Gulf of Maine-Georges Bank American Plaice

2015 Assessment Update Report

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National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts

Compiled September 2015

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 ocurring. 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 1-2). Spawning stock biomass (SSB) in 2014 was estimated to be 14,543 mt which is 109% of the biomass target for this stock (SSB_{MSY} *proxy* = 13,288; Figure 1). Adjusting for retrospective bias, SSB in 2014 is estimated to be 10,977 (mt) which is 83% of the biomass target for this stock. The 2014 fully selected fishing mortality was estimated to be 0.08 which is 41% of the overfishing threshold proxy (F_{MSY} *proxy* = 0.196; Figure 2). Adjusting for retrospective bias, F in 2014 is estimated to be 0.116 which is 59% of the overfishing threshold for this stock.

Table 1: 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 from the current updated VPA assessment.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
					Data					
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
					Model Results					
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 $age1$	29,643	40,420	16,684	23,538	14,199	8,655	12,495	9,184	11,302	30,333

Table 2: 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	13,288 (10,294-17,168)
MSY (mt)	3,385	2,658 (2,060 - 3,430)
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 3: 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	8,947 (7,852 - 10,160)	0.156
2016	1,695	8,645 (7,505 - 9,863)	0.196
2017	1,686	8,324 (7,516 - 9,697)	0.196
2018	1,722	8,710 (7,132 - 11,185)	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).
  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 strong, moderate, or mild?
  This assessment has a relatively strong retrospective pattern and values of Mohn's rho of 0.32487 for SSB and of -0.32406 for fishing mortality.

- 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. A comparison of the realized catch during 2012-2014 with the 2012 assessment projections indicates that the projections were slightly optimistic, but this does not take into account the subsequent industry or management decisions during that time.

- 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 as not overfished and overfishing 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 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.

