

10 Gulf of Maine-Georges Bank American plaice

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*This assessment of the Gulf of Maine-Georges Bank American plaice (*Hippoglossoides platessoides*) stock is an operational update of the existing 2012 benchmark assessment (O'Brien et al. 2012). Based on the previous assessment the stock was not overfished, and overfishing was not occurring. This 2017 assessment updates commercial fishery catch data, research survey indices of abundance, the analytical VPA assessment model, and reference points through 2016. Additionally, stock projections have been updated through 2020.*

State of Stock: Based on this updated assessment, the Gulf of Maine-Georges Bank American plaice (*Hippoglossoides platessoides*) stock is not overfished and overfishing is not occurring (Figures 49-50). Retrospective adjustments were made to the model results. Spawning stock biomass (SSB) in 2016 was estimated to be 13,351 mt which is 99% of the biomass target for this stock (SSB_{MSY} proxy = 13,503; Figure 49). The 2016 fully selected fishing mortality was estimated to be 0.111 which is 51% of the overfishing threshold proxy (F_{MSY} proxy = 0.216; Figure 50).

Table 32: Catch and model results for Gulf of Maine-Georges Bank American plaice. All weights are in (mt), recruitment is in (000s), and F_{Full} is the fishing mortality on fully selected ages (ages 6-9). Model results are unadjusted values from the current updated VPA assessment.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	<i>Data</i>									
GM Commercial landings	601	703	866	901	771	762	764	738	828	718
GM Commercial discards	82	113	115	239	96	161	88	36	42	60
GB Commercial landings	377	388	501	492	595	699	528	498	400	287
GB Commercial discards	164	144	274	152	102	123	64	53	44	40
SNE landings	12	9	13	11	3	1	5	3	2	3
CA landings	2	0	0	0	1	0	0	0	0	0
Catch for Assessment	1,238	1,357	1,770	1,795	1,569	1,747	1,449	1,328	1,316	1,108
	<i>Model Results</i>									
Spawning Stock Biomass	7,149	9,783	10,726	11,038	11,415	11,635	12,214	13,073	12,952	15,148
F_{Full}	0.146	0.198	0.248	0.176	0.152	0.173	0.133	0.091	0.098	0.075
Recruits (age 1)	13,509	29,350	15,837	9,813	13,530	10,127	12,548	30,813	7,889	9,201

Table 33: Comparison of reference points estimated in the previous assessment and from the current assessment update. An $F_{40\%}$ proxy was used for the overfishing threshold and was based on long-term stochastic projections.

	2015	2017
F_{MSY} proxy	0.196	0.216
SSB_{MSY} (mt)	13,107	13,503 (10,398 - 17,611)
MSY (mt)	2,675	2,924 (2,249 - 3,815)
Median recruits (age 1) (000s)	23,059	21,969
<i>Overfishing</i>	No	No
<i>Overfished</i>	No	No

Projections: Short term projections of biomass were derived by sampling from an empirical cumulative distribution function of 36 recruitment estimates from VPA model results. The annual fishery selectivity, maturity ogive, and mean weights at age used in projections are the most recent 5 year averages; retrospective adjustments were applied in the projections.

Table 34: Short term projections of total fishery catch and spawning stock biomass for Gulf of Maine-Georges Bank American plaice based on a harvest scenario of fishing at F_{MSY} proxy between 2018 and 2020. Catch in 2017 was assumed to be 1,226 (mt).

Year	Catch (mt)	SSB (mt)	F_{Full}
2017	1,226	9,913 (8,717 - 11,155)	0.120
Year	Catch (mt)	SSB (mt)	F_{Full}
2018	2,260	10,640 (9,112 - 12,364)	0.216
2019	2,010	9,641 (8,216 - 11,269)	0.216
2020	1,794	8,421 (7,144 - 9,970)	0.216

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 source of uncertainty in this assessment are the estimates of historical landings at age, prior to 1984, and the magnitude of historical discards, prior to 1989. Both of these affect the scale of the biomass and fishing mortality estimates, and influence reference point estimations.

