

16 Gulf of Maine - Georges Bank windowpane flounder

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*This assessment of the Gulf of Maine - Georges Bank windowpane flounder (*Scophthalmus aquosus*) stock is an operational update of the 2015 assessment which was based on survey and fishery data through 2014 (NEFSC 2015). Based on the 2015 assessment the stock was overfished, but overfishing was not occurring. This assessment updates commercial fishery catch data, survey biomass indices, AIM model results, and reference points through 2016.*

State of Stock: Based on this updated assessment, the Gulf of Maine - Georges Bank windowpane flounder (*Scophthalmus aquosus*) stock is overfished but overfishing is not occurring (Figures 78-79). Retrospective adjustments were not made to the model results. The mean NEFSC fall bottom trawl survey index from years 2014, 2015 and 2016 (a 3-year moving average is used as a biomass index) was 0.359 kg/tow which is lower than the $B_{Threshold}$ of 1.030 kg/tow. The 2016 relative fishing mortality was estimated to be 0.222 kt per kg/tow which is lower than the F_{MSY} proxy of 0.340 kt per kg/tow.

Table 48: Catch and model results table for Gulf of Maine - Georges Bank windowpane flounder. All landings and discard weights are rounded to the nearest metric ton. Biomass index is in units of kg/tow, and relative F is in units of kt per kg/tow (catch in kt per kg/tow of the survey index).

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<i>Data</i>										
Commercial discards	974	329	412	235	180	198	355	215	187	85
Commercial landings	117	46	28	0	0	1	0	0	0	0
Total catch	1,091	376	440	236	180	199	355	215	188	85
<i>Model Results</i>										
Biomass index	0.524	0.448	0.442	0.467	0.433	0.343	0.518	0.535	0.536	0.36
Relative F	2.079	0.849	0.996	0.514	0.416	0.584	0.676	0.393	0.354	0.222

Table 49: Reference points estimated in the 2015 assessment and in the current assessment update. F_{MSY} proxy is in units of kt per kg/tow.

	2015	2017
F_{MSY} proxy	0.450	0.340 (0.009 - 0.659)
B_{MSY} proxy (kg/tow)	1.554	2.060
MSY proxy (mt)	700	700
<i>Overfishing</i>	No	No
<i>Overfished</i>	Yes	Yes

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).

Even though estimated catch has decreased in recent years, the survey index has not shown any resulting increase despite evidence of regular recruitment from survey length frequencies. Since there has been a 'no possession' rule in place since 2010, almost 100% of catch has consisted of estimated discards. These estimates have a higher CV than those for the southern stock but are still fairly low at a mean of 0.124 since 2010 so it is unlikely discards are being poorly estimated. Removals by Canadian fisheries occur from the northern stock area and are not used as a catch component in the model. Using them, especially if they have changed over time, might improve the model fit, which is not as good as the southern stock.

- 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 AIM (An Index Model) model used to estimate status of this stock does not allow estimation of a retrospective pattern.

- 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?

The GARM benchmark indicated that projections should not be made based on discards, so no projections are run for windowpane flounder. Northern windowpane flounder was supposed to be rebuilt by 2017, however the 2008 GARM report states 'Given that current catch is mostly incidental and also given the high uncertainty of index based assessments, it was concluded that it was not appropriate to calculate F rebuild for this stock'.

- 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 were made to the Gulf of Maine - Georges Bank windowpane flounder assessment for this update other than the incorporation of 2015 and 2016 NEFSC fall bottom trawl survey data and 2015 and 2016 U.S. commercial landings and discard data.

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

The stock status of Gulf of Maine - Georges Bank windowpane flounder has not changed since the previous assessment. In 2015, the F status changed from overfishing to no overfishing.

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

Since the year 2000, Gulf of Maine - Georges Bank windowpane flounder has shown decreasing survey indices despite reductions in catch and relative F levels, and the model output replacement ratio for 2016 was only 0.68. The stock was declared overfished in 2007 (the final year of data for GARM 2008) and was scheduled to be rebuilt by 2017, but the stock still remains below the biomass threshold. According to 21.6, windowpane flounder has low

overall climate vulnerability and both males and females are currently showing high condition indices. There are also new recruits regularly present in the fall bottom trawl survey catches.

