Northeast Fisheries Science Center Reference Document 18-08

65th Northeast Regional Stock Assessment Workshop (65th SAW) Assessment Summary Report

by the Northeast Fisheries Science Center

August 2018

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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SAW-65 ASSESSMENT SUMMARY REPORT

Introduction

The 65th SAW Assessment Summary Report contains summary and detailed technical information on stock assessments reviewed during June 26-29, 2018 at the Stock Assessment Workshop (SAW) by the 65th Stock Assessment Review Committee (SARC-65): Sea scallop and Atlantic herring. The SARC-65 consisted of three external, independent reviewers appointed by the Center for Independent Experts [CIE], and an external SARC chairman from the NEFMC SSC. The SARC evaluated whether each Term of Reference (listed in the Appendix) was completed successfully based on whether the work provided a scientifically credible basis for developing fishery management advice. The reviewers' reports for SAW/SARC-65 are available at the NEFSC Stock Assessment Reports website under the heading "SARC 65 Panelist Reports."

An important aspect of any assessment is the determination of current stock status. The status of the stock relates to both the rate of removal of fish from the population – the exploitation rate – and the current stock size. The exploitation rate is the proportion of the stock alive at the beginning of the year that is caught during the year. When that proportion exceeds the amount specified in an overfishing definition, overfishing is occurring. Fishery removal rates are usually expressed in terms of the instantaneous fishing mortality rate, F, and the maximum removal rate is denoted as $F_{THRESHOLD}$.

Another important factor for classifying the status of a resource is the current stock level, for example, spawning stock biomass (SSB) or total stock biomass (TSB). Overfishing definitions, therefore, characteristically include specification of a minimum biomass threshold as well as a maximum fishing threshold. If the biomass of a stock falls below the biomass threshold ($B_{THRESHOLD}$) the stock is in an overfished condition. The Sustainable Fisheries Act mandates that a stock rebuilding plan be developed should this situation arise.

As there are two dimensions to stock status – the rate of removal and the biomass level – it is possible that a stock not currently subject to overfishing in terms of exploitation rates is in an overfished condition; that is, has a biomass level less than the threshold level. This may be due to heavy exploitation in the past, or a result of other factors such as unfavorable environmental conditions. In this case, future recruitment to the stock is very important and the probability of improvement may increase greatly by increasing the stock size. Conversely, fishing down a stock that is at a high biomass level should generally increase the long-term sustainable yield. Stocks under federal jurisdiction are managed on the basis of maximum sustainable yield (MSY). The biomass that produces this yield is called B_{MSY} and the fishing mortality rate that produces MSY is called F_{MSY}.

Given this, federally managed stocks under review are classified with respect to current overfishing definitions. A stock is overfished if its current biomass is below $B_{THRESHOLD}$ and overfishing is occurring if current F is greater than $F_{THRESHOLD}$. The table below depicts status criteria.

		Biomass		
		$B < B_{THRESHOLD}$	$B_{THRESHOLD} < B < B_{MSY}$	$B > B_{MSY}$
Exploitation Rate	$F > F_{THRESHOLD}$	Overfished, overfishing is occurring; reduce F, adopt and follow rebuilding plan	Not overfished, overfishing is occurring; reduce F, rebuild stock	$F = F_{TARGET} <= F_{MSY}$
	$F < F_{THRESHOLD}$	Overfished, overfishing is not occurring; adopt and follow rebuilding plan	Not overfished, overfishing is not occurring; rebuild stock	$F = F_{TARGET} <= F_{MSY}$

Fisheries management may take into account scientific and management uncertainty, and overfishing guidelines often include a control rule in the overfishing definition. Generically, the control rules suggest actions at various levels of stock biomass and incorporate an assessment of risk, in that F targets are set so as to avoid exceeding F thresholds.

Outcome of Stock Assessment Review Meeting

Text in this section is based on SARC-65 Review Panel reports (available at the NEFSC Stock Assessment Report website under the heading “SARC-65 Panelist Reports”).

SARC 65 concluded that the sea scallop stock is neither overfished nor did it experience overfishing in 2017. The Panel concluded that all tasks specified in the SAW ToRs had been reasonably and satisfactorily completed. A gonad-based SSB and related reference points were developed and presented. But the panel recommended that in the interim meat weight-based reference points continue to be used. The method of using gonad weight to calculate spawning stock size seems promising, but additional work is needed to fully develop the approach.

