

## 10 Gulf of Maine-Georges Bank American plaice

Loretta O'Brien

*This assessment of the Gulf of Maine-Georges Bank American plaice (*Hippoglossoides platessoides*) stock is an operational assessment 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 2015 assessment updates commercial fishery catch data, research survey indices of abundance, the analytical VPA assessment model, and reference points through 2014. Additionally, stock projections have been updated through 2018.*

**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 51-52). Retrospective adjustments were made to the model results. Spawning stock biomass (SSB) in 2014 was estimated to be 10,977 mt which is 84% of the biomass target for this stock ( $SSB_{MSY} proxy = 13,107$ ; Figure 51). The 2014 fully selected fishing mortality was estimated to be 0.116 which is 59% of the overfishing threshold proxy ( $F_{MSY} proxy = 0.196$ ; Figure 52).

Table 33: 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 average fishing mortality on ages (ages 6-9). Model results are from the current updated VPA assessment.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	<i>Data</i>									
GM Commercial landings	752	583	601	703	866	901	771	762	764	738
GM Commercial discards	213	142	82	113	115	239	96	161	88	36
GB Commercial landings	574	504	377	388	501	492	595	699	528	498
GB Commercial discards	76	144	164	144	274	154	0	0	0	0
SNE landings	16	18	12	9	13	11	3	1	5	3
CA landings	5	11	2	0	0	0	1	0	0	0
Catch for Assessment	1,636	1,402	1,239	1,357	1,770	1,797	1,467	1,624	1,385	1,275
	<i>Model Results</i>									
Spawning Stock Biomass	5,145	6,118	8,079	11,193	12,988	13,990	14,937	14,811	14,427	14,543
$F_{Full}$	0.33	0.28	0.13	0.17	0.2	0.14	0.11	0.13	0.1	0.08
Recruits <i>age1</i>	29,643	40,420	16,684	23,538	14,199	8,655	12,495	9,184	11,302	30,333

Table 34: 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.

	2012	Current
$F_{MSY}$ proxy	0.179	0.196
$SSB_{MSY}$ (mt)	18,398	13,107 (10,142-16,951)
MSY (mt)	3,385	2,675 (2,071 - 3,456)
Median recruits (age 1) (000s)	24,504	22,514
Overfishing	No	No
Overfished	No	No

**Projections:** Short term projections of biomass were derived by sampling from an empirical cumulative distribution function of 34 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 35: 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 2016 and 2018. Catch in 2015 was assumed to be 1,395 (mt).

Year	Catch (mt)	SSB (mt)	$F_{Full}$
2015	1,395	8,948 (7,858 - 10,160)	0.156
2016	1,695	8,645 (7,506 - 9,863)	0.196
2017	1,686	8,325 (7,163 - 9,697)	0.196
2018	1,722	8,710 (7,136 - 11,184)	0.196

### 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).

*Sources 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  $\rho$ , relative to SSB, was 0.63 in the 2012 assessment and was 0.325 in 2014. The 7-year Mohn's  $\rho$ , relative to F, was -0.35 in the 2012 assessment and was -0.324 in 2014. There was a major retrospective pattern for this assessment because the  $\rho$*

adjusted estimates of 2014 SSB ( $SSB_p=10,977$ ) and 2014  $F$  ( $F_p=0.116$ ) were outside the approximate 90% confidence region around SSB (12,742 - 16,439) and  $F$  (0.069 - 0.093). A retrospective adjustment was made for both the determination of stock status and for projections of catch in 2016. The retrospective adjustment changed the 2014 SSB from 14,543 to 10,977 and the 2014  $F_{Full}$  from 0.08 to 0.116.

