19 Gulf of Maine winter flounder

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This assessment of the Gulf of Maine winter flounder (Pseudopleuronectes americanus) stock is an operational assessment of the existing 2015 operational assessment area-swept assessment (NEFSC 2015). Based on the previous assessment the biomass status is unknown but overfishing was not occurring. This assessment updates commercial and recreational fishery catch data, research survey indices of abundance, and the area-swept estimates of 30+ cm biomass based on the fall NEFSC, MDMF, and MENH surveys.

State of Stock: Based on this updated assessment, the Gulf of Maine winter flounder (*Pseudopleuronectes americanus*) stock biomass status is unknown and overfishing is not occurring (Figures 90-91). Retrospective adjustments were not made to the model results. Biomass (30+ cm mt) in 2016 was estimated to be 2,585 mt (Figure 90). The 2016 30+ cm exploitation rate was estimated to be 0.086 which is 37% of the overfishing exploitation threshold proxy (E_{MSY} *proxy* = 0.23; Figure 91).

Table 54: Catch and status table for Gulf of Maine winter flounder. All weights are in (mt) and E_{Full} is the exploitation rate on 30+ cm fish. Biomass is estimated from survey area-swept for non-overlaping strata from three different fall surveys (MENH, MDMF, NEFSC) using an updated q estimate of 0.87 on the wing spread from the sweep study (Miller et al., 2017).

	2011	2012	2013	2014	2015	2016
Data						
Recreational discards	4	1	1	2	1	6
Recreational landings	38	22	29	55	27	24
Commercial discards	4	10	6	5	2	3
Commercial landings	173	348	218	213	186	188
Catch for Assessment	219	381	254	275	217	221
Model Results						
30+ cm Biomass	4,618	2,312	2,032	3,225	2,307	2,585
E_{Full}	0.047	0.165	0.125	0.085	0.094	0.086

Table 55: Comparison of reference points estimated in an earlier assessment and from the current assessment update. An $E_{40\%}$ exploitation rate proxy was used for the overfishing threshold and was based on a length based yield per recruit model from the 2011 SARC 52 benchmark assessment.

	2015	2017
E_{MSY} *proxy*	0.23	0.23
B_{MSY}	Unknown	Unknown
MSY (mt)	Unknown	Unknown
Overfishing	No	No
Overfished	Unknown	Unknown

Projections: Projections are not possible with area-swept based assessments. Catch advice was based on 75% of $E_{40\%}$(75% E_{MSY} *proxy*) using the fall area-swept estimate assuming q=0.87 on the wing spread which was updated using the average efficiency from 2009-2016 from the sweep experiment (Miller et al., 2017). Updated 2016 fall 30+ cm area-swept biomass (2,585 mt) implies an OFL of 595 mt based on the E_{MSY} *proxy* and a catch of 446 mt for 75% of the E_{MSY} *proxy*.

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).
  The largest source of uncertainty with the direct estimates of stock biomass from survey area-swept estimates originates from the survey gear catchability (q). Biomass and exploitation rate estimates are sensitive to the survey q assumption. However this 2017 update does incorporate the use of an estimated q through an average estimate of efficiency from 2009-2016 (q=0.87) from the sweep study for the NEFSC survey. This updated q assumption (0.87) results in a lower estimate of 30+ biomass (2,585 mt) relative to the original q=0.6 assumption (3,731 mt) from the fall surveys. Another major source of uncertainty with this method is that biomass based reference points cannot be determined and overfished status is unknown.

- 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 model used to determine status of this stock does not allow estimation of a retrospective pattern. An analytical stock assessment model does not exist for Gulf of Maine winter flounder. An analytical model was no longer used for stock status determination at SARC 52 (2011) due to concerns with a strong retrospective pattern. Models have difficulty with the apparent lack of a relationship between a large decrease in the catch with little change in the indices and age and/or size structure over time.

- 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 winter flounder do not exist for area-swept assessments and stock biomass status is unknown. Catch advice from area-swept estimates tend to vary with interannual variability in the surveys. Stabilizing the catch advice may also be desired and could be obtained through the averaging of the area-swept fall and spring survey estimates or through the use of a moving average across years.