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

While the Gulf of Maine - Georges Bank windowpane flounder AIM model fit is reasonable (the relationship between $\ln(\text{relative } F)$ and $\ln(\text{replacement ratio})$, a measure of the relationship between catch and survey index values, has a p-value of 0.11) there may be catches (such as from the Canadian groundfishery on Georges Bank), discards, or incidental mortality unaccounted for in the model. The fit might be improved in the future by estimating additional sources of mortality or removal from the population that may be increasing over recent years. There may also be value in looking carefully at the windowpane stock definitions to see if there might be reason to change them. For the last several years the NEFSC has been collecting otoliths from northern windowpane during the fall survey and we now have several year's worth of ages, enough to explore an age-based model such as ASAP which could provide insight into the population dynamics of northern windowpane.

- Are there other important issues?

None.

16.1 Reviewer Comments: Gulf of Maine - Georges Bank windowpane flounder

Assessment Recommendation:

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

Alternative Assessment Approach:

Not applicable

Status Recommendation:

Based on this updated assessment, the panel agrees with the conclusion that the Gulf of Maine-Georges Bank windowpane flounder stock is overfished but overfishing is not occurring. Since the year 2000, Gulf of Maine-Georges Bank windowpane flounder has shown decreasing survey indices despite reductions in catch and relative F levels. The stock was declared overfished in 2007 (the final year of data for Groundfish Assessment Review Meeting 2008) and was scheduled to be rebuilt by 2017, but the stock still remains below the biomass threshold. Windowpane flounder has low overall climate vulnerability, the larval index has been stable over many years, and both males and females are currently showing high condition indices. There are also new recruits regularly present in the fall bottom trawl survey catches.

Key Sources of Uncertainty:

Even though estimated catch has decreased in recent years, the survey index has not shown any resulting increase despite evidence of regular recruitment from survey length frequencies. There are uncertainties around discard estimates. Removals by Canadian fisheries occur from the Gulf of Maine-Georges Bank stock area and are not used as a catch component in the model. The model fit is notably poor and is worse than in the 2015 operational assessment.

Research Needs:

The panel recommends research focused on estimating additional sources of mortality or removal from the population that may be increasing over recent years. There may also be value in looking carefully at the windowpane stock definitions to see if there might be reason to change them. For the last several years the National Marine Fisheries Service has been collecting otoliths from Gulf of Maine-Georges Bank windowpane during the fall survey and now has several years' worth of ages, enough to explore a statistical catch-at-age model, which could provide insight into the population dynamics of Gulf of Maine-Georges Bank windowpane.

References:

Most recent assessment update:

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 online at <http://nefsc.noaa.gov/publications/crd/crd1524>

Most recent benchmark assessment:

Northeast Fisheries Science Center. 2008. Assessment of 19 Northeast Groundfish Stocks through 2007: Report of the 3rd Groundfish Assessment Review Meeting (GARM III), Northeast Fisheries Science Center, Woods Hole, Massachusetts, August 4-8, 2008. US Dep Commer, NOAA Fisheries, Northeast Fish Sci Cent Ref Doc. 08-15; 884 p + xvii.