- 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 7-year Mohn's ρ , relative to SSB, was 0.32 in the 2015 assessment and was 0.35 in

2016. The 7-year Mohn's ρ , relative to F , was -0.32 in the 2015 assessment and was -0.33 in 2016. There was a major retrospective pattern for this assessment because the ρ adjusted estimates of 2016 SSB ($SSB_{\rho}=13,351$) and 2016 F ($F_{\rho}=0.111$) were outside the approximate 90% confidence regions around SSB (13,582 - 17,009) and F (0.065 - 0.088). A retrospective adjustment was made for both the determination of stock status and for projections of catch in 2018. The retrospective adjustment changed the 2016 SSB from 15,148 to 13,351 and the 2016 F_{Full} from 0.075 to 0.111.

- 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 Gulf of Maine-Georges Bank American plaice 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 addition of recent years of data, were made to the Gulf of Maine-Georges Bank American plaice assessment for this update. A new version of VPA was used (V3.4.5) which gave nearly identical results to the 2015 VPA V3.3.0 run.

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

As in recent assessments for Gulf of Maine-Georges Bank American plaice the stock status remains as not overfished and overfishing not occurring.

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

The current fishing mortality rate is relatively low, and so recent above average recruitment has resulted in an increase in SSB. SSB is projected to decrease in the short term, however, even at current fishing rates.

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

The Gulf of Maine-Georges Bank American plaice assessment could be improved with updated studies on growth of Georges Bank and Gulf of Maine fish.

- Are there other important issues?

A difference in growth between GM and GB fish has been documented, however, historical catch data information for GB may not be sufficient to conduct a separate assessment. Also, the growth difference may not persist in the most recent years. This could all be explored further in an benchmark review.

10.1 Reviewer Comments: Gulf of Maine-Georges Bank American plaice

Assessment Recommendation:

The panel concluded that the operational assessment with adjustments for retrospective bias was acceptable as a scientific basis for management advice.

Alternative Assessment Approach:

Not applicable

Status Recommendation:

Based on this updated assessment, the panel supports the conclusion that the Gulf of Maine-Georges Bank American plaice stock is not overfished and overfishing is not occurring. In addition to the current fishing mortality being relatively low, a spike in recruitment in one year (2013) has contributed to an increase in spawning stock biomass. This stock is currently in a rebuilding plan with a deadline of 2024, and was very close to target biomass in 2016. However, spawning stock biomass is projected to decrease in the short term, even at current fishing rates.

Key Sources of Uncertainty:

A source of uncertainty in this assessment is the estimates of historical landings at age, prior to 1984, and the magnitude of historical discards, prior to 1989 as well as the historical age composition of the surveys. The retrospective pattern remains a sources of uncertainty. Also, there is evidence of growth differences between Georges Bank and Gulf of Maine fish. Finally, the inconsistent recent trends between the National Marine Fisheries Service surveys and Massachusetts Department of Marine Fisheries survey constitutes uncertainty in the assessment. Catchability is a source of uncertainty. Catchability estimates derived from the cooperative research study are substantially different from those estimated in this assessment.

Research Needs:

The Gulf of Maine-Georges Bank American plaice assessment could be improved with updated studies on growth of Georges Bank and Gulf of Maine fish. A difference in growth rates between Gulf of Maine and Georges Bank fish has been documented; however, historical catch data for Georges Bank may not be sufficient to conduct a separate assessment. The panel recommends continuation of research on growth rates and implications for stock structure. The growth rate difference actually may not persist in the most recent years so this could all be explored further in a benchmark review. Finally, the panel recommends further research and consideration of survey catchability estimates.

References:

O'Brien, L. and J. Dayton (2012). E. Gulf of Maine - Georges Bank American plaice Assessment for 2012 in Northeast Fisheries Science Center, 2012, Assessment or Data Updates of 13 Northeast Groundfish Stocks through 2010. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 12-06; 789 p. <http://www.nefsc.noaa.gov/publications/crd/crd1206/>.