SARC 65 concluded that the Atlantic herring stock is neither overfished nor did it experience overfishing in 2017. The Panel concluded that all tasks specified in the SAW ToRs had been reasonably and satisfactorily completed. The key changes in the ASAP model used from the last assessment were in assumptions about M and selectivity, in the introduction of new index time series (including an acoustic survey series for the first time). The sensitivity analyses successfully explained the observed assessment scale difference from 2015. The recruitment estimates from the most recent five years were among the lowest in the time series. This suggests that the short-to-medium term prognosis for the stock is likely to be relatively poor.

B. ATLANTIC HERRING ASSESSMENT SUMMARY FOR 2018

State of Stock

Spawning stock biomass (SSB) was estimated to be 141,473mt in 2017 and average fishing mortality rate over ages 7-8 (F) was estimated to be 0.45 (Figure B1). These estimates are derived from an age-structured model proposed as the best scientific information available for determining the stock status for Atlantic herring.

Maximum sustainable yield (MSY) reference points were estimated based on a proxy overfishing threshold of $F_{40\%}$. $F_{MSY\ proxy}$ = 0.51, $SSB_{MSY\ proxy}$ = 189,000 mt (½ $SSB_{MSY\ proxy}$ = 94,500 mt), and MSY_{proxy} = 112,000 mt. Based on a comparison of these MSY_{proxy} reference points with the estimates of F and SSB for 2017, the SARC concluded that the stock is not overfished and overfishing is not occurring (the probability of overfishing P(F>Fmsy) is 24% and the probability of being overfished P(SSB<½ $SSB_{MSY\ proxy}$) is 2%, Figure B3).

Projections

Short-term projections of future stock status were conducted based on results of the Age Structured Assessment Model (ASAP, Legault and Restrepo 1999). It was not necessary to correct projections for retrospective patterns. Uncertainty in the starting conditions for projections was derived from the results of the assessment model. Age 1 recruitment for 2018 was derived from the estimated recruitments for 2013-2017, whereas that for 2019-2021 was drawn from 1965-2015. The estimates of recruitment from 2016-2017 were excluded from the latter calculations because they were highly uncertain. Selectivity at age equaled the catch-weighted selectivities at age from the mobile and fixed fleets over the last five years. These selectivities were generally similar to that for the mobile fleet. Weights at age and maturity at age were the averages over years 2013-2017.

It is unlikely the 2018 Acceptable Biological Catch (ABC) will be fully utilized. Consequently, two example projections were conducted to address two catch scenarios in 2018 (Table B1): 1) assumed catch equal to the 2018 ABC (i.e., 111,000 mt), and 2) assumed catch equal to half the 2018 ABC (i.e., 55,000 mt). In both scenarios $F_{7\text{-}8}$ was fixed at the overfishing threshold (0.51) during 2019-2021. Projected catch and SSB were higher in Scenario 2 than Scenario 1. Likewise, the probability of overfishing in 2018 and the probability of the stock being overfished in each year were less in Scenario 2 than Scenario 1.

Table B1. Results of short-term projection under two scenarios differing in assumed 2018 catch.

Scenario 1	**2018**	**2019**	**2020**	**2021**
Catch (mt)	111,000	13,700	31,000	55,700
F_{7-8}	1.7	0.51	0.51	0.51
SSB (mt)	32,900	19,700	31,700	85,800
P(overfishing)	0.95	--	--	--
P(overfished)	0.96	0.94	0.93	0.58

Scenario 2	**2018**	**2019**	**2020**	**2021**
Catch (mt)	55,000	28,900	38,000	59,400
F_{7-8}	0.58	0.51	0.51	0.51
SSB (mt)	75,300	43,500	42,600	91,000
P(overfishing)	0.69	--	--	--
P(overfished)	0.76	0.92	0.91	0.53

As estimates of recent recruitments have been below average, a projection was also developed using age 1 recruitment estimated at half the average recruitment for the period 1965-2015. This projection gave somewhat more pessimistic results in terms of short-term fishery performance and stock status (see Appendix B8 in full herring assessment report of SAW65).