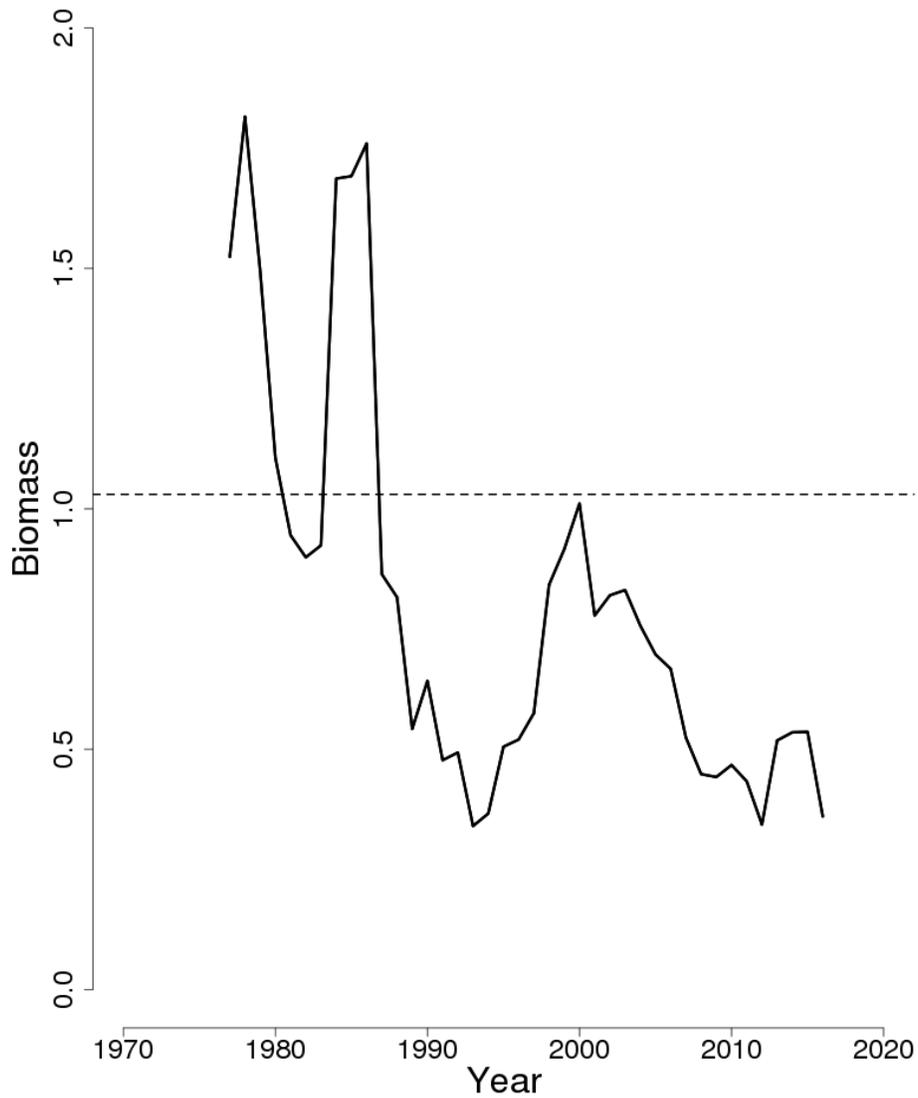


Figure 78: Trends in the biomass index (a 3-year moving average of the NEFSC fall bottom trawl survey index) of Gulf of Maine - Georges Bank windowpane flounder between 1975 and 2016 from the current assessment, and the corresponding $B_{Threshold} = \frac{1}{2} B_{MSY} proxy = 1.030$ kg/tow (horizontal dashed line).