- 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.
  The assumption on q changed from 0.6 to 0.87 using information from the sweep experiment (Miller et al., 2017) and incorporation of new survey data were made to this Gulf of Maine winter flounder assessment update.

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

  The overfishing status of Gulf of Maine winter flounder has not changed.

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

  The Gulf of Maine winter flounder has relatively flat survey indices with little change in the size structure over time. There have been large declines in the commercial and recreational removals since the 1980s. However, this large decline over the time series does not appear to have resulted in a response in the stock's size structure within the catch and surveys nor has it resulted in a change in the survey indices of abundance.

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

  Direct area-swept assessments could be improved with additional studies on federal and state survey gear efficiency. Quantifying the degree of herding between the doors and escapement under the footrope and/or above the headrope for state surveys is needed to improve the area-swept biomass estimates. Studies quantifying winter flounder abundance and distribution among habitat types and within estuaries could improve the biomass estimate.

- Are there other important issues?

  The general lack of a response in survey indices and age/size structure are the primary sources of concern with catches remaining far below the overfishing level.

19.1 Reviewer Comments: Gulf of Maine winter flounder

Assessment Recommendation:

The panel concluded that the operational assessment was acceptable as a scientific basis for management advice, including the decision to use a revised average catchability estimate from the recent cooperative research project on fall survey catchability.

Alternative Assessment Approach:

Not applicable

Status Recommendation:

Based on this operational assessment, the panel supports the conclusion that the Gulf of Maine winter flounder stock biomass status is unknown and overfishing is not occurring. The Gulf of Maine winter flounder has relatively flat survey indices with little change in the size structure over time. There have been large declines in the commercial and recreational removals since the 1980s. However, this large decline over the time series does not appear to have resulted in a response in the stock's size structure within the catch and surveys nor has it resulted in a change in the survey indices of abundance.

Key Sources of Uncertainty:

The largest source of uncertainty concerns the direct estimates of stock biomass from survey area-swept estimates originating from the survey gear catchability (q), in part due to small sample sizes and application to different gear types and other surveys. Another major source of uncertainty with this method is that biomass based reference points cannot be determined and overfished status is unknown. The general lack of a response in survey indices and age/size structure are the primary sources of concern with catches remaining far below the overfishing level.

Research Needs:

The panel recommends additional studies on federal and state survey gear efficiency. Quantifying the degree of herding between the doors and escapement under the footrope and/or above the headrope for state surveys is also warranted. Studies quantifying winter flounder abundance and distribution among habitat types and within estuaries could improve biomass estimates. The panel further recommends consideration of including additional surveys (e.g., spring trawl survey). Finally, a moving average approach to estimating catch advice (rather than based on a single year) should be considered to stabilize catch advice.

References:

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; Commer, Northeast Fish Sci Cent Ref Doc. 15-01; 251 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026. CRD15-24

Northeast Fisheries Science Center. 2011. 52^{nd} Northeast Regional Stock Assessment Workshop (52^{nd} 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. CRD11-17