- Based on this stock assessment, are population projections well determined or uncertain?  
*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 (V3.3.0) which gave very similar results to the 2012 VPA 3.1.0 run, with the same  $F$  and slightly lower SSB. The MADMF spring and autumn survey indices were re-estimated for the time series, accounting for revised stratum areas. The revision occurred in 2007, but was overlooked in the 2012 assessment. A comparison of 2010 terminal year VPAs indicated minimal differences in 2010 SSB (now slightly lower) and no change in  $F$ .*
- 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 not overfished and overfishing is not occurring.*
- 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 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 a benchmark review.*

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

**Recommendation:** The Panel concluded that the updated stock assessment with retrospective adjustment was acceptable as a scientific basis for management advice and agreed with the status determination that the stock is not overfished and overfishing is not occurring. The Panel accepted the current projections as a basis for the 2016-2018 overfishing limits. All data updates and minor survey revisions were accepted by the Panel.

**Alternative Assessment Approach:** Not applicable

**Sources of Uncertainty:** A major source of uncertainty is the retrospective pattern. The current assessment model underestimates fishing mortality and overestimates spawning stock biomass. However, compared to the 2012 assessment, the magnitude of the retrospective pattern has declined slightly. Other sources of uncertainty include the age composition of catch during 1980-1984, discards estimates prior to 1989, age composition of discards in the small mesh fishery, and the mixed stock composition of age data.

**Research Needs:** For the next benchmark assessment, the Panel recommended that a statistical catch-at-age model, which can potentially handle the observed conflict between offshore and inshore surveys, should be explored. In addition, the assessment team should consider the inclusion of the Maine-New Hampshire survey as another calibration index.

**References:**

O'Brien, L. and J. Dayton (2012). E. Gulf of Maine - Georges Bank American plaice Assessment for 2012 in Assessment or Data Updates of 13 Northeast Groundfish Stocks through 2010. US Dep Commer, NOAA Fisheries, Northeast Fish Sci Cent Ref Doc. 12-06; 789 p. [CRD12-06](#)