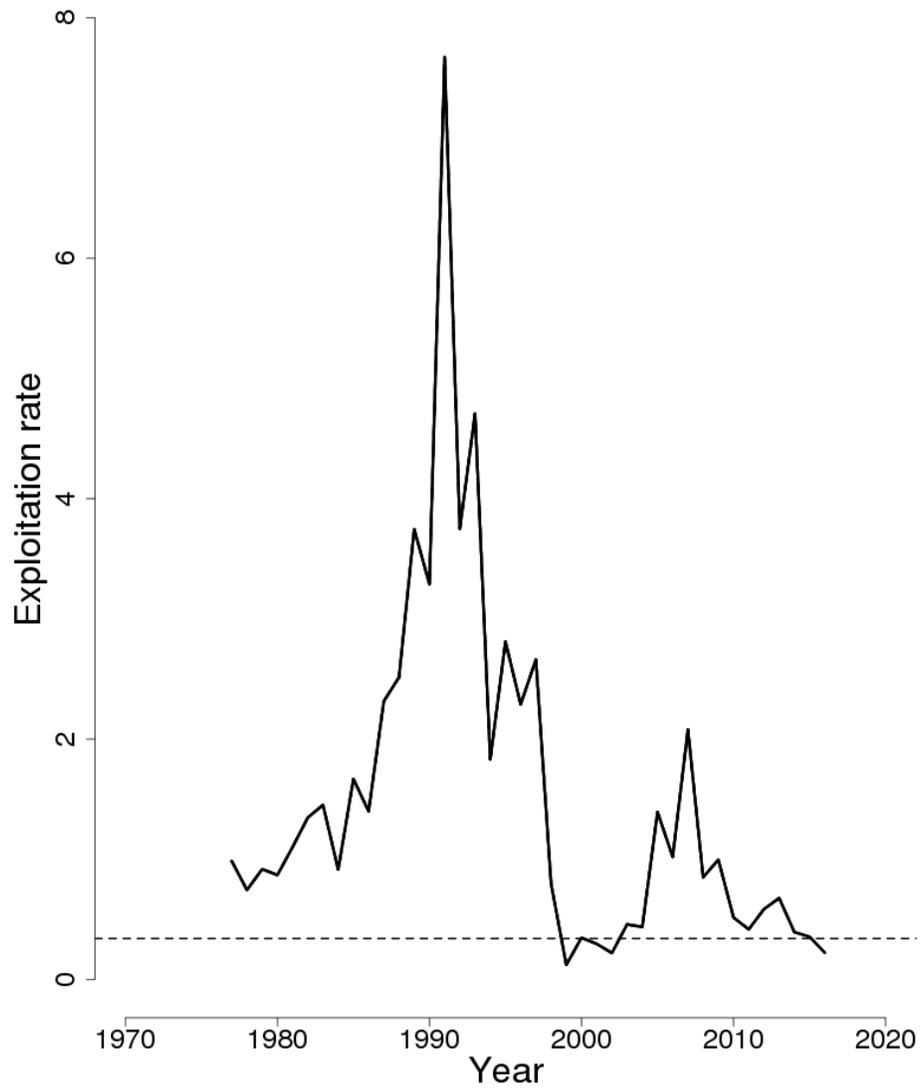


Figure 79: Trends in estimated relative fishing mortality of Gulf of Maine - Georges Bank windowpane flounder between 1975 and 2016 from the current assessment, and the corresponding F_{MSY} proxy = 0.34 (horizontal dashed line).

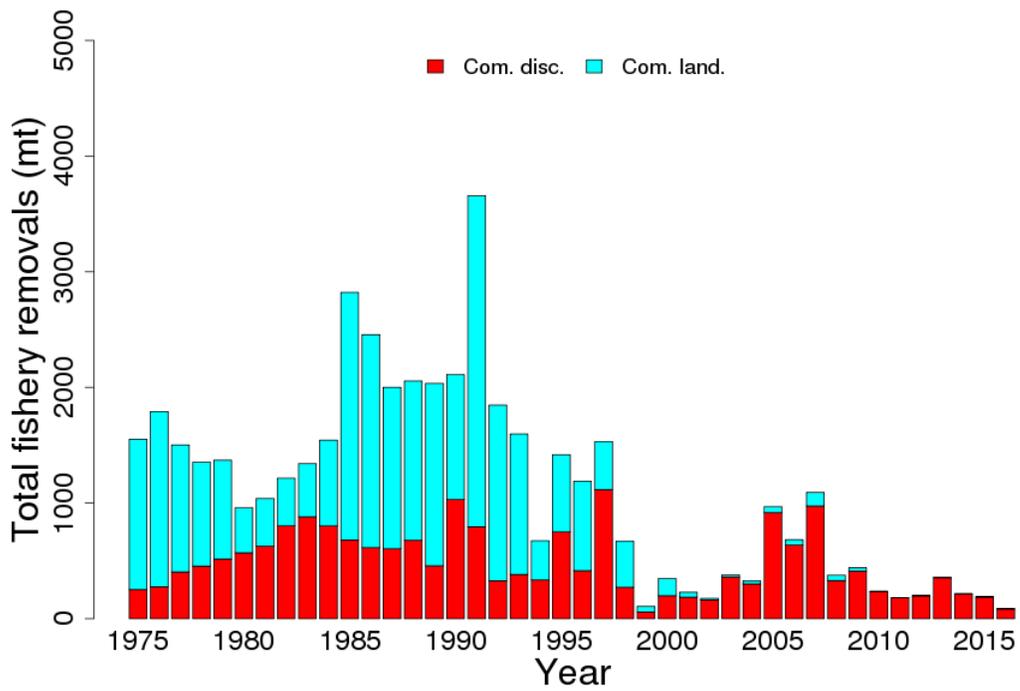


Figure 80: Total catch of Gulf of Maine - Georges Bank windowpane flounder between 1975 and 2016 by disposition (landings and discards).

