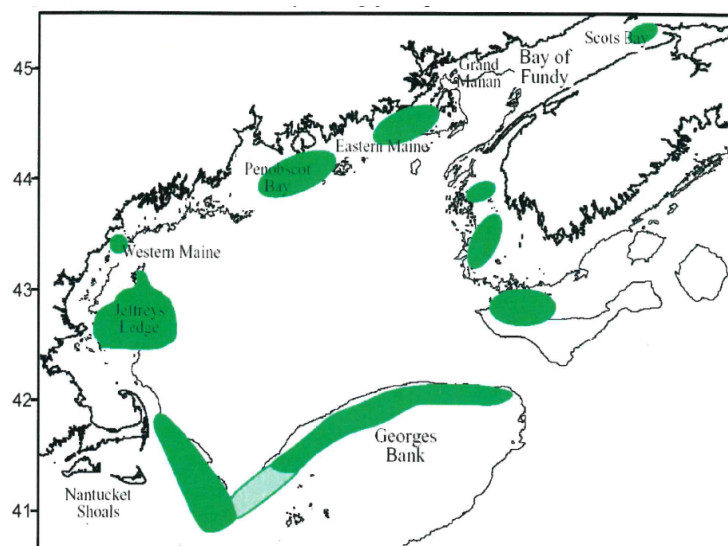


# Atlantic Herring Fishery Management Plan

## Framework Adjustment 7

Including an Environmental Assessment and  
Initial Regulatory Flexibility Analysis



**DRAFT**

**June 2021 – For Council Consideration**

Prepared by the  
New England Fishery Management Council  
In consultation with the  
National Marine Fisheries Service and the  
Mid-Atlantic Fishery Management Council



***Document history***

Initial Framework Meeting: September 2019  
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***Cover image***

Generalized view of major herring spawning areas in the Gulf of Maine and Georges Bank  
(Overholtz et al. 2004)



**FRAMEWORK ADJUSTMENT 7 TO THE  
ATLANTIC HERRING FISHERY MANAGEMENT PLAN**

**Proposed Action:** Propose measures to protect spawning of adult Atlantic herring on Georges Bank.

**Type of Statement:** Draft Environmental Assessment

**Responsible Agencies:** New England Fishery Management Council  
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**Abstract:** The New England Fishery Management Council, in consultation with NOAA National Marine Fisheries Service, has prepared Framework Adjustment 7 to the Atlantic Herring Fishery Management Plan, which includes a draft environmental assessment that presents the range of alternatives to achieve the goals and objectives of the action. The proposed action focuses on measures to protect spawning adults of Atlantic herring on Georges Bank. The document describes the affected environment and valued ecosystem components and analyzes the impacts of the alternatives on both. It addresses the requirements of the National Environmental Policy Act, the Magnuson Stevens Fishery Conservation and Management Act, the Regulatory Flexibility Act, and other applicable laws.

## 1.0 EXECUTIVE SUMMARY

This document contains the New England Fishery Management Council (Council) recommendations for the protection of Atlantic herring spawning on Georges Bank, consistent with the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Atlantic Herring Fishery Management Plan (FMP), approved by the National Marine Fisheries Service (NMFS) on October 27, 1999. In addition, this document includes information and supporting analyses required under other applicable law, including the National Environmental Policy Act (NEPA) and Regulatory Flexibility Act (RFA).

### *Proposed Action*

The Council's preferred alternative includes ...

### *Impacts of the Alternatives*

The impacts of the alternatives considered by the Council on each VEC described in the Affected Environment are in Section 7.0 and summarized in **Error! Reference source not found..** Overall, ....