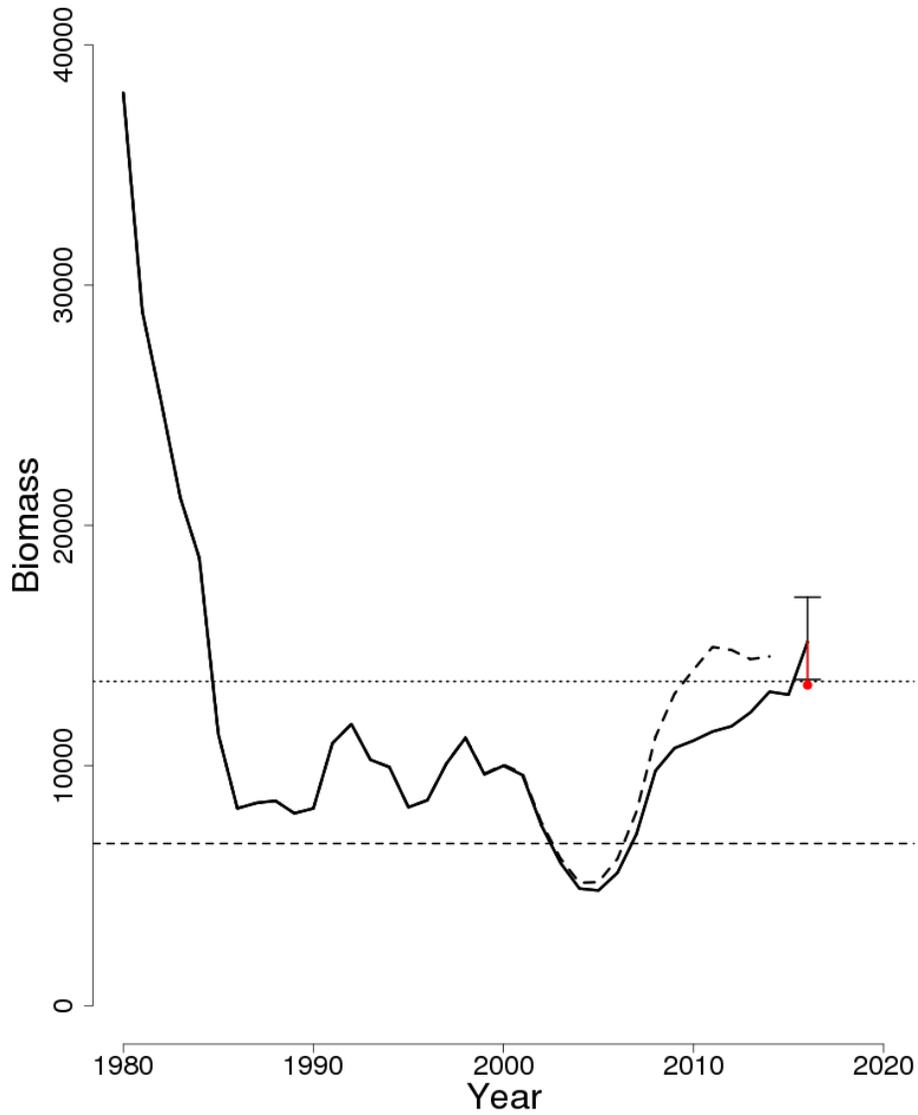


Figure 49: Trends in spawning stock biomass of Gulf of Maine-Georges Bank American plaice between 1980 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding $SSB_{Threshold}$ ($\frac{1}{2} SSB_{MSY}$ proxy; horizontal dashed line) as well as SSB_{Target} (SSB_{MSY} proxy; horizontal dotted line) based on the 2017 assessment. Biomass was adjusted for a retrospective pattern and the adjustment is shown in red. The approximate 90% normal confidence intervals are shown.

