

ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR ATLANTIC HERRING
(Clupea herengus)

2018 FISHING YEAR



Prepared by the Plan Review Team

Approved by the Atlantic Herring Management Board
April 2019

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I. Status of Fishery Management Plan

<u>Date of FMP Approval</u>	November 1993
<u>Amendments</u>	Amendment 1 (February 1999) Amendment 2 (March 2006) Amendment 3 (February 2016)
<u>Addenda</u>	Addendum I to Amendment 1 (July 2000) Technical Addendum #1A to Amendment I (October 2001) Addendum II to Amendment I (February 2002) Technical Addendum 1 to Amendment 2 (August 2006) Addendum I to Amendment 2 (March 2009) Addendum II to Amendment 2 (December 2010) Addendum V to Amendment 2 (October 2012) Addendum VI to Amendment 2 (August 2013) Addendum I to Amendment 3 (May 2017)
<u>Management Unit</u>	US waters of the northwest Atlantic Ocean from the shoreline to the seaward boundary of the Exclusive Economic Zone (East Coast of Maine), and from the US/Canadian border to the southern end of the species range (Cape Hatteras, North Carolina).
<u>States With Declared Interest</u>	Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, and New Jersey
<u>Active Boards/Committees</u>	Atlantic Herring Section, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, and Plan Review Team

Atlantic herring (*Clupea harengus*), also known as sea herring, are an oceanic fish that occur in large schools and undergo seasonal inshore-offshore migrations. Herring are important to the Northwest Atlantic ecosystem as a forage species and to the fishing industry as bait for lobster, blue crab, and tuna. To a lesser degree this resource also serves as a food, typically canned, pickled, or smoked. The U.S. Atlantic herring fishery is currently managed as a single stock through complementary plans by the Atlantic States Marine Fisheries Commission (ASMFC) and the New England Fishery Management Council (NEFMC).

The stockwide annual catch limit (ACL) is divided amongst four distinct management areas: inshore Gulf of Maine (Area 1A), offshore Gulf of Maine (Area 1B), Southern New England/Mid-Atlantic (Area 2), and Georges Bank (Area 3). The Area 1A fishery is managed by ASMFC's Atlantic Herring Section (Section), which includes representatives from Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York and New Jersey.

The 1993 ASMFC Atlantic Herring Fishery Management Plan (FMP) was implemented to address the growth of the herring resource and interest in Internal Waters Processing (IWP) operations. Amendment 1 to the FMP was developed to complement the goals and objectives of the NEFMC federal management plan. It established total allowable catch limits (TACs) for specific management areas. The Days Out program was established for state waters.

Addendum I (2000) redefined spawning areas in state waters. It also reduced the exploitation of herring spawning aggregations by imposing a limited landing restriction on herring caught in spawning areas (20% tolerance for spawn herring in Maine and Massachusetts). Technical Addendum #1A (October 2001) was approved to change the delineation of the Eastern Maine spawning area.

Addendum II (2002) was developed in conjunction with NEFMC's Framework Adjustment 1 to allocate the Management Area 1A TAC on a seasonal basis. This addendum also specified procedures to allocate the annual Internal Waters Processing (IWP) quota.

Amendment 2 (2006) to the FMP was developed to complement management measures in Amendment 1 to the federal FMP. Identical management area boundaries were adopted, in addition to a joint TAC specification setting process between NEFMC and ASMFC, and management area closure when 95% of the TAC is harvested. Technical Addendum I to Amendment 2 (2006) was developed to address inconsistent interpretation of the zero tolerance spawning provision.

Addendum I (2009) identified tools to address effort in Area 1A in order to maintain a steady supply of herring throughout the fishing season. States adjacent to Area 1A could set bi-monthly, trimester or seasonal quotas and roll the quota into later periods if there was under-harvest. It also required states to implement weekly reporting for timely quota management.

Addendum II (2010) was developed to complement Amendment 4 to the federal FMP. It revised the specifications process (sets measures for three-years) and terminology (e.g., TAC is now called ACL) to be consistent with federal management.

Addendum V (2012) compiled the previously approved spawning regulations into one document and revised the spawning sample provisions.