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## 2.3 ACRONYMS

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
ALWTRP	Atlantic Large Whale Take Reduction Plan
AM	Accountability Measure
AP	Advisory Panel
APA	Administrative Procedures Act
ASMFC	Atlantic States Marine Fisheries Commission
B <sub>MSY</sub>	Biomass that would allow for catches equal to Maximum Sustainable Yield when fished at the overfishing threshold ( $F_{MSY}$ )
BiOp, BO	Biological Opinion, a result of a review of potential effects of a fishery on Protected Resource species
CEQ	Council on Environmental Quality
DFO	Department of Fisheries and Oceans (Canada)
DMF	Division of Marine Fisheries (Massachusetts)
DMR	Department of Marine Resources (Maine)
DPWG	Data Poor Working Group
EA	Environmental Assessment
EEZ	Exclusive economic zone
EFH	Essential fish habitat
ESA	Endangered Species Act
F	Fishing mortality rate
FEIS	Final Environmental Impact Statement
FMP	Fishery management plan
FW	Framework
FY	Fishing year
GARFO	Greater Atlantic Regional Fisheries Office
GB	Georges Bank
GIS	Geographic Information System
GOM	Gulf of Maine
HAPC	Habitat area of particular concern
HPTRP	Harbor Porpoise Take Reduction Plan
IFM	Industry-funded monitoring
LOA	Letter of authorization
MA	Mid-Atlantic
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum sustainable yield
NEMAP	Northeast Area Monitoring and Assessment Program
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NLSA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OBDBS	Observer database system
OY	Optimum yield

PDT	Plan Development Team
PRA	Paperwork Reduction Act
RFA	Regulatory Flexibility Act
RPA	Reasonable and Prudent Alternatives
SA	Statistical Area
SARC	Stock Assessment Review Committee
SAW	Stock Assessment Workshop
SIA	Social Impact Assessment
SMB	Squid Mackerel Butterfish FMP (MAFMC)
SNE	Southern New England
SNE/MA	Southern New England-Mid-Atlantic
SSB	Spawning stock biomass
SSC	Scientific and Statistical Committee
TEWG	Technical Expert Working Group
TRAC	Trans-boundary Resources Assessment Committee
VEC	Valued Ecosystem Component
VMS	Vessel monitoring system
VTR	Vessel trip report



## 3.0 INTRODUCTION AND BACKGROUND

### 3.1 PURPOSE AND NEED

*To be completed later as Council develops this action.*

### 3.2 GOALS AND OBJECTIVES

The goal of this action is to protect spawning adults of Atlantic herring and/or Atlantic herring egg mats to increase overall herring biomass. The specific measurable action, or objective of this action is to consider similar measures to ones in place in Area 1A for other spawning components of this resource (i.e., Georges Bank and Nantucket Shoals).

The goal specifically includes the term “and/or” before herring egg mats to clarify that if there is not enough information to support measures to protect adult herring or herring egg mats, the action could focus on just one. During development, the Council clarified that the scope of this action is to minimize potential impacts of the herring fishery on adult spawning aggregations only. Therefore, the measures under consideration in this action are limited to the herring fishery only and will not include restrictions on other fisheries. The Council may consider other measures to protect spawning of Atlantic herring and/or Atlantic herring egg mats from other fisheries in a separate action in the future.

## 4.0 ALTERNATIVES UNDER CONSIDERATION

### 4.1 ACTION 1 – HERRING SPAWNING CLOSURE ON GEORGES BANK

#### 4.1.1 Alternative 1 - No Action

Alternative 1 (No Action) is no specific measure to directly protect spawning of Atlantic herring on Georges Bank. There are several measures in place for other purposes that may have indirect benefits for spawning adults on Georges Bank.

*Draft Rationale:* There are several measures in place that likely have indirect benefits on spawning of Atlantic herring on Georges Bank. For example, when 90% of the herring sub-ACL in Area 3 is estimated to be caught, a herring possession limit is implemented (40,000 lb.) essentially closing the area to directed herring fishing for the remainder of the year. Under low herring sub-ACLs in particular, the Area 3 sub-ACL that includes most of Georges Bank may be harvested before the fall spawning season begins. In addition, there are bycatch catch caps in place for river herring/shad and GB haddock. If these area/gear catch caps are reached during the year, portions of GB could close to the herring fishery for the remainder of the year. Finally, there are three spawning closures within the Gulf of Maine that are implemented through the Atlantic States Marine Fisheries Commission. Because herring stock components are known to mix and these mixing rates are somewhat uncertain and variable, there may be indirect benefits on the GB sub-component if some fish remain mixed and stay within the GOM spawning closures during these seasonal closures. In summary, the measures currently in place would be considered adequate to minimize potential impacts of the herring fishery on spawning of Atlantic herring on Georges Bank.