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/.
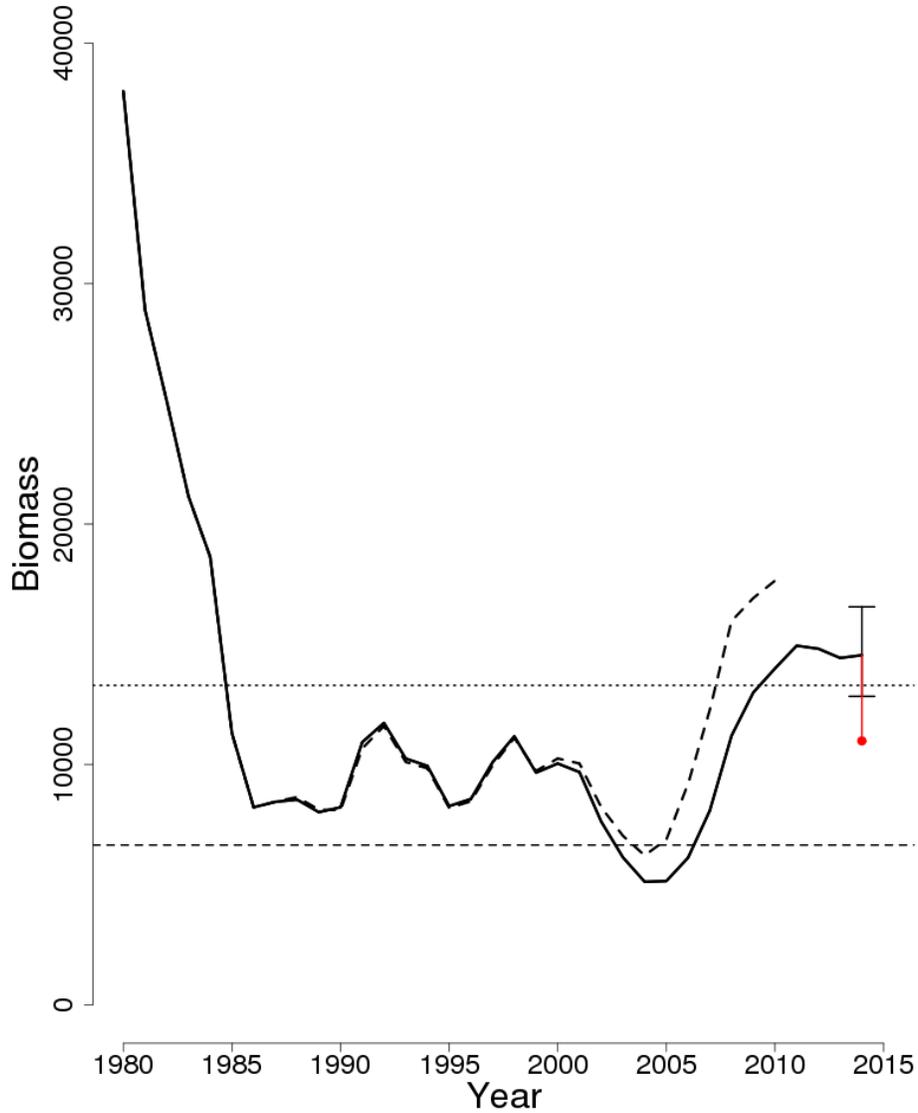
Figure 1: Trends in spawning stock biomass of Gulf of Maine-Georges Bank American Plaice between 1980 and 2015 from the current (solid line) and previous (dashed line) assessment and the corresponding $SSB_{Threshold}$ ($\frac{1}{2}$ SSB_{MSY} proxy; horizontal dashed line) as well as SSB_{Target} (SSB_{MSY} 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.
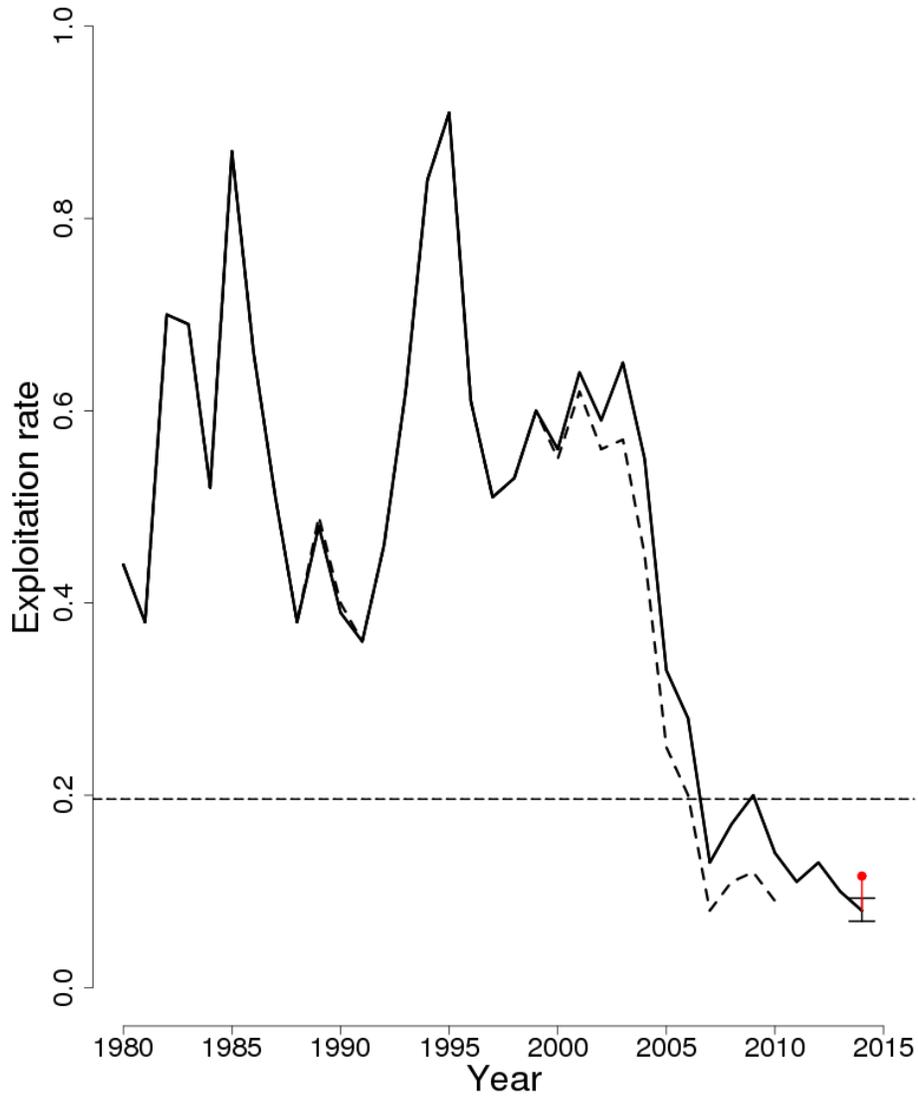