Addendum VI (2013) was developed to complement the NEFMC's Framework Adjustment 2 to the federal FMP. It established new provisions and consistent measures for the four management areas. States were allowed to seasonally split sub-ACLs for each management area, and up to 10% of unused sub-ACL could be carried over to the following fishing year (after data is available). Addendum VI also established new closure triggers: a directed fishery closes when 92% of an area's sub-ACL is projected to be reached, and the stock-wide fishery closes when 95% of the total ACL is projected to be reached.

Amendment 3 (2016) to the FMP consolidates prior amendments, addenda, and recent management decisions into a single document; it is now the comprehensive document for Atlantic herring management in state waters. The amendment refines the spawning closure system using a modified GSI-based spawning monitoring system. Additionally, the fixed gear set-aside is now available to fixed gear fishermen through December 31.

Addendum I (2017) to Amendment 3 was developed to stabilize the rate of catch in Area 1A and distribute the seasonal quota throughout Trimester 2 (June through September). The Addendum includes a variety of management tools which can be used by the Section, including weekly landings limits, restrictions on carrier vessels, vessel declaration requirements, and modifications to the 'days out' procedure for a variety of gear type and permit categories.

II. Status of the Stock

The most recent benchmark stock assessment for Atlantic herring was peer reviewed in August 2018 (SAW-65). The assessment found that Atlantic Herring are not overfished and overfishing is not occurring, but highlighted concerns about trends in recruitment and spawning stock biomass. Recruitment has been below the time series average for the last five years. In particular, 2016 recruitment was the lowest on record at 1.7 million fish. While recruitment has been variable throughout time, recent and continuing low levels of recruitment indicate that there will be fewer fish available to harvest in future years. Spawning stock biomass (SSB) has also been lower in recent years. In 2017, SSB was estimated at 141,473 mt, below the SSB threshold of 189,000 mt (417 million pounds). Fishing mortality has decreased in recent years, with a 2017 level of 0.45, below the fishing mortality threshold of 0.51.

III. Status of the Fishery

There is an Atlantic herring fishery in the United States and Canada. The U.S. Atlantic herring fishery is controlled by annual catch limits (ACL) set by NOAA Fisheries. The stockwide ACL is distributed among the four management areas. Specifications are set every three years and adjusted annually to account for overages or underages from the previous fishing season. Once 92% of the sub-ACL for an area is reached, the respective fishery is closed. The stockwide fishery closes when 95% of the total ACL is projected to be reached. Following a closure, there is a 2,000 lb trip limit to allow for incidental bycatch of Atlantic herring for the remainder of the fishing year. In addition to quota-based closures, the "days out" and spawning closure programs provide additional measures to control fishing effort.

For the 2016-2018 fishing season, the Council and Commission set the ACL at 231 million pounds (104,800 mt), a 2.6% decrease from the 2013-2015 fishing limits. For all three years, the ACL is further subdivided by Atlantic herring management areas as follows: Area 1A = 66.79 million pounds, Area 1B = 9.9 million pounds, Area 2 = 64.1 million pounds, and Area 3 = 90.16 million pounds. The Area 1A sub-ACL is distributed seasonally with 72.8% available from June 1-September 30 and 27.2% available from October 1-December 31. Underages from June through September may be rolled into the October through December period.

The domestic Atlantic herring fishery is predominantly commercial; recreational catch accounts for less than 1% of landings. Over the time series of 1965 to 2017, annual landings by the United States Atlantic herring fleet generally increased and averaged roughly 131.4 million pounds (59,612 mt). Landings reached the lowest level in 1983, at 51.263 million pounds (23,253 mt), and peaked in 2006 at 268.533 million pounds (121,804 mt).

Catch, in metric tons, from Area 1A is shown in Table 1. Preliminary information from 2018 indicates that 24,814 mt were caught in Area 1A, representing 89.4% of the sub-ACL. Since a directed fishery closes when 92% of an area’s sub-ACL is projected to be reached, there was no closure in the Area 1A fishery in 2018.