## 4.1.2 Alternative 2 - Implement a Default Herring Spawning Closure on Georges Bank

Alternative 2 would implement a default spawning closure to all vessels on a declared herring trip to protect spawning adults of Atlantic herring on Georges Bank. Within each of the following sub-sections, the Council will identify the recommended default closure area and default season for spawning protection on Georges Bank.

*Draft Rationale:* Implementation of a spawning closure on Georges Bank is expected to improve overall herring biomass by reducing potentially negative impacts of fishing on spawning adults of this sub-component of the overall herring stock. These measures are primarily intended to protect spawning adults from harvest, as well as reduce disturbance/interaction of spawning activity, and potentially protect herring egg EFH from disturbance. Finally, these measures are intended to be a compliment to spawning closures that have been implemented under the Atlantic States Marine Fisheries Commission to protect spawning of sub-components of Atlantic herring known to occur in more inshore areas within the Gulf of Maine.

### 4.1.2.1 Spawning Closure Area

#### 4.1.2.1.1 Spawning Closure Area Option 1

Spawning Closure Area Option 1 would close two separate areas to protect spawning of Atlantic herring, the two red polygons in Figure 1. One area is about 20 nautical miles southeast of Cape Cod and the other area is on the northeast peak of Georges Bank. The specific coordinates of these areas are in Table 1. In combination, the closure would be about 3,500 km<sup>2</sup>. The spawning closure season that would have restrictions are included in Sections 4.1.2.2.

**Table 1 – Coordinates of spawning closure under consideration for Spawning Area Option 1**

Sub-area	Point	Longitude	Latitude
WGB	1	-69° 36'	40° 54'
WGB	2	-69° 36'	41° 20'
WGB	3	-69° 5'	41° 20'
WGB	4	-69° 5'	40° 54'
WGB	5	-69° 36'	40° 54'
EGB	1	-67° 32.5'	41° 49'
EGB	2	-67° 31.5'	42° 10.5'
EGB	3	-67° 9.78'	42° 10.47'
EGB	4	-67° 4.6'	42° 4.5'
EGB	5	-67° 5'	41° 49'
EGB	6	-67° 32.5'	41° 49'

*Draft Rationale:* Option 1 includes areas where three or more data layers overlap from an analysis of six existing data sets of Atlantic herring spawning information. This analysis occurred during a Council review and analysis of Atlantic herring spawning on Georges Bank before this action was developed (See

Appendix I, (NEFMC 2019)). The datasets evaluated include: the food habits database, larval monitoring dataset, Atlantic herring egg EFH, historical spawning grounds, DMR portside monitoring (maturity stage U), and fall trawl survey (maturity stage U). Straight lines were drawn around the core areas of overlap.

