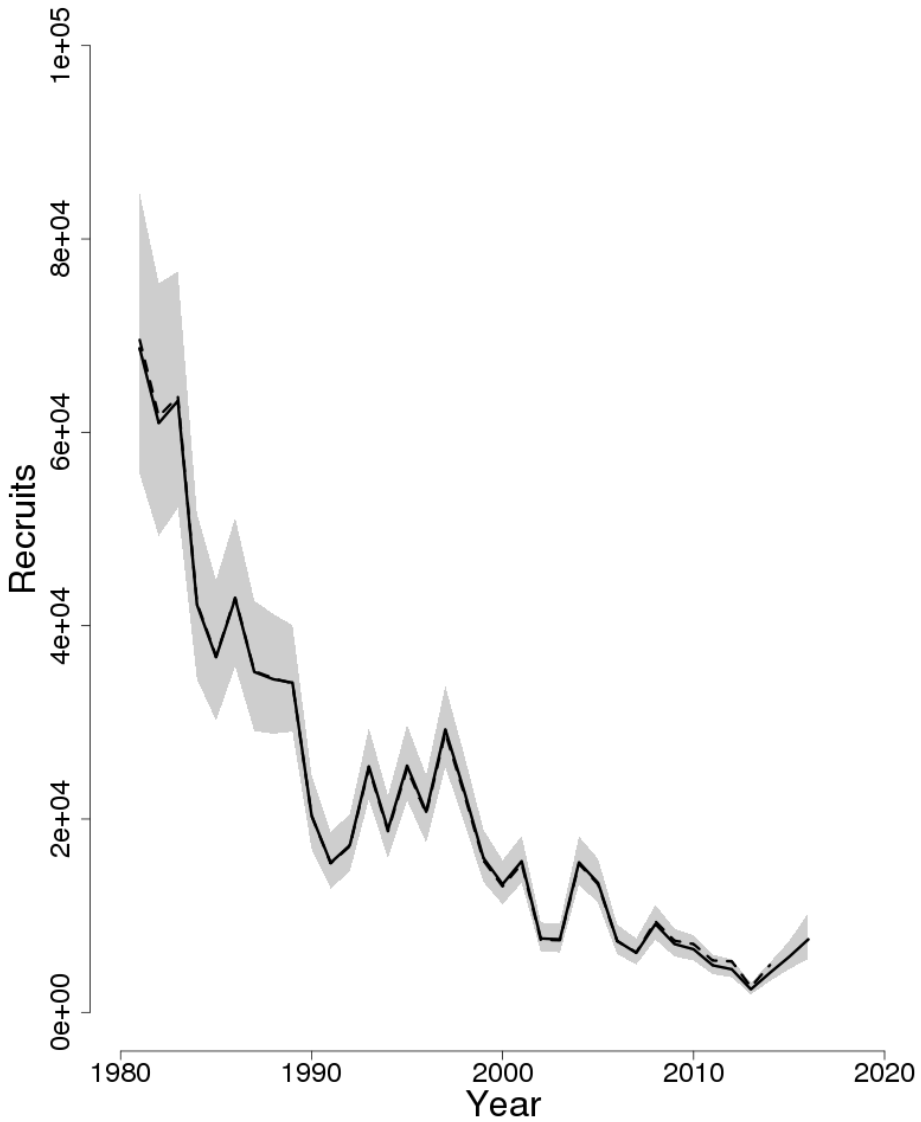

Figure 46: Trends in Recruits (age 1) (000s) of Southern New England Mid-Atlantic winter flounder between 1981 and 2016 from the current (solid line) and previous (dashed line) assessment. The approximate 90% lognormal confidence intervals are shown.