Table 1: Area 1A catch, sub-ACL, and associated directed fishery closures from 2013-2018. Source of catch information: NOAA Fisheries Atlantic Herring Fishery Monitoring

Year	Sub-ACL (mt)	Catch (mt)	% Utilized	Sub-ACL Closure
2013	29,775	29,820	100%	Oct-15
2014	33,031	33,428	101%	Oct-26
2015	30,290	29,406	97%	Nov-2
2016	30,102	27,826	92%	Oct-18
2017	31,115	28,682	92%	NA
2018	27,743**	24,814*	89.4%	NA

*Preliminary landings data

**Adjusted August 22, 2018 from 31,962 mt to 27,743 mt

2018 Fishing Season

Based on preliminary data provided in state compliance reports, Maine and Massachusetts accounted for over 90% of the commercial Atlantic herring landings in 2018 (Table 2). Landings generally decreased across the states with the largest decreases occurring in Rhode Island (53% reduction from 2017) and New Hampshire (53% reduction from 2017). Connecticut and New York did see noticeable increase in landings in 2017 (93%).

Table 2. 2018 commercial landings by state and percent of total harvest. 2018 landings data is considered preliminary at this time. Source: State compliance reports.

	Commercial Landings (lbs)	Percent of Total
ME	59,691,749	62.8%
NH	1,335,250	1.4%
MA	28,431,238	29.9%
RI	2,140,745	2.3%
CT	82,701	0.1%
NY	32,302	0.1%
NJ	3,374,027	3.5%

Table 3 outlines the ‘days out’ program and effort control measures which were implemented in Area 1A. Based on the accelerated landings of Area 1A quota during Trimester 2 in both 2015 and 2016, and the adoption of Addendum I, the original landing schedule for Area 1A was established at 3 days a week for vessels with a Category A permit. This was subsequently increased to 4, then 5 days as it became clear that landings were occurring at a slower pace than the two previous years. On August 22nd the sub-ACL was adjusted from 31,962 mt to 27,743 mt based on the results of the 2018 stock assessment. As of September 10 harvest had reached 97% of the Trimester 2 allocation, with the fishery moving to zero landings days through September 30. On October 1, a 5 days consecutive landings limit was implemented for Trimester 3. This was increased to 7 days in November once it became clear that landings were below the sub-ACL for Area 1A. Trimester 3 landings continued well into December, creating a longer season similar to 2017 (see Table 1).

Table 3: 2018 ‘days out’ program for trimester 2 and 3 in Area 1A.

Trimester	Date Effective	Consecutive Landing Days for Category A Permit	Weekly Landings Limit for Category A Permit	Poundage that can be Transferred to a Carrier Vessel
2	June 1, 2018	4	480,000	80,000
	July 22* 2018	5	640,000	160,000
	September 10, 2018	0	0	0
3	October 1, 2018	5	NA	NA
	November 16, 2018	7	NA	NA

*Effective 6 p.m. Sunday July 22 for Maine, 12:01 a.m. Monday July 23 for New Hampshire and Massachusetts

ACL Adjusted August 22, 2018 from 31,962 mt to 27,743 mt

Spawning Area Closures

The Atlantic Herring Area 1A (inshore Gulf of Maine) fishery regulations include seasonal spawning closures for portions of state and federal waters in Eastern Maine, Western Maine and Massachusetts/New Hampshire. In 2017, the Commission’s Atlantic Herring Section permanently implemented the GSI₃₀ Based Forecast System for spawning closures in Area 1A. This forecasting method relies upon at least three samples, each containing at least 25 female herring in gonadal stages III-V, to trigger a spawning closure. If sufficient samples are not available, the spawning closure occurs on the default dates outlined in Amendment 3. Prior to 2017, the GSI₃₀ spawning protocol had been implemented as a 1-year pilot program in 2016.

The Eastern Maine spawning area closed on the default date of August 28th through September 24th, given there were no samples from the area at the time. The Western Maine spawning area also closed due to lack of samples on the default date of October 4 through October 31.

For the Massachusetts/New Hampshire spawning area, closure began October 26th and continued through November 22nd, based on forecasting produced from eight samples.