Catch and Status Table: Atlantic herring

(Weights in mt, recruitment in millions, arithmetic means; minimum, maximum and mean values for years 1965-2017)

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
US mobile catch	84,650	103,458	67,191	82,022	87,162	95,182	92,566	80,465	62,307	47,889
US fixed catch	31	98	1,263	422	9	9	518	738	1,208	258
New Brunswick weir catch	6,448	4,031	10,958	3,711	504	6,431	2,149	146	4,060	2,103
Total catch	91,129	107,587	79,413	86,155	87,675	101,622	95,233	81,350	67,574	50,250
Spawning stock biomass	207,711	139,353	121,661	185,013	243,767	210,106	330,492	264,982	175,698	141,473
Recruitment (age 1)	2712	10580	2364	2110	6942	1370	1608	776	175	392
Fully selected F	0.58	0.94	0.72	0.61	0.60	0.65	0.51	0.47	0.47	0.45

Catch and status table, Atlantic herring, cont'd:

Year	Min	Max	Mean
US mobile catch	26,883	421,091	111,496
US fixed catch	6	58,739	8,631
New Brunswick weir catch	146	44,112	20,125
Total catch	44,613	477,767	140,252
Spawning stock biomass	53,084	1,352,730	312,736
Recruitment (age 1)	175	14035	4163
Fully selected F	0.13	1.04	0.57

Stock Distribution and Identification

The Gulf of Maine/Georges Bank Atlantic herring complex is composed of several spawning aggregations. Fisheries and research surveys, however, catch fish from a mix of the spawning aggregations and methods to distinguish fish from each aggregation are not yet well established. Consequently, recent assessments have combined data from all areas and conducted a single assessment of the entire complex. Although this approach poses a challenge to optimally managing each stock component and can create retrospective patterns within an assessment, the mixing of the spawning components in the fishery and surveys precludes separate assessments. Atlantic herring caught in the New Brunswick, Canada, weir fishery were considered part of the Gulf of Maine/Georges Bank complex because tagging studies suggested mixing. Herring from the Canadian Scotian Shelf stock also likely mix with the Gulf of Maine/Georges Bank complex, but the degree of mixing is unknown and methods to distinguish fish from each stock are not yet developed. Catches from the Scotian Shelf were not considered part of the Gulf of Maine/Georges Bank complex. Despite a single assessment for the entire complex, catch limits are allocated to spatial management areas (Correia 2012).

Catches

US catch data were reported for two aggregate gear types, fixed and mobile gears, during 1965-2017. The reported catch is a sum of landings and self-reported discards, but discard estimates have only been available since 1996 and were assumed to be zero prior to 1996. Available discard estimates, however, are generally less than 1% of landings and do not represent a significant source of mortality (Wigley et al. 2011).

New Brunswick, Canada weir catches were provided for the years 1965-2017 and were combined with US fixed gear catches for the purposes of the assessment.

Catch in the mobile gear fishery peaked in the late 1960s and early 1970s, largely due to foreign fleets (Figure B4). Catch in the US fixed gear fishery has been variable, but has been relatively low since the mid-1980s (Figure B4). Catch in the New Brunswick weir fishery has also declined since the 1980s (Figure B4).

The mobile gear fishery catches a relatively broad range of ages and some strong cohorts can be seen for several years. In contrast, the fixed gear fisheries harvest almost exclusively age-2 herring.

Data and Assessment

In the 2012 stock assessment (NEFSC 2012), the natural mortality rates during 1996-2011 were increased by 50% to resolve a retrospective pattern and to ensure that this additional mortality was consistent with observed increases in estimated consumption of herring by predators. In the 2015 assessment (Deroba 2015), a retrospective pattern re-emerged and the additional mortality was no longer consistent with estimated consumption. Consequently, M was reevaluated in this 2018 assessment, and M was set equal to 0.35 for all years and ages.

Similar to the previous assessment, maturity-at-age varied through time. The time variation in maturity was based on observed proportions mature-at-age from commercial fishery samples in quarter three (July-September) of each year. This represents a change from the previous assessment when predictions of maturity-at-age from annual fits of generalized additive models (GAM) were used instead of the empirical observations. The GAMs were used previously to reduce the effect of sampling noise, but sampling intensity was considered sufficient to make the empirical observations representative of temporal changes in maturity and unlikely to be affected by sampling noise, making the GAMs unnecessary.

Abundances (i.e., arithmetic mean numbers per tow) from the NMFS summer shrimp survey and the spring and fall multispecies bottom trawl surveys were used in the assessment model along with annual coefficients of variation and age composition when they were available. The spring and fall surveys had three time stanzas: 1965-1984, 1985-2008, 2009-2017 to account for the changes in vessel and gear type.