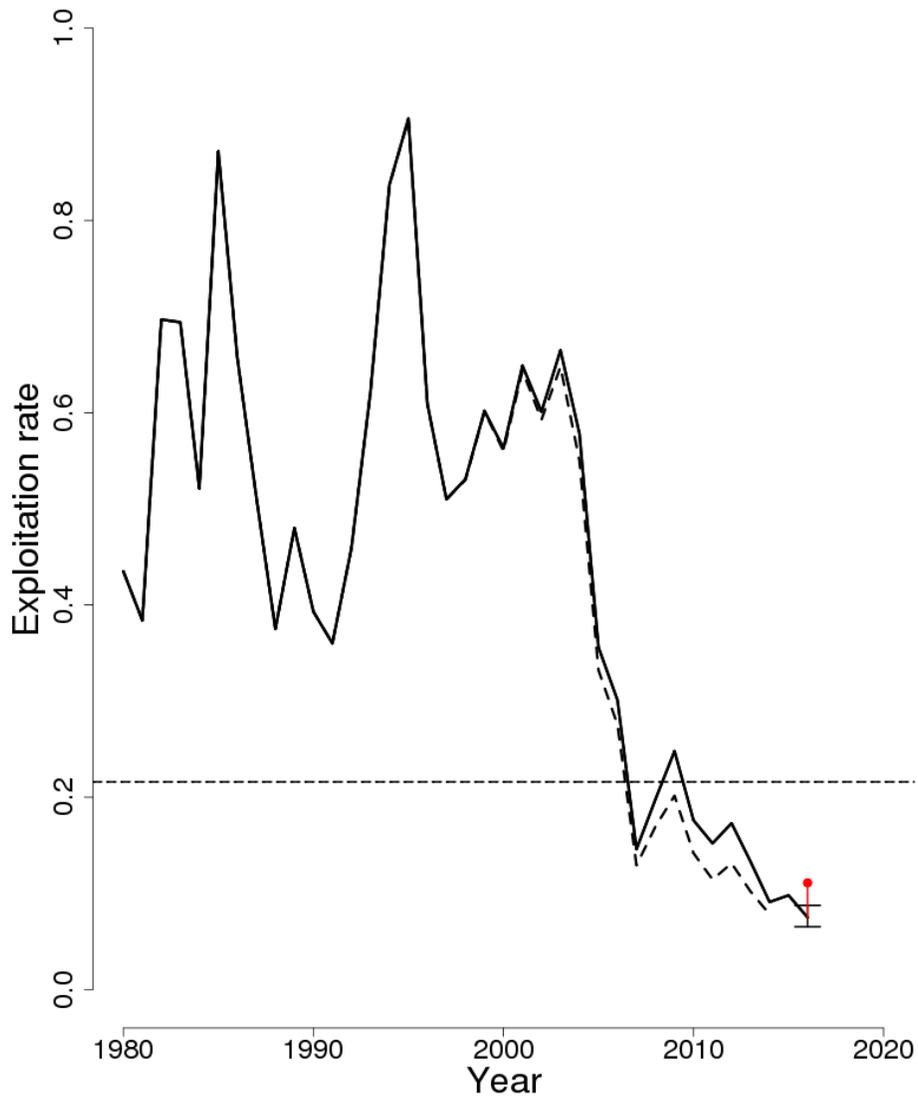


Figure 50: Trends in the fully selected fishing mortality (F_{Full}) of Gulf of Maine-Georges Bank American plaice between 1980 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding $F_{Threshold}$ (F_{MSY} proxy=0.216; horizontal dashed line). F_{Full} was adjusted for a retrospective pattern and the adjustment is shown in red, based on the 2017 assessment. The approximate 90% normal confidence intervals are shown.