IV. Status of Research and Monitoring

Under Amendment 3, states are not required to conduct fishery independent surveys for Atlantic herring. However, state survey programs designed to catch other species may encounter herring regularly, so some states do collect biological information on Atlantic herring. A summary of these surveys results follow.

Maine and New Hampshire: The states jointly operate an inshore bottom trawl survey in the spring and fall that is designed to catch groundfish, but regularly encounters Atlantic herring. In 2018, Atlantic herring catch was higher than in previous years in the spring survey but lower in than in previous years for the fall survey. In the Spring survey, Atlantic Herring were caught in 98 out of the 118 tows, and a maximum number of 16,146 were caught in one tow. In the fall survey, Atlantic Herring were caught in 64 of the 96 tows, and a maximum of 4,223 were caught in one tow.

Maine Department of Marine Resources also conducts commercial portside catch sampling. In 2018, 71 sampling events occurred, covering purse seine, mid-water trawl, and small-mesh bottom trips. The number of sampling events was a decline from 2018 levels (96).

New Hampshire Fish and Game Department also conducts a juvenile finfish seine survey in the Great Bay, its tributaries, and other coastal harbors. In 2018, 5,415 Atlantic herring were observed during the months of June and July.

In 2015, **Massachusetts** Division of Marine Fisheries and UMass-Dartmouth School for Marine Science and Technology (SMAST) applied for the 2016-2018 Atlantic herring Research Set-Aside (RSA), and were awarded the majority of RSA quota. Portside sampling and the River Herring Bycatch Avoidance program were conducted with both the midwater trawl (MWT) fishery (primarily operating out of Massachusetts ports) including both herring and mackerel trips, at 42.1% (40 of 95) by trip and 57.9% (6,033 of 10,418 mt) by weight, in 2018. Data from an additional four Northeast Fisheries Observer Program (NEFOP) trips and one Maine Department of Marine Resources portside sampled trip landed in MA were incorporated into the bycatch avoidance program. MA DMF continued to utilize its real-time reporting mechanism (laptops with custom-designed reporting software) to receive NEFOP data from captains while at-sea. This negates the need to sample these observed trips, and supplements the overall coverage levels. Thus, combined trip coverage of 47.4% was achieved in 2018

The primary goal of the River Herring Bycatch Avoidance program is to characterize the landings of vessels and advise the fleets of river herring bycatch, in an effort to minimize bycatch independent of management actions. Participating fishermen have generated over \$210,000 through RSA compensation fishing since 2014, all from Herring Management Area 1A. This year marked the final year of the 2016-2018 MA DMF and SMAST Atlantic Herring Research Set-

Aside program. Over 3,000 mt of RSA quota were distributed among qualified participants, but fisheries circumstances created less demand for RSA quota than previous years. Only two companies utilized RSA quota, with only 216 of the 3,144 mt of compensation quota harvested. A total of \$16,500 was generated by RSA harvest in 2018. Despite this reduced compensation, funds generated by the 2017 RSA (mainly through donations) continue to allow for high rates of sampling. Due to reduced fishery effort in 2018 there are still funds available for sampling activities. A no-cost extension was granted, thus, portside sampling and bycatch avoidance strategies will continue into 2019.

Rhode Island Division of Fish & Wildlife conducts a Seasonal Trawl Survey to develop abundance indices for Atlantic herring. Atlantic herring are mostly observed in the late fall and spring in the RIDFW seasonal trawl survey. Monitoring for 2018 suggested a decrease in the relative biomass and abundance of Atlantic herring in Rhode Island waters, a continued trend from 2017. An average of 0.24 kg/tow of Atlantic herring was observed in 2018, lower than the 1.28 kg/tow observed during 2017. Similarly, the Atlantic herring abundance index derived from the trawl data decreased from 84.65 fish/tow in 2017 to 70.13 fish/tow in 2018.

Connecticut Department of Energy and Environmental Protection monitors Atlantic herring through the Long Island Sound Trawl Survey (LISTS), which is conducted each spring and fall since 1984. The Long Island Sound Trawl Survey underwent significant changes to the collection procedure in 2018; as such, the QA/QC portion of the 2018 Survey is still underway and the finalized 2018 data is not available.