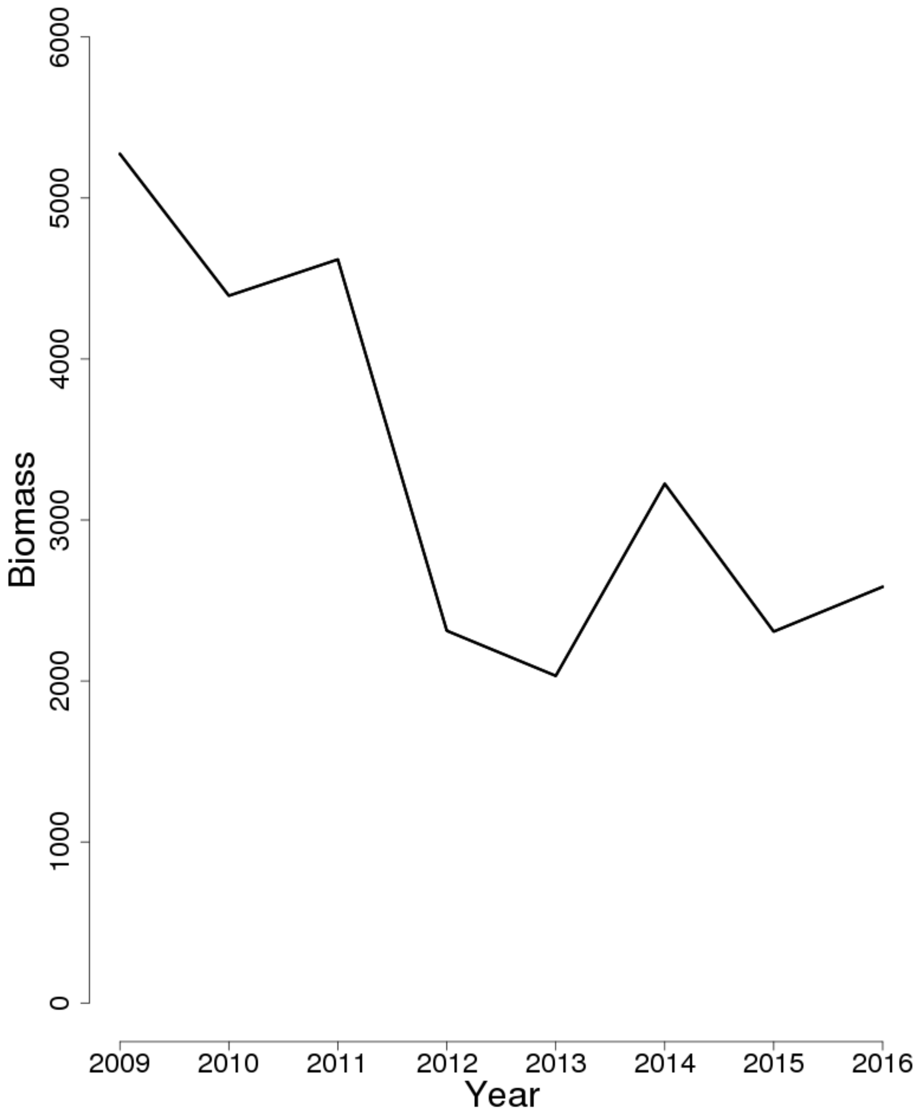

Figure 90: Trends in 30+ cm area-swept biomass of Gulf of Maine winter flounder between 2009 and 2016 from the current assessment based on the fall (MENH, MDMF, NEFSC) surveys.