An acoustic time series collected during the NMFS fall bottom trawl survey was also used as an index of age 3+ herring abundance.

Fishing Mortality

The average F between ages 7 and 8 was used for reporting results related to fishing mortality ($F_{7\text{-}8}$) because these ages are fully selected by the mobile gear fishery, which has accounted for most of the landings since 1986. $F_{7\text{-}8}$ in 2017 equaled 0.45 (80% probability interval: 0.32-0.57), and ranged from 0.13 in 1965 to 1.04 in 1975 (Figure B1).

Biomass

The 2017 SSB was 141,473 mt (80% probability interval: 114,281-182,138), and ranged from 53,084 mt in 1982 to 1,352,700 mt in 1967 (Figure B1). Total biomass in 2017 was 239,470 mt, and ranged from 169,860 mt in 1982 to 2,035,800 mt in 1967.

Recruitment

Age-1 recruitment has been below average since 2013 (Figure B2). The time series high of 1.4 billion age-1 fish was estimated in 1971. The estimates for 2009 and 2012 are of relatively strong cohorts, as in previous assessments. The time series low of 1.7 million fish occurred in 2016, and the second lowest of 3.9 million fish occurred in 2017, although this estimate is highly uncertain. Four of the six lowest annual recruitment estimates have occurred since 2013 (2013, 2015, 2016, and 2017).

Biological Reference Points

MSY reference points from the previous assessment (Deroba 2015) were based on the fit of a Beverton-Holt stock-recruitment curve. The ability to estimate the stock-recruit curve deteriorated in this 2018 assessment. Proposed reference points from SARC65 in 2018 no longer rely on a stock-recruit relationship; thus MSY reference points were estimated based on a proxy of $F_{40\%}$. $F_{MSYproxy}$ = 0.51, $SSB_{MSYproxy}$ = 189,000 mt (½ $SSB_{MSYproxy}$ = 94,500), and MSY_{proxy} = 112,000 mt.

Special Comments

- Note that based on the recent run of below average estimated annual recruitments and the assumed catch in 2018 in both example projection scenarios (Table B1), the projected status would change to the stock being overfished and overfishing occurring in 2018 and likely overfished in years 2019-2021.
- If the recent estimates (since 2013) of poor recruitment are confirmed and continue into the future, then projected stock status will continue to decline.
- The model's reduced ability to estimate the stock-recruit relationship is likely related to changes in M and various likelihood penalties.
- Selectivity, natural mortality, and the lack of a stock-recruitment curve have changed from the previous assessment, thus preventing comparison of the F_{MSY} between this assessment and the previous assessment.

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Wigley, S.E., J. Blaylock, P.J. Rago, J. Tang, H.L. Haas, and G. Shield. 2011. Standardized bycatch reporting methodology 3-year review report – 2011 Part 1. Northeast Fisheries Science Center Reference Document 11-09.