New York has *de minimis* status and does not conduct directed monitoring of Atlantic herring.

New Jersey Division of Fish and Wildlife monitors Atlantic herring through the New Jersey Ocean Trawl Survey, which collects samples during five surveys conducted throughout the year between Sandy Hook, NJ and Cape Henlopen, Delaware. In 2018, 189.76 pounds (2,320 individuals) of Atlantic Herring were caught in the ocean trawl surveys.

V. Status of Assessment Advice

The following research recommendations were included in the 2018 benchmark stock assessment.

Research Recommendations from the 65th Northeast Region Stock Assessment for Atlantic Herring (2018)

- **Further research on the use of acoustic technology for inclusion in stock assessment, including information using industry based platforms. Specifically:**
 - Investigate methods for converting herring acoustic indices to biomass.
 - Investigate refinements in target strength conversion to abundance estimates in acoustic data

- Evaluate statistical design implications in acoustic data from surveys and ships of opportunity.
- Additional research to better understand species identification using acoustic signals
- Investigate use of length data, stock structure and movement within assessment models (e.g. SS3)
- **Evaluate data collected in study fleet program for informing assessment data. Development research ideas that can be addressed within the context of the study fleet.**
 - Explore fisheries selectivity in greater depth. Perhaps with study fleet and with historical perspective with industry.
 - Research on depth preferences of herring in the water column through time to inform selectivity and catchability.
- Continue work related to understanding sources of variation in stomach contents, especially as this relates to the (GAMM) models used to develop an index of herring abundance.
- General assessment recommendations:
- **Evaluate the ability of state-space models to reliably estimate observation and process error variances under a range of scenarios, as well as their ability to estimate quantities of management interest**
- Develop a list of standards for evaluating data for possible use in stock assessment. Also develop standards for evaluating model diagnostics and inclusion criteria of indices.
- Develop protocols for multi model inference to provide management advice from stock assessments based on NEFSC experience as well as other input (e.g. model averaging approaches).
- Develop simulations to evaluate diagnostics that are useful under different scenarios (e.g. use of likelihoods, retrospective patterns for diagnostics, etc.).

VI. Management Measures and Issues

Amendment 3 to the Interstate Fishery Management Plan for Atlantic Herring lists the following state regulatory requirements:

1. Each jurisdiction shall prohibit the landing of herring when the management area sub-ACL has been attained.
2. Vessels are prohibited from landing more than 2,000 lbs. of Atlantic herring from Area 1A when the fishery is closed, during a 'day out' or during spawning closures.
3. Jurisdictions will close the directed fishery when 92% of a management area's sub-ACL is projected to be harvested.
4. Each jurisdiction must enact spawning area restrictions that are at least as restrictive as those in Section 4.2.6.
5. States adjacent to Area 1A will implement days out restrictions as identified in Section 4.2.4.1.

6. States are required to implement weekly reporting by all non-federally permitted fishermen on Atlantic herring (including mobile and fixed gear).
7. Any herring vessel transiting a management area that is under a herring spawning closure or a 'day out' must have all of its fishing gear stowed.
8. The harvest of herring for the primary purpose of reduction to meal or meal-like product is prohibited.
9. Internal Water Processing operations will be prohibited from processing herring caught in all state waters.

VII. PRT Recommendations

State Compliance

All states with a declared interest in the management of Atlantic herring have submitted compliance reports and have regulations in place that meet or exceed the requirements of the Interstate Fisheries Management Plan for Atlantic herring as described in Amendment 3.

Request for *De Minimis* Status

A state may be eligible for *de minimis* status if its combined average of the last three years of commercial landings (by weight) constitute less than one percent of the coastwide commercial landings for the same three-year period.

New York has previously requested and met the requirements for *de minimis* status. The state's 2015-2017 combined average commercial landings (96,876 pounds) is less than 1% of coastwide commercial landings during the same three year period. As of April 2nd, staff has not received a request from New York to continue *de minimis* status

Research and Monitoring Recommendations

In addition to the research recommendations outlined in the 2018 stock assessment, the PDT has previously recommended the following research priorities. The PDT will convene in 2019 to review these research recommendations in light of those put forward from SAW/SARC 65.