Figure 2: Trends in the fully selected fishing mortality (F_{Full}) of Gulf of Maine-Georges Bank American Plaice between 1980 and 2015 from the current (solid line) and previous (dashed line) assessment and the corresponding $F_{Threshold}$ (F_{MSY} proxy=0.196; horizontal dashed line). F_{Full} was 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.
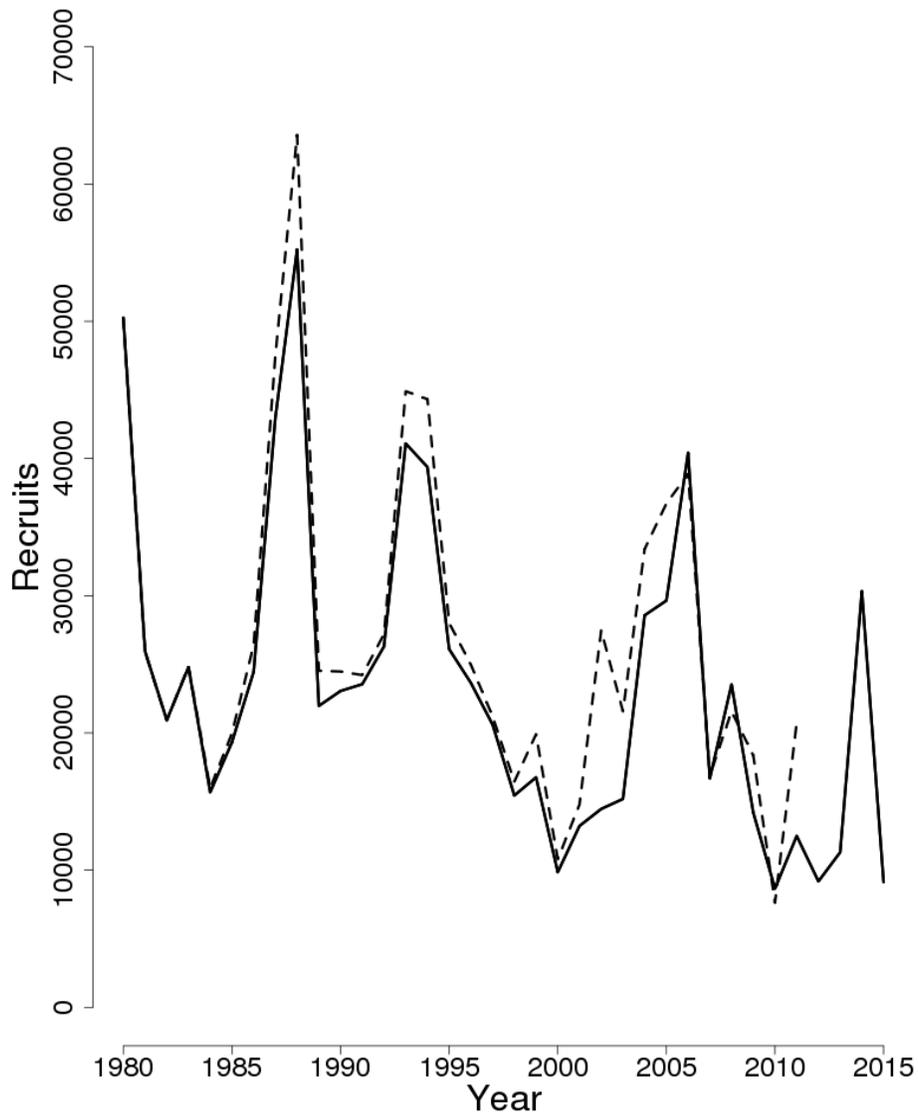
Figure 3: Trends in Recruits (age 1) (000s) of Gulf of Maine-Georges Bank American Plaice between 1980 and 2015 from the current (solid line) and previous (dashed line) assessment.
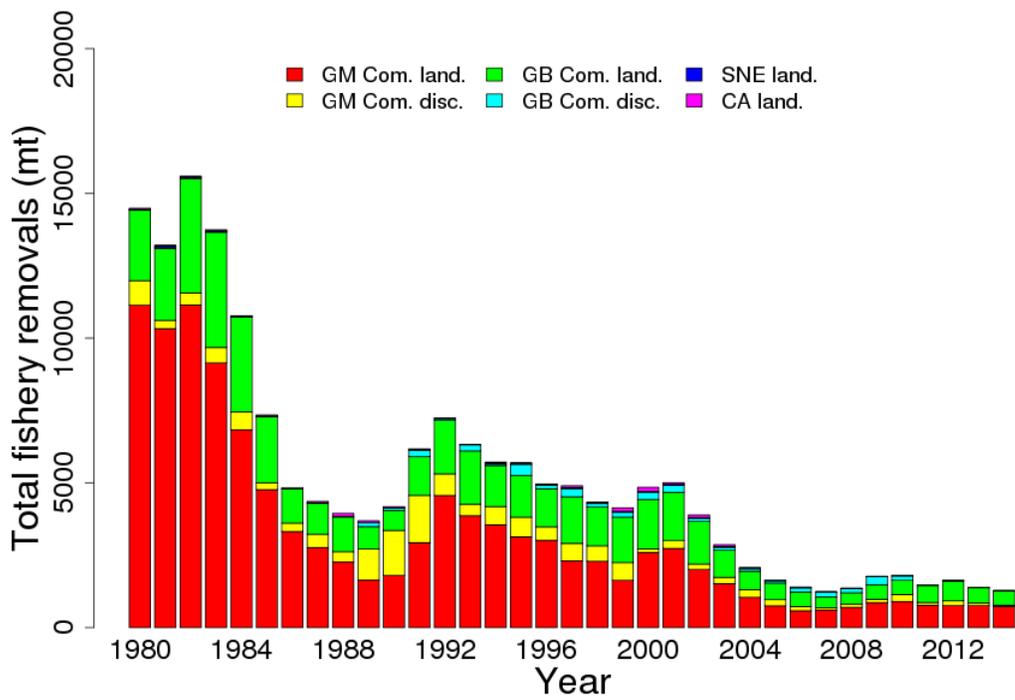