Figures

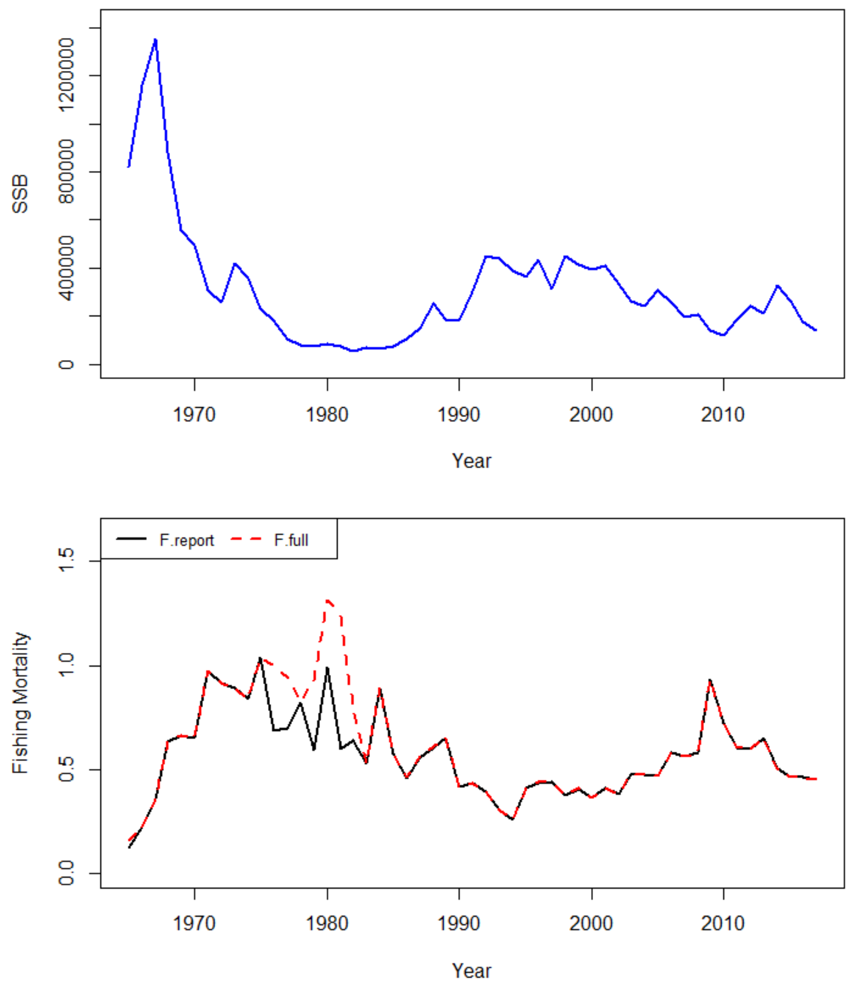

Figure B1. Atlantic herring spawning stock biomass (mt) and fishing mortality (F.report averaged over ages 7 and 8; F.full is fully selected) time series from the ASAP model for 1965-2017

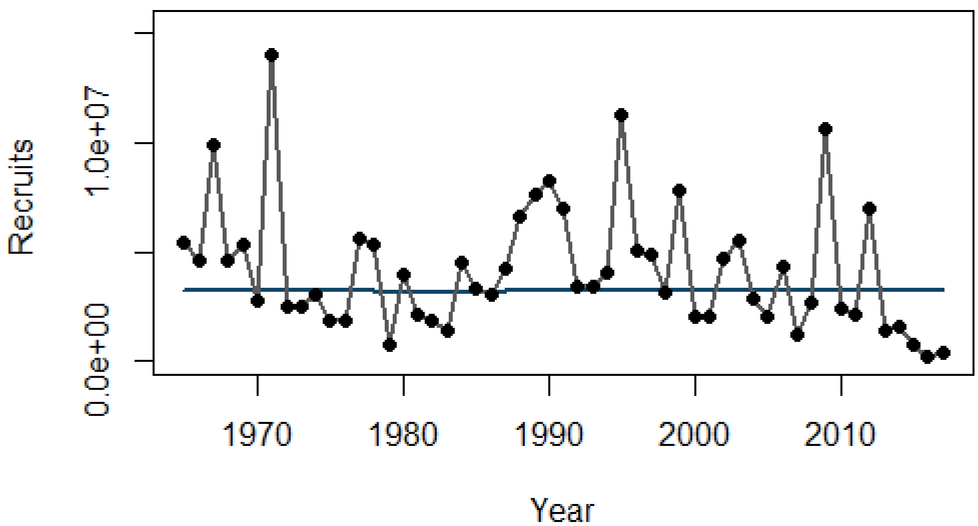

Figure B2. Atlantic herring annual recruit (000s) time series, 1965-2017. The horizontal line is the average over the time series.