NEFSC Fall bottom trawl survey

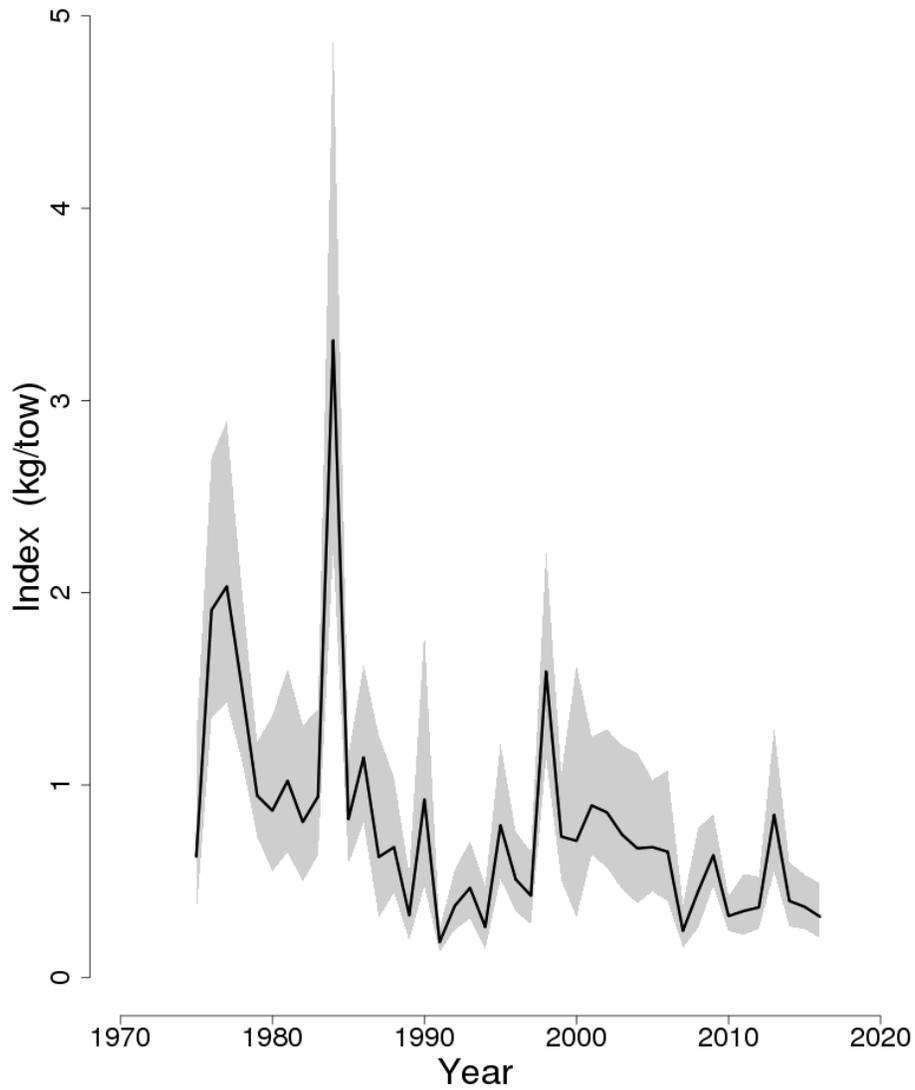


Figure 81: NEFSC fall bottom trawl survey indices in kg/tow for Gulf of Maine - Georges Bank windowpane flounder between 1975 and 2016. The approximate 90% lognormal confidence intervals are shown.