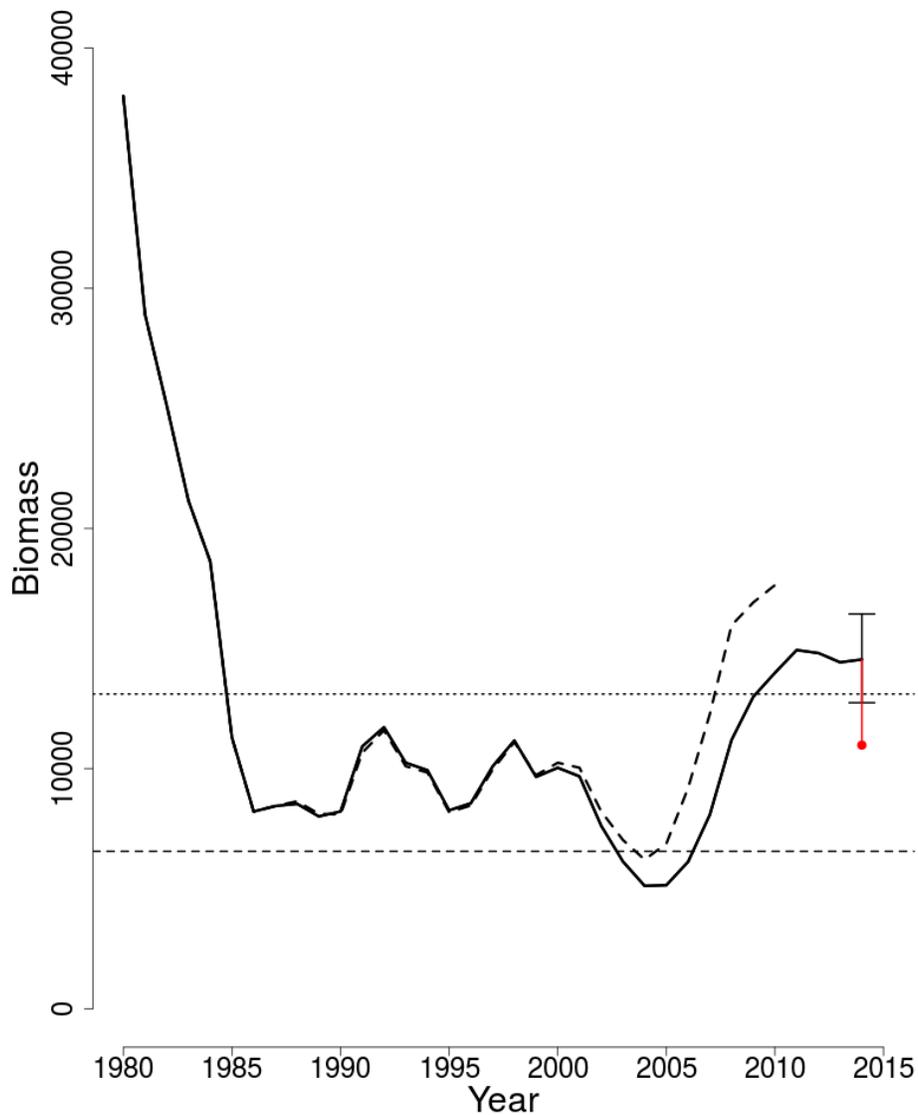


Figure 51: Trends in spawning stock biomass of Gulf of Maine-Georges Bank American plaice between 1980 and 2015 from the current (solid line) and previous (dashed line) assessment and the corresponding  $SSB_{Threshold}$  ( $\frac{1}{2} SSB_{MSY}$  proxy; horizontal dashed line) as well as  $SSB_{Target}$  ( $SSB_{MSY}$  proxy; horizontal dotted line) based on the 2015 assessment. Biomass was adjusted for a retrospective pattern and the adjustment is shown in red. The approximate 90% normal confidence intervals are shown.