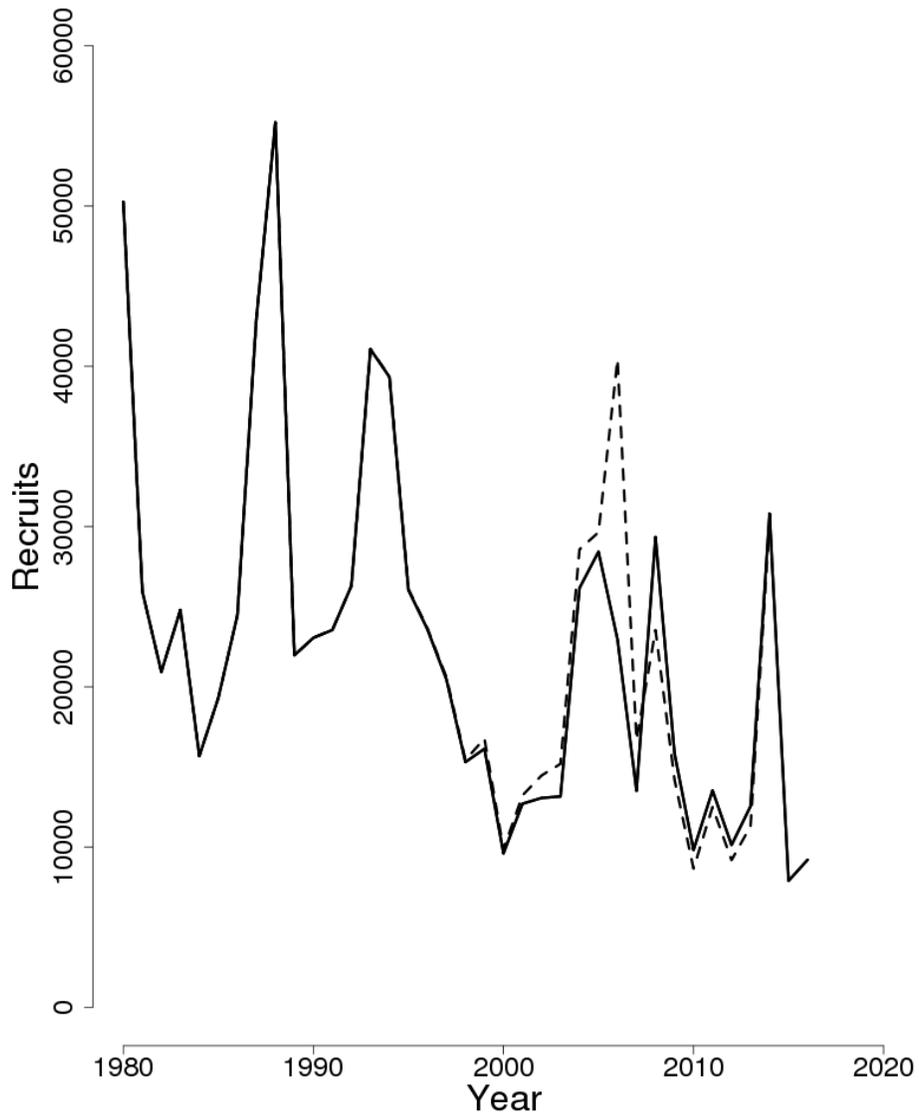


Figure 51: Trends in Recruits (age 1) (000s) of Gulf of Maine-Georges Bank American plaice between 1980 and 2016 from the current (solid line) and previous (dashed line) assessment.

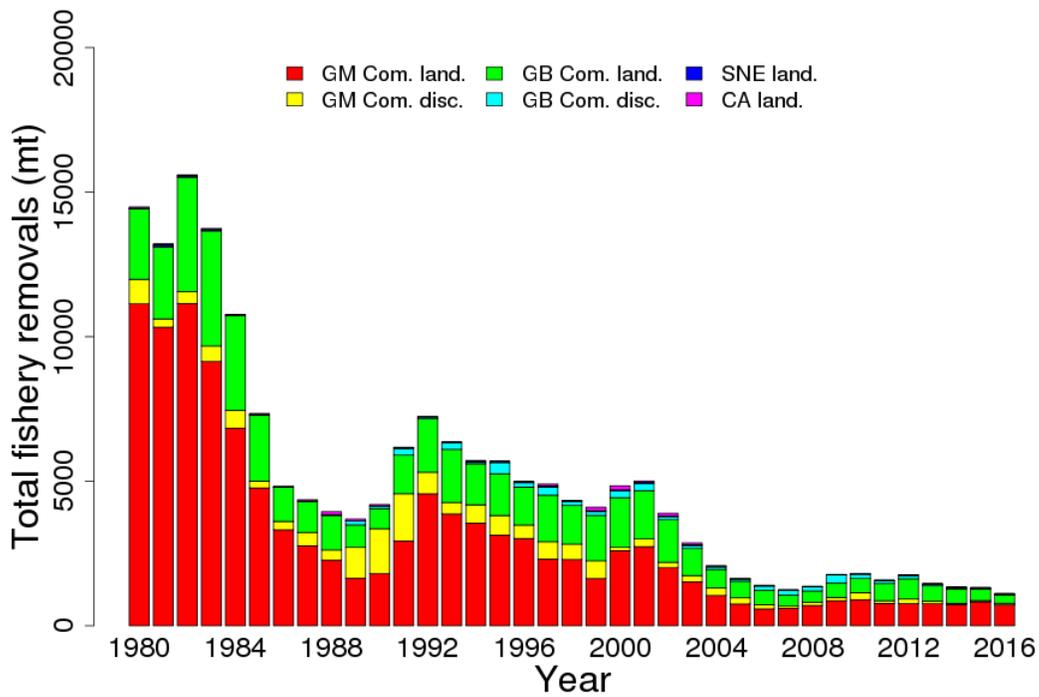


Figure 52: Total catch of Gulf of Maine-Georges Bank American plaice between 1980 and 2016 by fleet (Gulf of Maine, Georges Bank, Southern New England, and Canadian) and disposition (landings and discards).