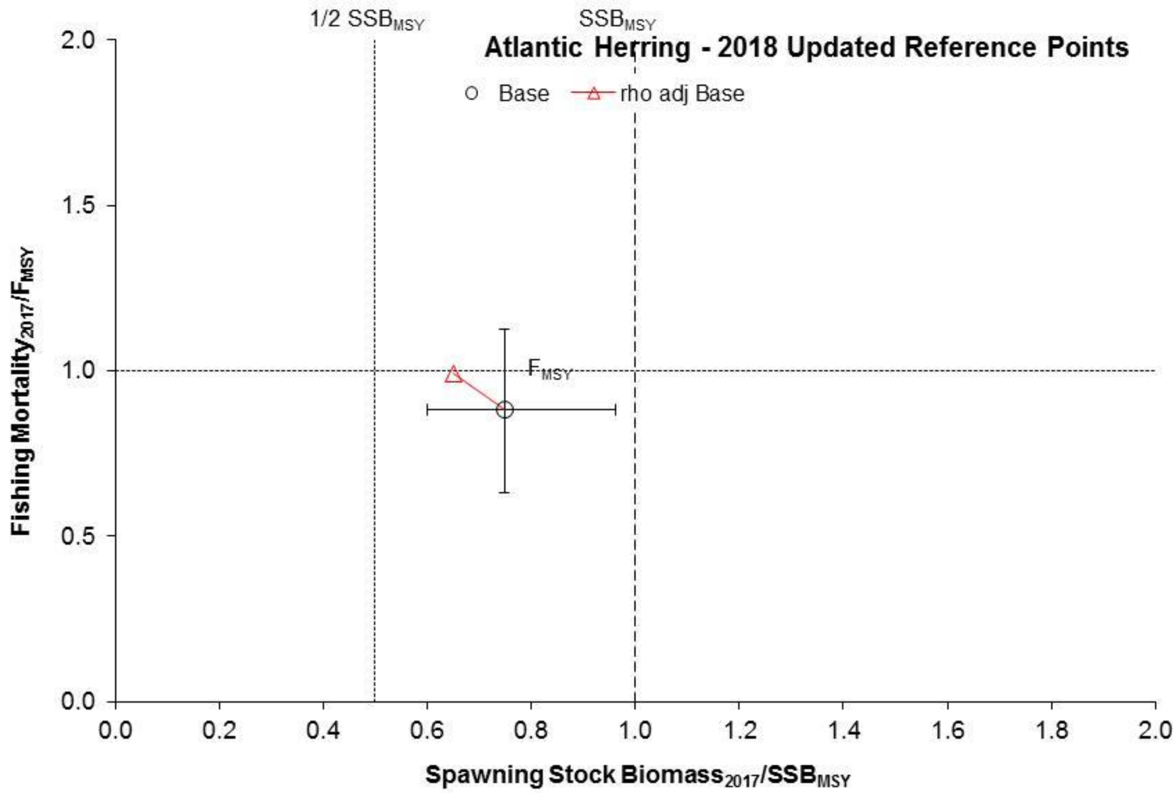

Figure B3. Atlantic herring stock status based on the ASAP model. Error bars represent the 80% probability intervals. The red triangle represents the model result if an adjustment were to be made for the retrospective pattern.