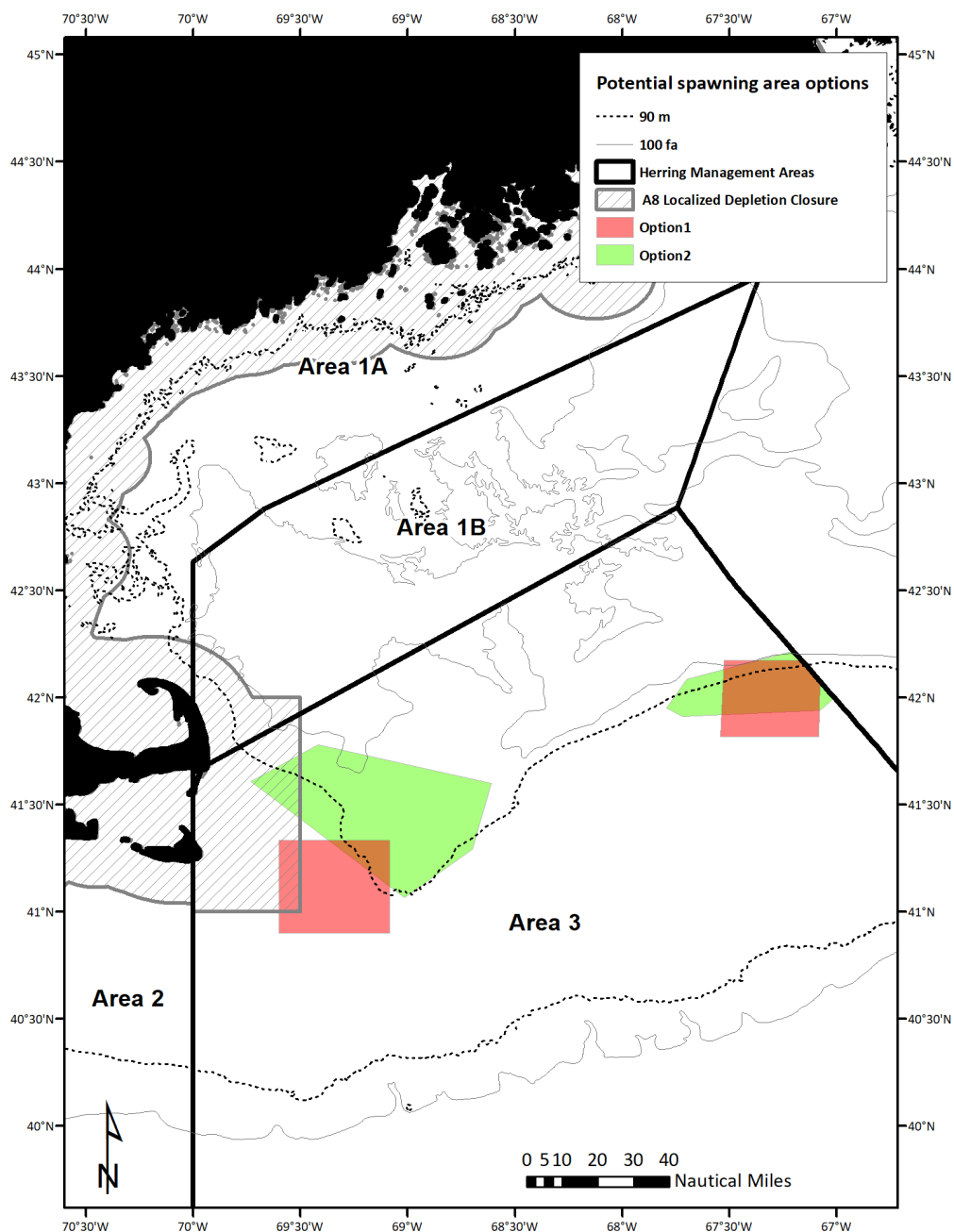
#### 4.1.2.1.2 Spawning Closure Area Option 2

Spawning Closure Area Option 2 would close two separate areas to protect spawning of Atlantic herring, the areas in green in Figure 1. One area encompasses most of the Great South Channel east of Cape Cod and the other area is on the northeast peak of Georges Bank that extends farther west than Option 1. The specific coordinates of these areas are in Table 2. In combination, the closure would be about 5,500 km<sup>2</sup>. The spawning closure season that would have restrictions are included in Sections 4.1.2.2.

**Table 2 – Coordinates of spawning closure under consideration for Spawning Area Option 2**

Sub-area	Point	Longitude	Latitude
WGB	1	-69° 25.04'	41° 46.83'
WGB	2	-68° 36.59'	41° 36'
WGB	3	-68° 41.99'	41° 17.54'
WGB	4	-69° 1'	41° 4'
WGB	5	-69° 43.98'	41° 36.5'
WGB	6	-69° 25.04'	41° 46.83'
EGB	1	-67° 41.95'	42° 5.2'
EGB	2	-67° 12.07'	42° 13.07'
EGB	3	-67° 0.5'	42° 0'
EGB	4	-67° 4.55'	41° 56.45'
EGB	5	-67° 43.22'	41° 54.68'
EGB	6	-67° 45.32'	41° 55.83'
EGB	7	-67° 47.55'	41° 57.17'
EGB	8	-67° 41.95'	42° 5.2'