Fishery-Dependent Priorities

High

- Investigate bycatch and discards in the directed herring fishery through both at sea and portside sampling.
- Continue commercial catch sampling of Atlantic herring fisheries according to ACCSP protocols

Fishery-Independent Priorities

High

- Expand monitoring of spawning components.

Low

- Continue to utilize the inshore and offshore hydroacoustic and trawl surveys to provide a fishery-independent estimation of stock sizes. Collaborative work between NMFS, DFO,

state agencies, and the herring industry on acoustic surveys for herring should continue to be encouraged.

Modeling / Quantitative Priorities

Moderate

- Conduct simulation studies to evaluate ways in which various time series can be evaluated and folded into the assessment model.
- Develop new approaches to estimating recruitment (i.e., juvenile abundance) from fishery-independent data.
- Examine the possible effects of density dependence (e.g., reduced growth rates at high population size) on parameter estimates used in assessments.

Low

- Conduct a retrospective analysis of herring larval and assessment data to determine the role larval data plays in anticipating stock collapse and as a tuning index in the age structured assessment.
- Investigate the M rate assumed for all ages, the use of CPUE tuning indices, and the use of NEFSC fall bottom trawl survey tuning indices in the analytical assessment of herring.

Life History, Biological, and Habitat Priorities

Moderate

- Continue tagging and morphometric studies to explore uncertainties in stock structure and the impacts of harvest mortality on different components of the stock. Although tagging studies may be problematic for assessing survivorship for a species like herring, they may be helpful in identifying the stock components and the proportion of these components taken in the fishery on a seasonal basis.

Low

- Research depth preferences of herring.

Management, Law Enforcement, and Socioeconomic Priorities

High

- Continue to organize annual US-Canadian workshops to coordinate stock assessment activities and optimize cooperation in management approaches between the two countries.

Moderate

- Develop a strategy for assessing individual spawning components to better manage heavily exploited portion(s) of the stock complex, particularly the Gulf of Maine inshore spawning component.
- Develop socioeconomic analyses appropriate to the determination of optimum yield.

Low

- Develop economic analyses necessary to evaluate the costs and benefits associated with different segments of the industry.