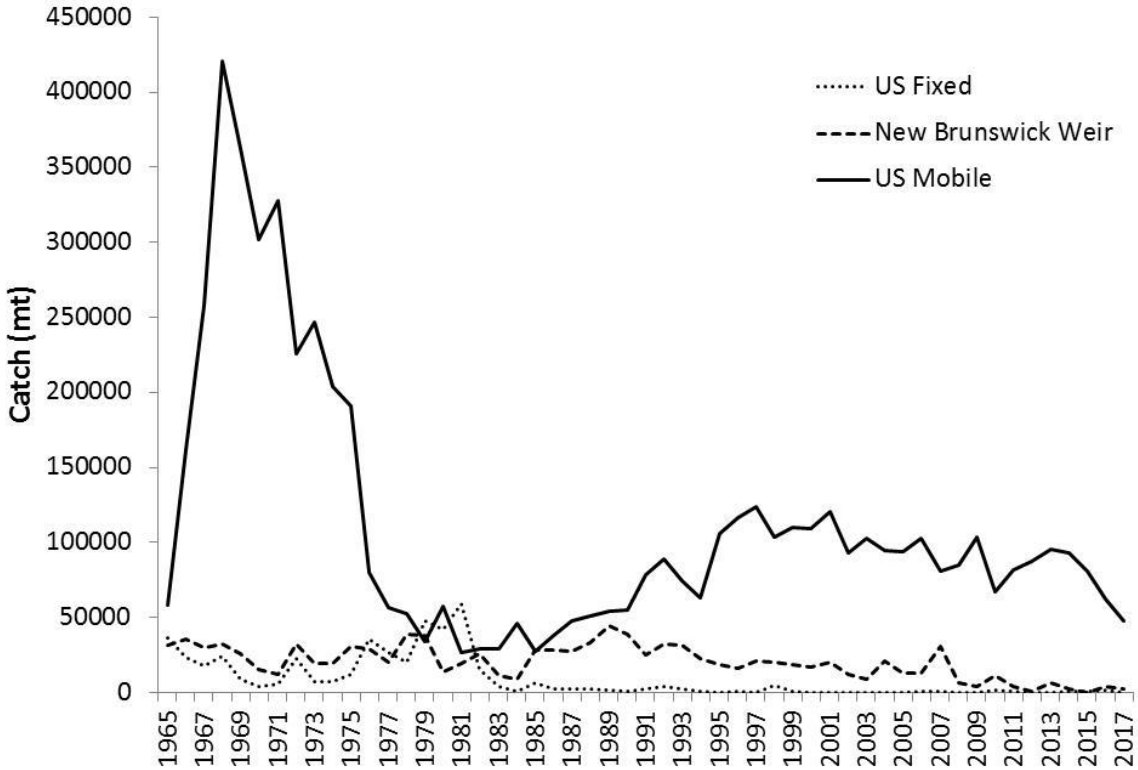

Figure B4. Atlantic herring catch for the US mobile fleet, US fixed fleet, and New Brunswick, Canada, weirs, for 1965-2017

Appendix: Stock Assessment Terms of Reference for SAW/SARC-65, June 26-29, 2018

A. Sea scallop

1. Estimate catch from all sources including landings, discards, and incidental mortality. Describe the spatial and temporal distribution of landings, discards, and fishing effort. Characterize the uncertainty in these sources of data.

2. a. Present the survey data being used in the assessment (e.g., regional indices of relative or absolute abundance, recruitment, size data, etc.). Characterize the uncertainty and any bias in these sources of data.

3. Summarize existing data, and characterize trends if possible, and define what data should be collected from the Gulf of Maine area to describe the condition and status of that resource. If possible provide a basis for developing catch advice for this area.

4. Investigate the role of environmental and ecological factors in determining stock distribution and recruitment success. If possible, integrate the results into the stock assessment.

5. Estimate annual fishing mortality, recruitment and stock biomass for the time series, and estimate their uncertainty. Report these elements for both the combined resource and by sub-region. Include retrospective analyses (historical, and within-model) to allow a comparison with previous assessment results and previous projections.

6. State the existing stock status definitions for “overfished” and “overfishing”. Then update or redefine biological reference points (BRPs; point estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, F_{MSY} and MSY) and provide estimates of their uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the scientific adequacy of existing BRPs and the “new” (i.e., updated, redefined, or alternative) BRPs.

7. Make a recommendation[a] about what stock status appears to be based on the existing model (from previous peer reviewed accepted assessment) and based on a new model or model formulation developed for this peer review.
   a. Update the existing model with new data and evaluate stock status (overfished and overfishing) with respect to the existing BRP estimates.
   b. Then use the newly proposed model and evaluate stock status with respect to “new” BRPs and their estimates (from TOR-5).
   c. Include descriptions of stock status based on simple indicators/metrics.

8. Develop approaches and apply them to conduct stock projections.
   a. Provide numerical annual projections (through 2020) and the statistical distribution (i.e., probability density function) of the catch at F_{MSY} or an F_{MSY} proxy (i.e. the overfishing level, OFL) (see Appendix to the SAW TORs). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. Use a

sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, variability in recruitment).

b. Comment on which projections seem most realistic. Consider the major uncertainties in the assessment as well as sensitivity of the projections to various assumptions. Identify reasonable projection parameters (recruitment, weight-at-age, retrospective adjustments, etc.) to use when setting specifications.
c. Describe this stock's vulnerability (see "Appendix to the SAW TORs") to becoming overfished, and how this could affect the choice of ABC.

9. Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in most recent SARC reviewed assessment and review panel reports. Identify new research recommendations.

[a]NOAA Fisheries has final responsibility for making the stock status determination based on best available scientific information.

B. Atlantic herring

1. Estimate catch from all sources including landings and discards. Describe the spatial and temporal distribution of landings, discards, and fishing effort. Characterize uncertainty in these sources of data. Comment on other data sources that were considered but were not included.

2. Present the survey data being used in the assessment (e.g., regional indices of abundance, recruitment, state surveys, age-length data, food habits, etc.). Characterize the uncertainty and any bias in these sources of data.

3. Estimate consumption of herring, at various life stages. Characterize the uncertainty of the consumption estimates. Address whether herring distribution has been affected by environmental changes.

4. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series, and estimate their uncertainty. Incorporate ecosystem information from TOR-3 into the assessment model, as appropriate. Include retrospective analyses (both historical and within-model) to allow a comparison with previous assessment results and projections, and to examine model fit.