Figure 4: Total catch of Gulf of Maine-Georges Bank American Plaice between 1980 and 2015 by fleet (Gulf of Maine, Georges Bank, Southern New England, and Canadian) and disposition (landings and discards).
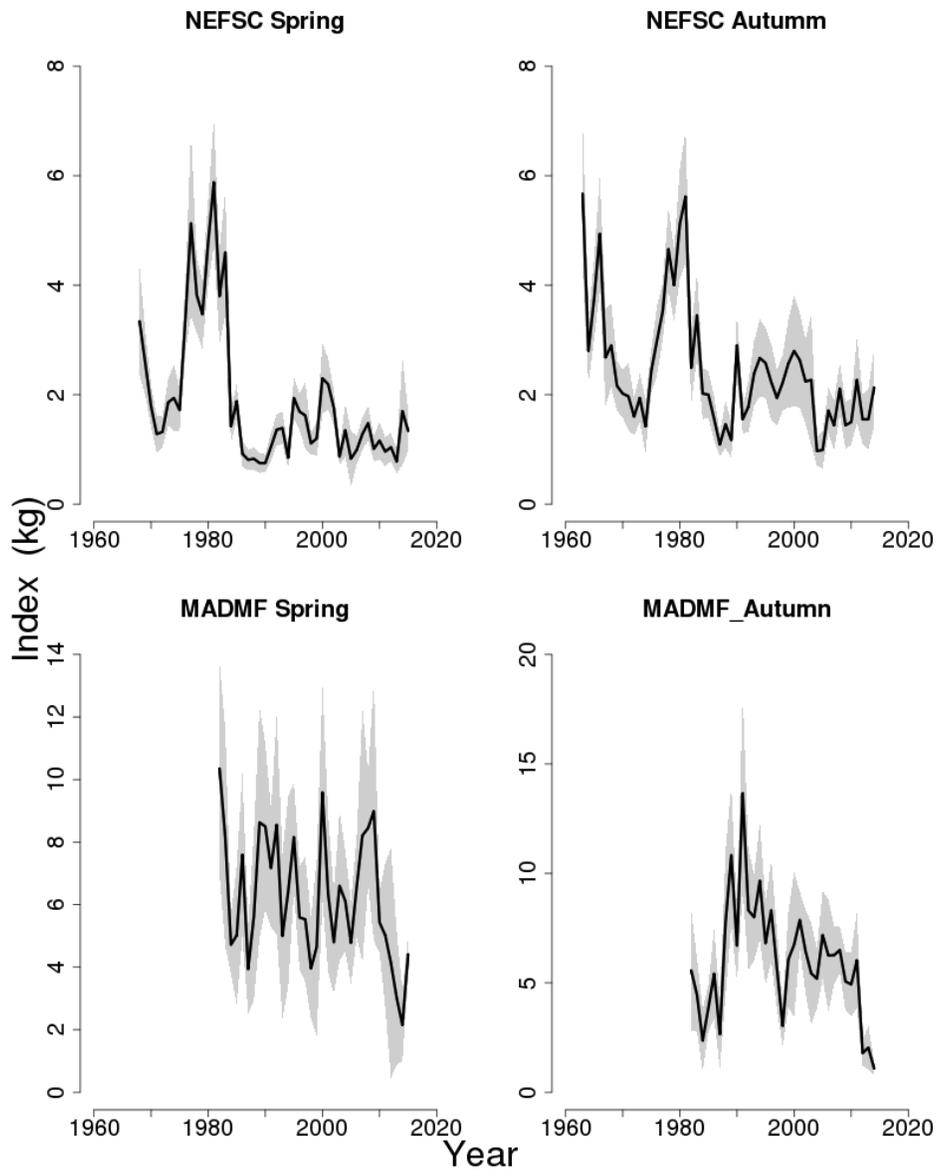
Figure 5: Indices of biomass for the Gulf of Maine-Georges Bank American Plaice between 1963 and 2015 for the Northeast Fisheries Science Center (NEFSC) and Massachusetts Division of Marine Fisheries (MADMF) spring and autumn research bottom trawl surveys. The approximate 90% normal confidence intervals are shown.