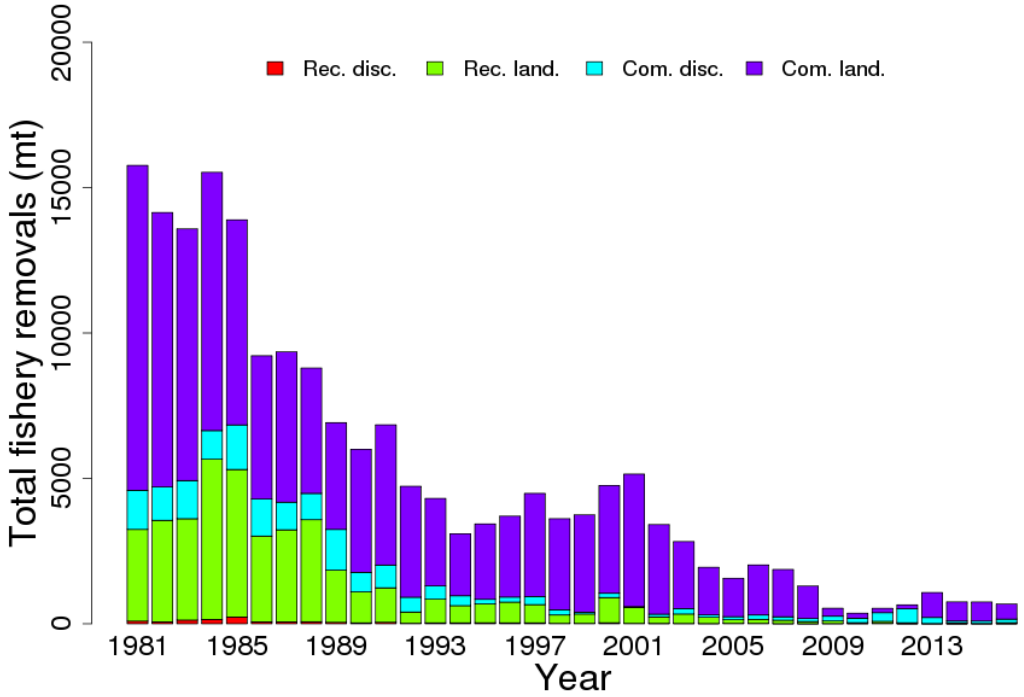

Figure 47: Total catch of Southern New England Mid-Atlantic winter flounder between 1981 and 2016 by fleet (commercial, recreational) and disposition (landings and discards).

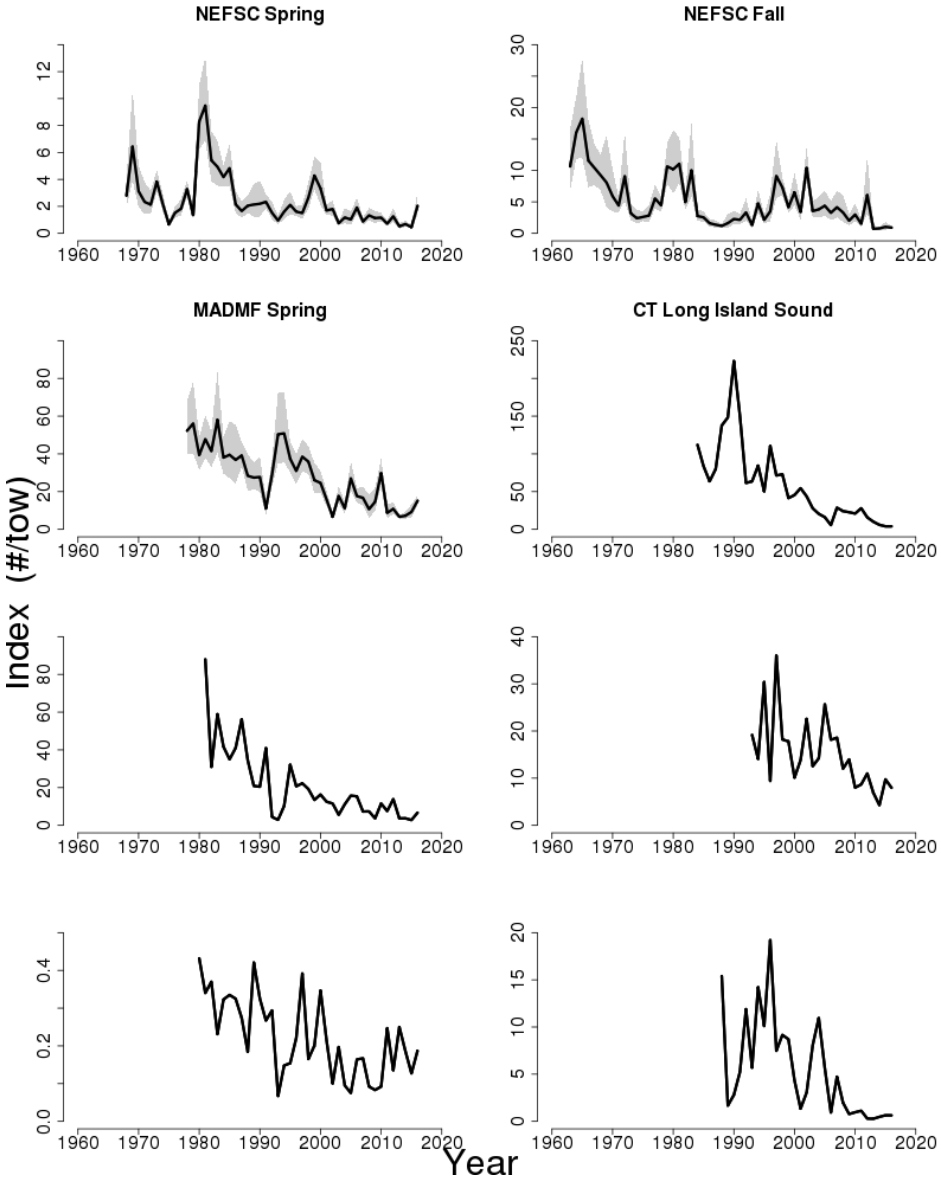

Figure 48: Indices of biomass for the Southern New England Mid-Atlantic winter flounder between 1963 and 2016 for the Northeast Fisheries Science Center (NEFSC) spring and fall bottom trawl surveys, the MADMF spring survey, the CT LISTS survey, the RIDFW Spring Trawl survey, the NJ Ocean Trawl survey, and two YoY surveys from MADMF and CT LISTS. Where available, the approximate 90% lognormal confidence intervals are shown.