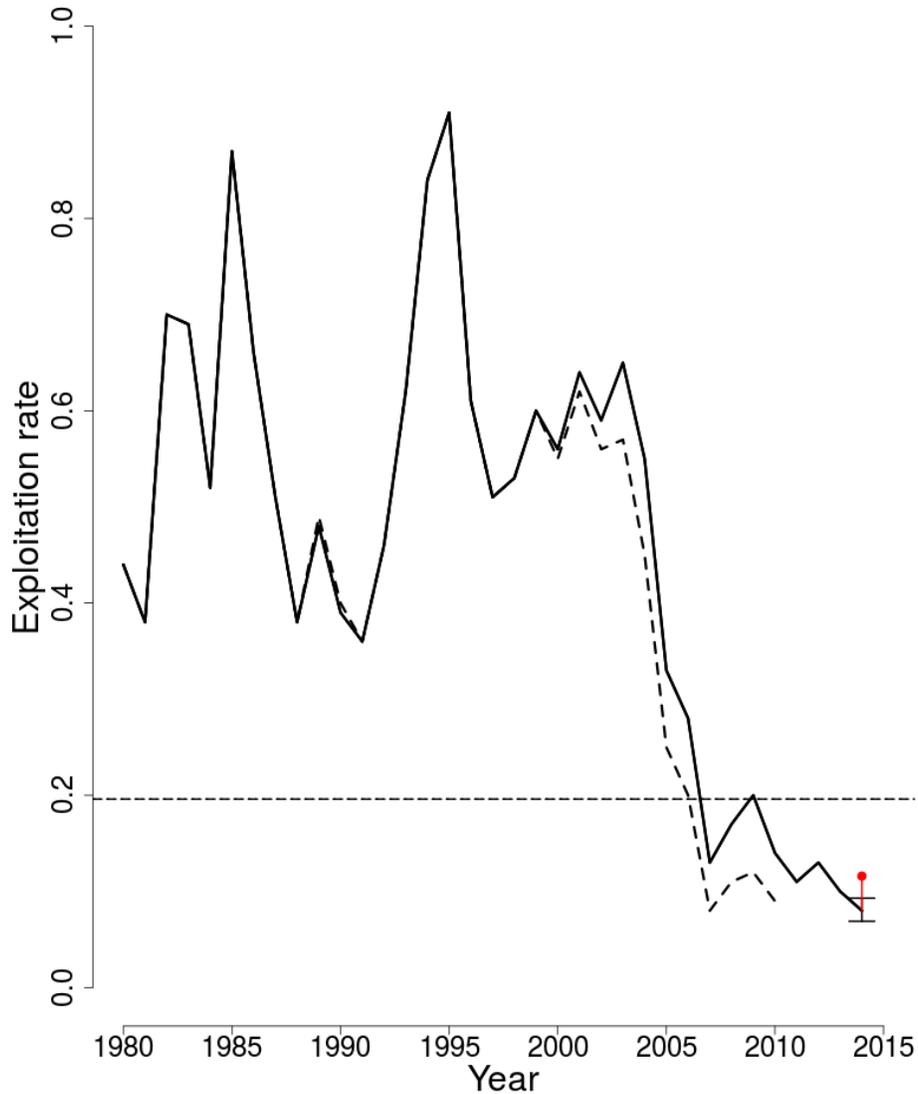


Figure 52: Trends in the fully selected fishing mortality ( $F_{Full}$ ) of Gulf of Maine-Georges Bank American plaice between 1980 and 2015 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{Threshold}$  ( $F_{MSY}$  proxy=0.196; horizontal dashed line).  $F_{Full}$  was adjusted for a retrospective pattern and the adjustment is shown in red, based on the 2015 assessment. The approximate 90% normal confidence intervals are shown.