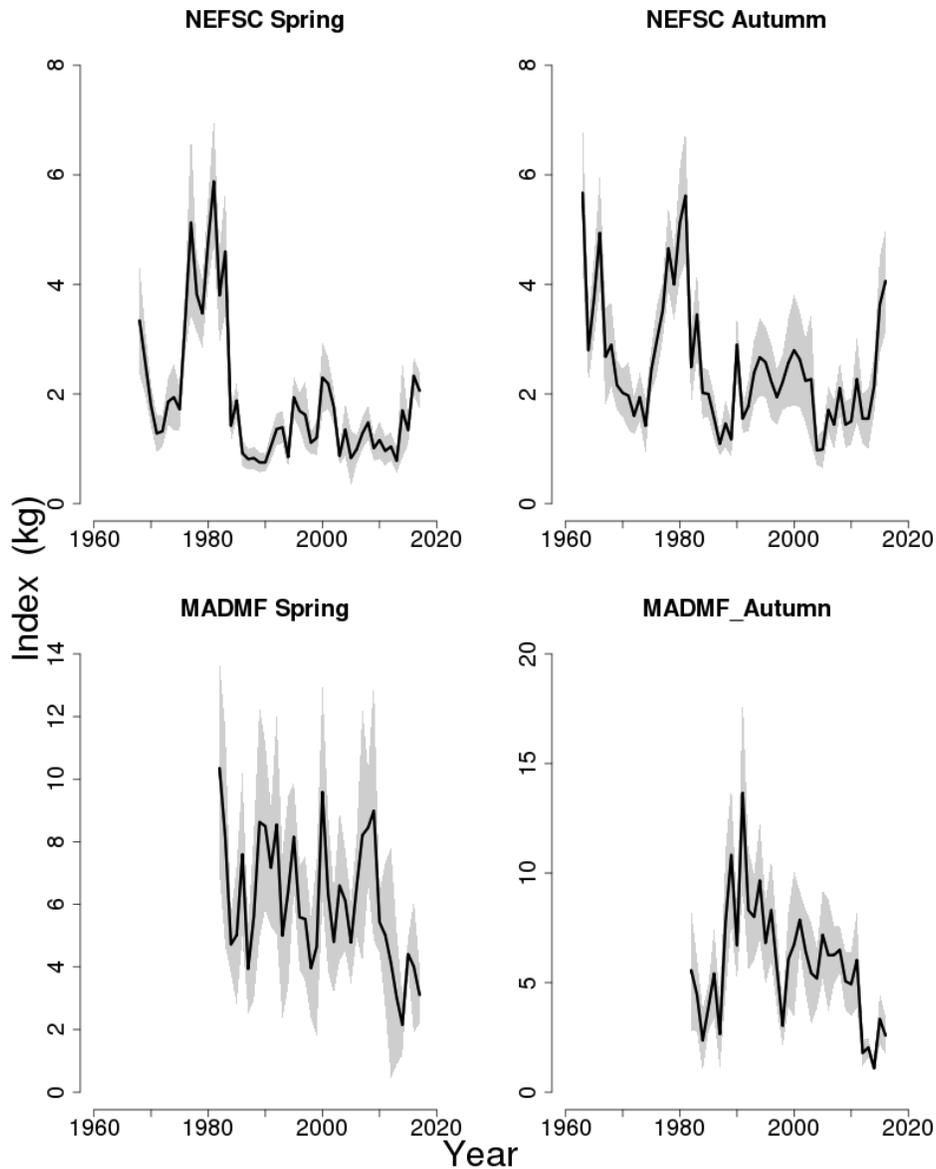


Figure 53: Indices of biomass for the Gulf of Maine-Georges Bank American plaice between 1963 and 2017 for the Northeast Fisheries Science Center (NEFSC) and Massachusetts Division of Marine Fisheries (MADMF) spring and autumn research bottom trawl surveys. The approximate 90% normal confidence intervals are shown.