XI. Figures

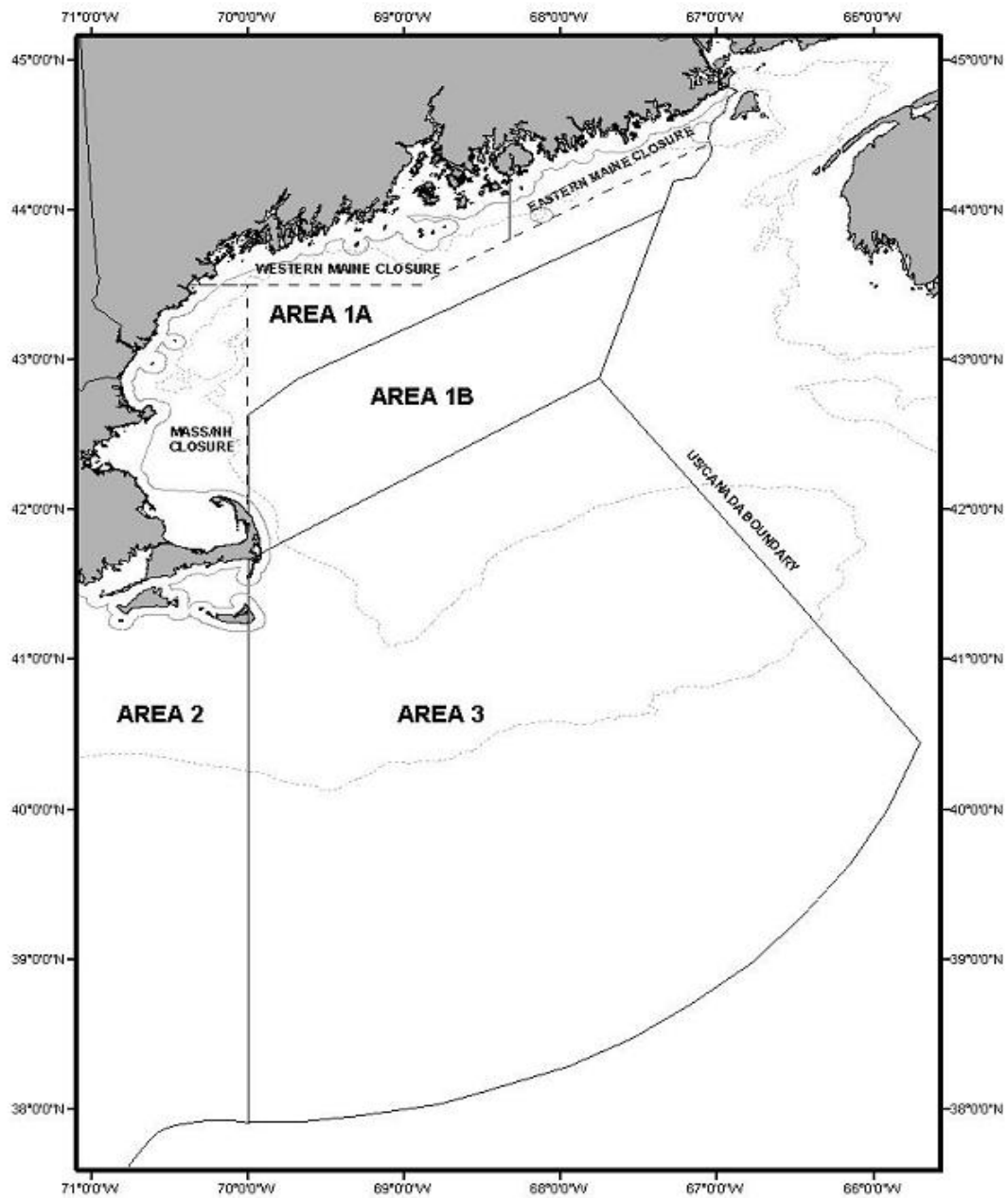


Figure 1. Map of Atlantic herring management areas with boundaries and the three spawning areas are within Area 1A, the inshore region of Gulf of Maine.