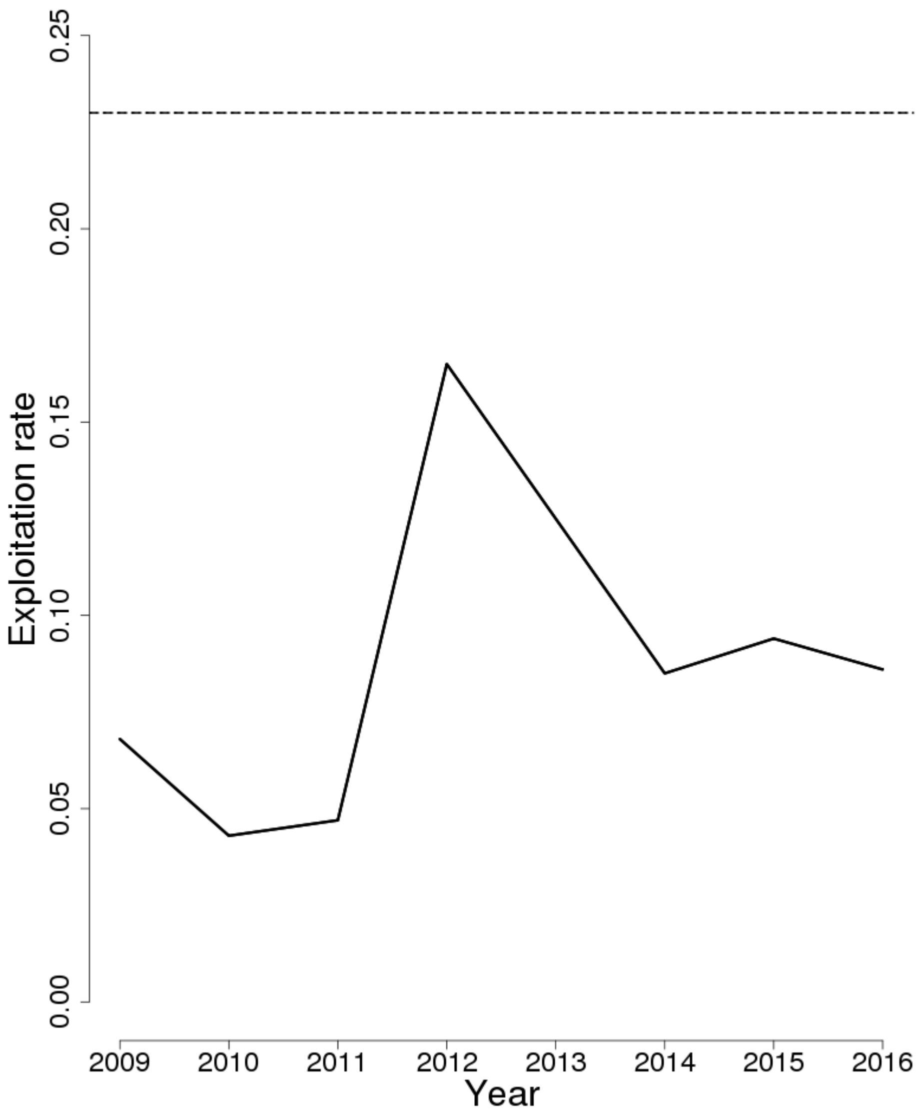

Figure 91: Trends in the exploitation rates (E_{Full}) of Gulf of Maine winter flounder between 2009 and 2016 from the current assessment and the corresponding $F_{Threshold}$ (E_{MSY} *proxy*=0.23; horizontal dashed line).

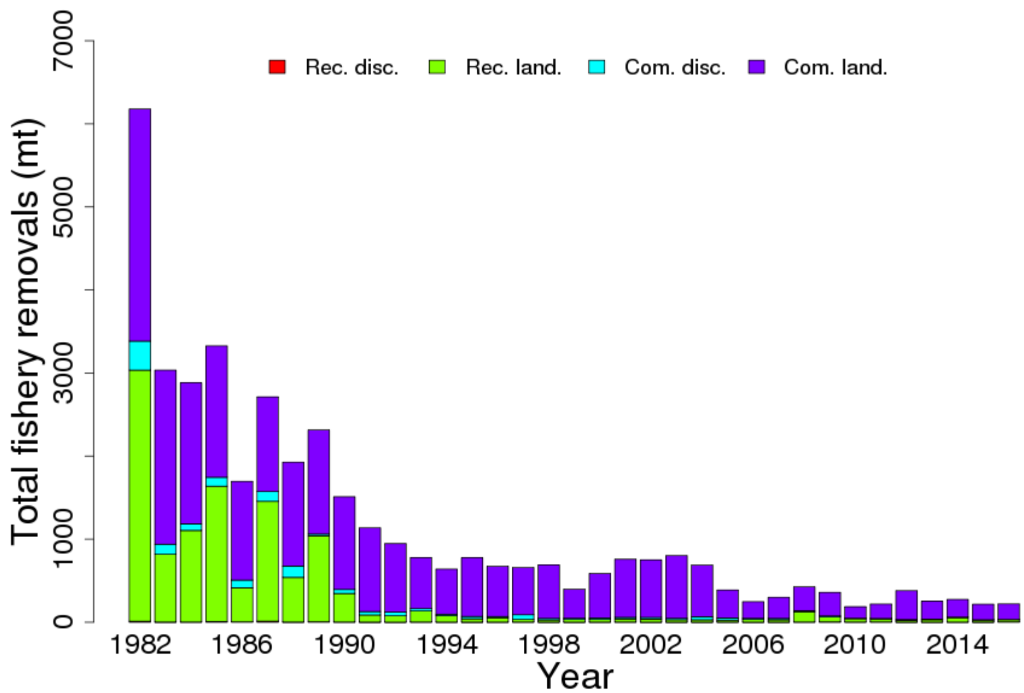

Figure 92: Total catch of Gulf of Maine winter flounder between 2009 and 2016 by fleet (commercial and recreational) and disposition (landings and discards). A 15% mortality rate is assumed on recreational discards and a 50% mortality rate on commercial discards.