*Draft Rationale:* Option 2 also uses analyses from the GB Spawning Discussion Document, but is more focused on identifying the location of spawning adults from both the NEFSC bottom trawl fall survey as well as Maine DMR portside samples of spawning adults by decade (1981 – 2018) (See Appendix I (NEFMC 2019)). Option 2 focuses on locations of adult spawning herring and recognizes spatial variation by decade, compared to the previous option which includes additional datasets including location of herring larvae, herring egg EFH, etc. This Option also identifies areas in eastern and western GB; the eastern GB area is very similar to the eastern GB in Option 1 (both about 1,500 km<sup>2</sup>); however, the western GB areas are quite different. (PDT will calculate the degree of overlap of these two areas eventually).



**Figure 1 – Potential options for GB spawning closure areas (Option 1 in red and Option 2 in green) (For reference - grey hatched area is the MWT gear prohibition area approved in Amendment 8).**

#### **4.1.2.2 Spawning Closure Season**

The spawning closure season selected in this section may be revised in a future action based on new data. In addition, if a more detailed real-time monitoring program is implemented like the one used by ASMFC for the spawning closures in the Gulf of Maine, it is possible this closure season could be modified based on real-time samples of spawning condition.

Georges Bank (GB) does not receive the same level of consistent pre-spawning fishing activity as in the GOM, making in-season monitoring and adaptive closures currently infeasible. Unless real-time monitoring of spawning on Georges Bank is developed (See Section 4.3), spawning closure seasons would likely use a fixed starting date and length.

##### **4.1.2.2.1 Spawning Closure Season Option 1 (six-week closure starting Sept 14)**

Closure Season Option 1 would close the default spawning closure area selected in Section 4.1.2.1 for six weeks, September 14 through October 25 each year. Vessels could transit the area with all fishing gear stowed but could not fish within the boundary selected during these six weeks.

*Draft Rationale:* This option is consistent with approaches used in the Gulf of Maine by ASMFC when spawning closures were recently updated in Addendum II (ASMFC 2019). Analyses of spawning herring samples from the Gulf of Maine (GOM) show that 25% of fish have begun to spawn when mean GSI equals 30, and for Atlantic herring that is when fish are about 23 cm. The length of time between when 25% of fish have begun to spawn and 25% have yet to spawn takes about 2.5 to 5 weeks. Based on these analyses, ASMFC implemented a default closure of six weeks to ensure low probability of fishery interaction with spawning.

While real-time data are not available, there are sufficient GSI samples from GB to inform the calculation of a closure date. The Herring PDT replicated the gonadal somatic index (GSI) timing analysis used in Addendum II using over 7,000 fish samples from over 270 herring trips on Georges Bank from 1998-2019 (See Appendix II for more details). Based on these analyses, September 14 is the predicted mean date that 25% of fish on Georges Bank will reach a GSI of 30, be in spawning condition.

##### **4.1.2.2.2 Spawning Closure Season Option 2 (eight-week closure starting Sept 7)**

Closure Season Option 2 would close the default spawning closure area to all vessels selected in Section 4.1.2.1 for eight weeks, September 7 through November 1 each year. Vessels could transit the area with all fishing gear stowed but could not fish within the boundary selected during these eight weeks.

*Draft Rationale:* This eight-week option better accounts for interannual variability and the inability to conduct in-season adaptive closures (See Figure 2.3.1 in Appendix II). Option 1 is based on means, but there is variation from year to year and Option 2 would be more precautionary since in-season monitoring of GSI is not currently available for trips throughout the range of the fishery, as it is in the Gulf of Maine. Furthermore, herring egg mats are thought to remain on the ocean floor for about 15 days after spawning. The additional two weeks could increase protection of herring eggs from impacts of any benthic fishing gear used on herring trips.