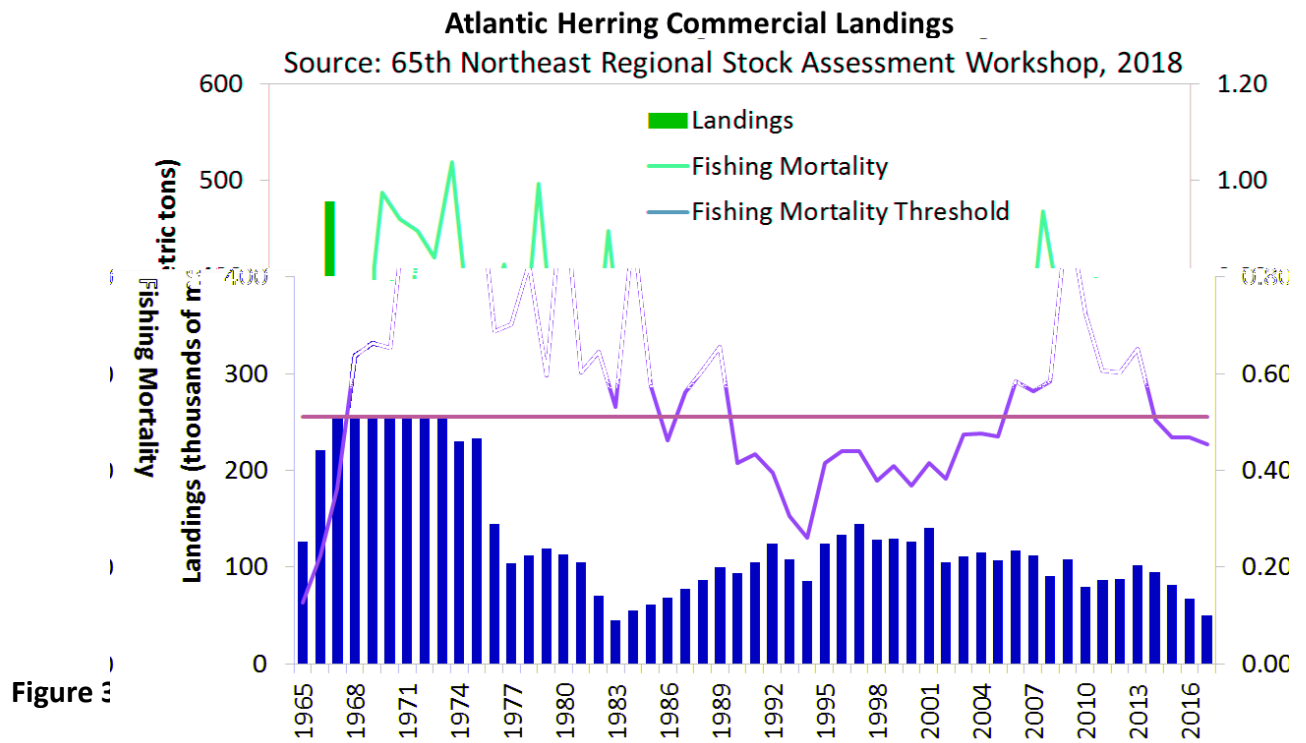
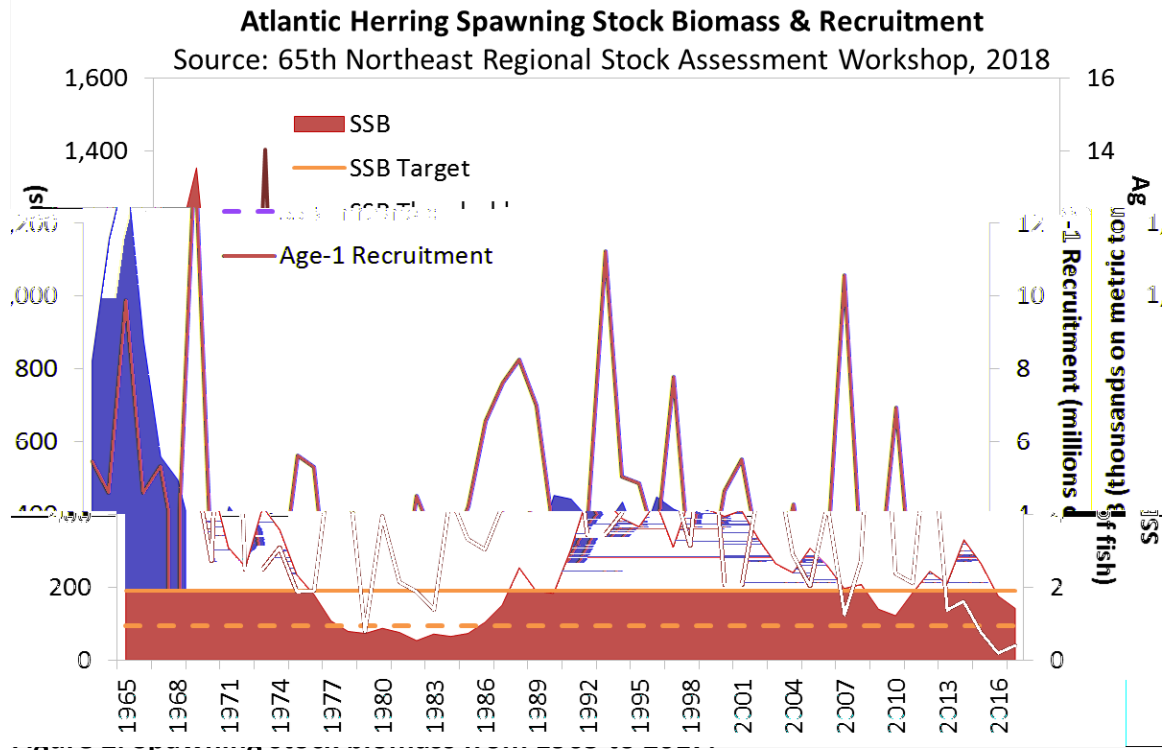


Figure 3