5. State the existing stock status definitions for "overfished" and "overfishing". Then update or redefine biological reference points (BRPs; point estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, F_{MSY} and MSY) and provide estimates of their uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the scientific adequacy of existing BRPs and the "new" (i.e., updated, redefined, or alternative) BRPs.

6. Make a recommendation[a] about what stock status appears to be based on the existing model (from previous peer reviewed accepted assessment) and based on a new model or model formulation developed for this peer review.
   a. Update the existing model with new data and evaluate stock status (overfished and overfishing) with respect to the existing BRP estimates.
   b. Then use the newly proposed model and evaluate stock status with respect to "new" BRPs and their estimates (from TOR-5).
   c. Include descriptions of stock status based on simple indicators/metrics.

7. Develop approaches and apply them to conduct stock projections.
   a. Provide numerical annual projections (through 2021) and the statistical distribution (i.e., probability density function) of the catch at F_{MSY} or an F_{MSY} proxy (i.e. the overfishing level, OFL) (see Appendix to the SAW TORs). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. Use a sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, variability in recruitment).
   b. Comment on which projections seem most realistic. Consider the major uncertainties in the assessment as well as sensitivity of the projections to various assumptions. Identify reasonable projection parameters (recruitment, weight-at-age, retrospective adjustments, etc.) to use when setting specifications.
   c. Describe this stock's vulnerability (see "Appendix to the SAW TORs") to becoming overfished, and how this could affect the choice of ABC.

8. If possible, make a recommendation about whether there is a need to modify the current stock definition for future assessments.

9. For any research recommendations listed in SARC and other recent peer reviewed assessment and review panel reports, review, evaluate and report on the status of those research recommendations. Identify new research recommendations.

[a]NOAA Fisheries has final responsibility for making the stock status determination based on best available scientific information.

Appendix to the SAW Assessment TORs:

Clarification of Terms used in the SAW/SARC Terms of Reference

On "Acceptable Biological Catch" (DOC Nat. Stand. Guidel. Fed. Reg., v. 74, no. 11, 1-16-2009):

Acceptable biological catch (ABC) is a level of a stock or stock complex's annual catch that accounts for the scientific uncertainty in the estimate of [overfishing limit] OFL and any other scientific uncertainty…" *(p. 3208) [In other words, OFL ≥ ABC.]*

ABC for overfished stocks. For overfished stocks and stock complexes, a rebuilding ABC must be set to reflect the annual catch that is consistent with the schedule of fishing mortality rates in the rebuilding plan. *(p. 3209)*

NMFS expects that in most cases ABC will be reduced from OFL to reduce the probability that overfishing might occur in a year. (p. 3180)

ABC refers to a level of ''catch'' that is ''acceptable'' given the ''biological'' characteristics of the stock or stock complex. As such, [optimal yield] OY does not equate with ABC. The specification of OY is required to consider a variety of factors, including social and economic factors, and the protection of marine ecosystems, which are not part of the ABC concept. (p. 3189)

On "Vulnerability" (DOC Natl. Stand. Guidelines. Fed. Reg., v. 74, no. 11, 1-16-2009):

"Vulnerability. A stock's vulnerability is a combination of its productivity, which depends upon its life history characteristics, and its susceptibility to the fishery. Productivity refers to the capacity of the stock to produce MSY and to recover if the population is depleted, and susceptibility is the potential for the stock to be impacted by the fishery, which includes direct captures, as well as indirect impacts to the fishery (e.g., loss of habitat quality)." (p. 3205)

Participation among members of a SAW Stock Assessment Working Group:

Anyone participating in SAW assessment working group meetings that will be running or presenting results from an assessment model is expected to supply the source code, a compiled executable, an input file with the proposed configuration, and a detailed model description in advance of the model meeting. Source code for NOAA Toolbox programs is available on request. These measures allow transparency and a fair evaluation of differences that emerge between models.

Guidance to SAW WG about "Number of Models to include in the Assessment Report":

In general, for any TOR in which one or more models are explored by the WG, give a detailed presentation of the "best" model, including inputs, outputs, diagnostics of model adequacy, and sensitivity analyses that evaluate robustness of model results to the assumptions. In less detail, describe other models that were evaluated by the WG and explain their strengths, weaknesses and results in relation to the "best" model. If selection of a "best" model is not possible, present alternative models in detail, and summarize the relative utility each model, including a comparison of results. It should be highlighted whether any models represent a minority opinion.