## 4.2 ACTION 2 - POSSESSION OF SPAWNING ADULT ATLANTIC HERRING

### 4.2.1 Alternative 1 - No Action

Alternative 1 (No Action) would have no limit on possessing or landing herring that are in spawning condition. Many vessels avoid spawning fish for a variety of reasons, but there are no restrictions on possessing or landing herring that are in spawning condition. This alternative would continue to allow vessels to possess and land herring in spawning condition.

**Rationale:** Most vessels avoid landing spawning herring, they are generally lower quality and less desirable for the bait market. Therefore, the need to prohibit possession or landing of spawning fish has not been necessary to date. Catch data show that less than 3% of all MWT catch sampled on Georges Bank from 1971-2018 was in spawning condition, adult herring with GSI values greater than stage 3 (NEFMC, 2019). Herring in stage 4 is considered maturing, and herring in stages 5 and 6 are considered mature, ripe, and running adults. Historically, spawning tolerances have been used in this fishery through the ASMFC management plan, with some undesirable impacts such as increased regulatory discards and enforcement and monitoring challenges.

### 4.2.2 Alternative 2 - Implement an individual herring spawning tolerance possession limit per vessel

Any vessel may fish for, take, land, or possess “spawn” herring, as identified below, from or within the spawning tolerance area defined below if such herring comprise less than 20% (by volume) of the herring possessed onboard at any time. “Spawn” herring shall be identified as Atlantic herring in ICNAF gonadal stages V and VI.

Any herring vessel having onboard spawn herring  $\geq 20\%$ , which were caught outside of a spawning tolerance area, may transit the area only if all of its fishing gear has been stowed.

An incidental bycatch allowance of up to 2,000 pounds of herring per trip for non-directed fisheries shall be in place in the spawning tolerance area. This bycatch allowance will not be subject to the tolerance provision, i.e. vessels may land “spawn” herring as long as said vessel lands no more than 2,000 pounds. The amount of herring landed by one vessel in a day, as a bycatch allowance, shall not exceed 2,000 pounds (this prohibits a vessel from making multiple trips in one day to land more than the bycatch allowance). A trip shall be based on a calendar day basis.

*Draft Rationale: A spawning tolerance up to 20% of total catch may provide more flexibility for the industry compared to a spawning closure if vessels can successfully target non-spawning fish from areas within spawning closures. Furthermore, once an area closes, there is no data from that space and time, no trips would be sampled from within a spawning closure area to provide a full picture of spawning activity on Georges Bank, while a trip under a spawning tolerance could still be sampled and provide more data about spawning activity on Georges Bank. A similar tolerance program was in place by ASMFC preceding the spawning closures that are now in effect. There is no scientific rationale for 20%, it is the value that was used in the past and likely represents a reasonable threshold for vessels to practically stay under in a high-volume fishery. This value is expected to incentivize fishing behavior that will discourage fishing in areas with spawning adults but provides some tolerance that is needed in higher volume fisheries.*

Note: The PDT recommends this alternative *not* be included in this action; multiple concerns raised about the feasibility of monitoring and enforcing an individual spawning possession limit.

### 4.2.3 Alternative 3 - Implement a herring spawning tolerance possession limit that triggers a fleetwide spawning closure

#### *Alternative still under development*

Herring trips will be monitored in season and once NMFS determines that ??? [three or more offloads] have more than ??? [20%] of total herring in spawning condition an area will close to the herring fishery for the remainder of the spawning season.

- What area? Same as options already developed?
- What season? Same as options already developed?
- Is three or more trips the most appropriate threshold?
- Maybe 20% threshold is not the best trigger to use here?
- What would the monitoring program look like? Would it have to be fleetwide, is it ok if all vessels are trips are not monitored? Could the IFM program be expanded to include biological sampling of catch to estimate spawning condition? Could the federal port sampling program be expanded to monitor spawning condition of commercial catch?

An incidental bycatch allowance of up to 2,000 pounds of herring per trip for non-directed fisheries shall remain in place if a spawning tolerance closure is implemented. This bycatch allowance will not be subject to the tolerance provision, i.e. vessels may land “spawn” herring as long as said vessel lands no more than 2,000 pounds. The amount of herring landed by one vessel in a day, as a bycatch allowance, shall not exceed 2,000 pounds (this prohibits a vessel from making multiple trips in one day to land more than the bycatch allowance). A trip shall be based on a calendar day basis.