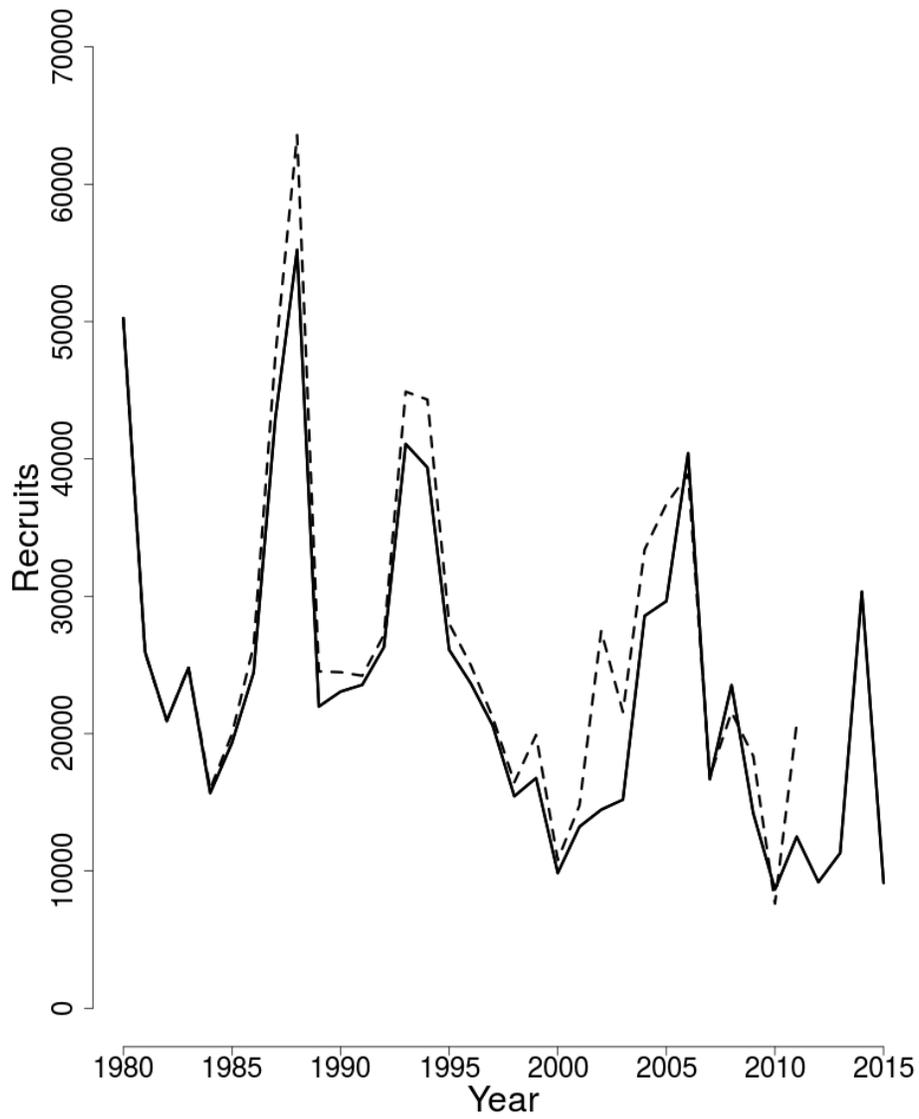


Figure 53: Trends in Recruits (age 1) (000s) of Gulf of Maine-Georges Bank American plaice between 1980 and 2015 from the current (solid line) and previous (dashed line) assessment.

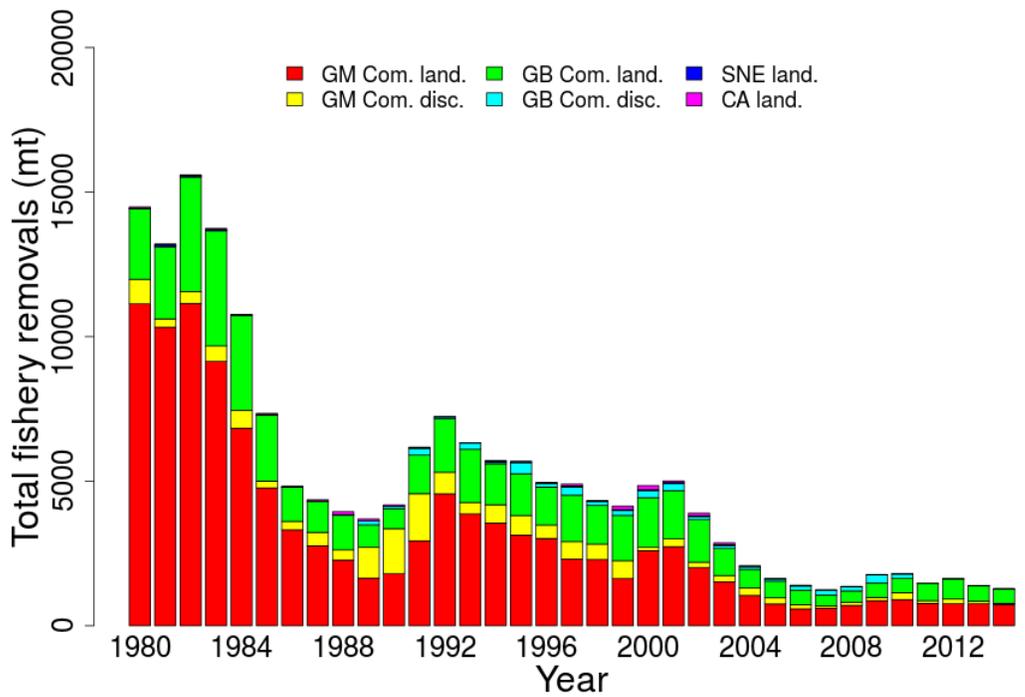


Figure 54: Total catch of Gulf of Maine-Georges Bank American plaice between 1980 and 2015 by fleet (Gulf of Maine, Georges Bank, Southern New England, and Canadian) and disposition (landings and discards).