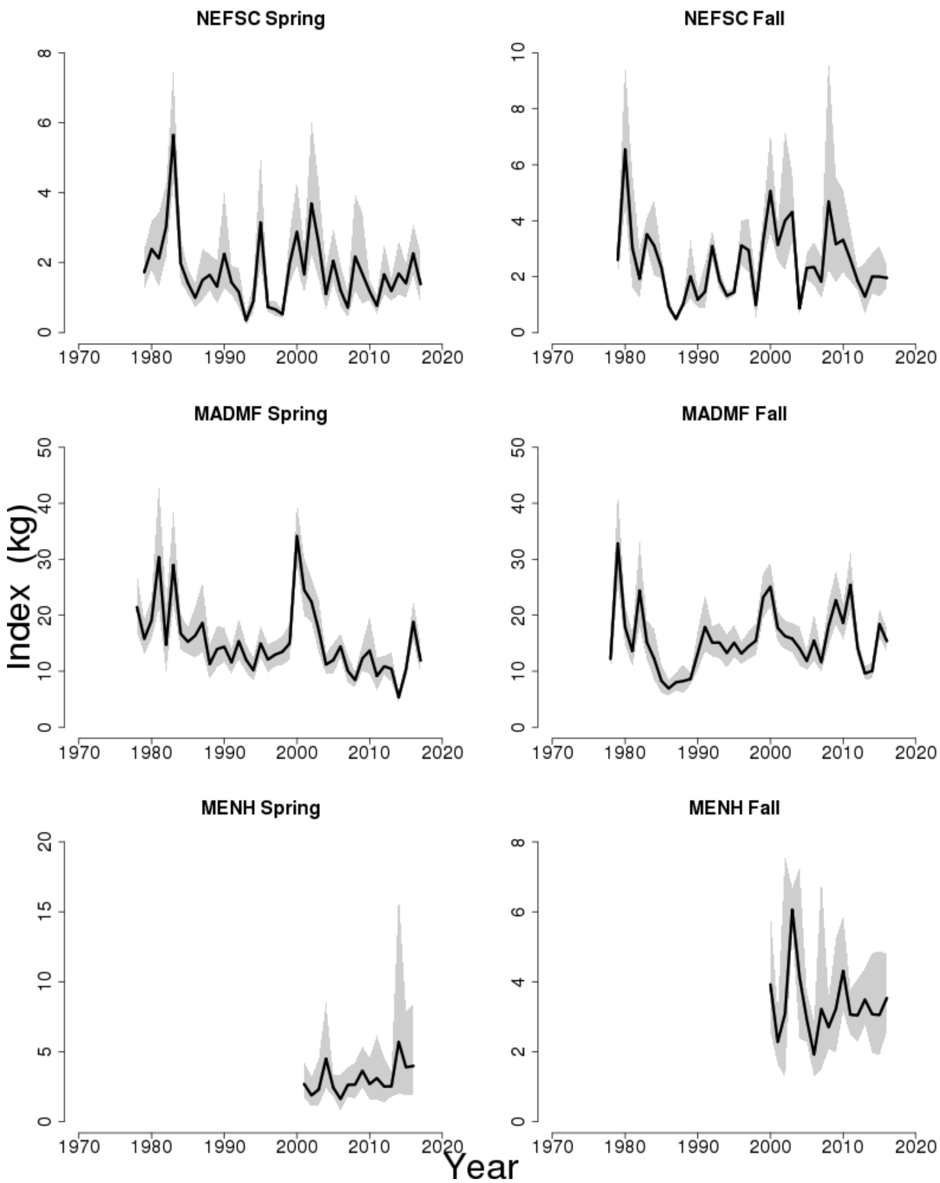

Figure 93: Indices of biomass for the Gulf of Maine winter flounder between 1978 and 2017 for the Northeast Fisheries Science Center (NEFSC), Massachusetts Division of Marine Fisheries (MDMF), and the Maine New Hampshire (MENH) spring and fall bottom trawl surveys. NEFSC indices are calculated with gear and vessel conversion factors where appropriate. The approximate 90% lognormal confidence intervals are shown.