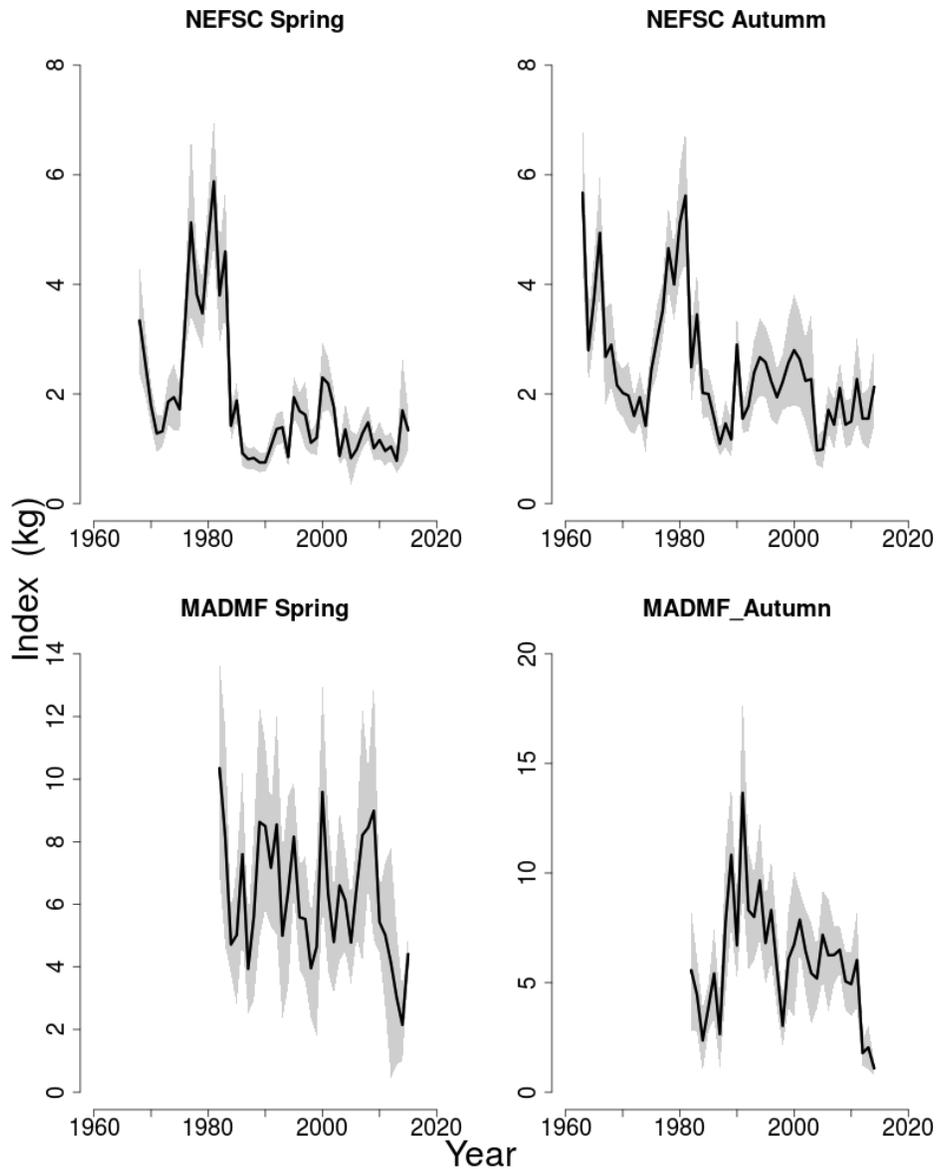


Figure 55: Indices of biomass for the Gulf of Maine-Georges Bank American plaice between 1963 and 2015 for the Northeast Fisheries Science Center (NEFSC) and Massachusetts Division of Marine Fisheries (MADMF) spring and autumn research bottom trawl surveys. The approximate 90% normal confidence intervals are shown.