Note: The PDT recommends that if in-season monitoring is feasible in the near term the trigger should be modeled after the in-season spawning closure program used in the GOM, not based on 20% tolerance. The program used in the GOM is based on measuring gonad mass of female herring (GSI30 protocol); it has been tested and adjusted over time. The GSI30 protocol is likely more feasible and less expensive compared to monitoring a 20% tolerance per trip for the entire fishery.

- **Background on GOM spawning closures**

Under ASMFC Amendment 3, spawning aggregations in the Gulf of Maine are protected using spawning closures. These closures prohibit directed fishing during specific times of the year in three distinct areas: Eastern Maine, Western Maine, and Massachusetts/New Hampshire (ASMFC 2016). The implementation of the spawning closures is determined by the GSI30 protocol. For female herring, GSI is a calculation of the gonad (ovary) mass as a proportion of the total body mass and it is used to measure herring maturity. Per the GSI30 protocol, three or more samples of herring, either from fishery independent or dependent sources, are used to model the relationship between GSI and date and forecast the timing of spawning. Given larger herring spawn first, the GSI values are standardized to a 30 cm fish to ensure protection of the majority of the population. If there are insufficient samples in a given year and area to forecast the timing of spawning, a default closure date is used. This default date is derived from historical GSI samples over the last decade as well as applicable literature. The initiation of a spawning closure is determined by a trigger value established in Amendment 3.



The relationship between GSI and the date is monitored as the season progresses and compared to the trigger value; when GSI is projected to exceed the trigger value, a spawning closure is implemented. Generally, a higher trigger value closes the fishery later and closer to spawning while a lower trigger value provides additional protection to maturing fish by encompassing time before the spawning season begins. Through Amendment 3, the Section implemented a GSI trigger value of 25 which sought to close the fishery in the later stages of maturity but just before spawning. Under Amendment 3, the length of a spawning closure is initially set at four weeks. A closure can be extended by two weeks if a sample taken from the area indicates a significant number of spawning herring. A ‘significant number’ of spawn herring is defined as 25% or more mature herring, by number in a sample, that have yet to spawn. To qualify, a sample must have a minimum of 80 randomly selected adult sized fish. A full copy of the spawning closure protocol can be found in Section 4.2.6 of Amendment 3.

In April 2019, the ASMFC Herring Board approved Addendum II to strengthen spawning protections in Area 1A by initiating a closure when a lower percentage of the population is spawning (from approximately 25% to 20%) and extending the closure for a longer time (from four weeks to six weeks). The Addendum also modified the trigger level necessary to reclose the fishery, with the fishery reclosing when 20% or more of the sampled herring are mature but have not yet spawned. These changes to spawning protections were implemented in response to the results of the 2018 Benchmark Stock Assessment which showed reduced levels of recruitment and spawning stock biomass (ASMFC, 2019).

## **4.3 ACTION 3 – SPAWNING AVOIDANCE PROGRAM / IN-SEASON MONITORING WITH TRIGGER BASED SPAWNING CLOSURE**

*Alternative still under development.*

The Committee passed a motion in February 2021 tasking the PDT explore an alternative that would implement a portside sampling program that would monitor catch. If catch exceeds a certain threshold, a specified area closes to the herring fishery.

In June 2021, the Committee passed another motion requesting a joint meeting of the Herring AP and Herring PDT to further develop alternatives for this action. Specifically, the group should discuss feasibility of in-season monitoring as it relates to development of a potential spawning tolerance alternative for consideration in Framework 7.

The Committee discussed that more time is needed to explore these complex questions. With low quotas expected in the near term there will likely be very little fishing activity offshore, especially later in the year during spawning season. One idea suggested for consideration is allowing vessels to fish in predefined spawning areas but require human observers to access the area during spawning (Sept 1 – October 31). During the fishing season if a specified number of trips are observed over the acceptable tolerance level then predefined spawning areas would close to the fishery for the remainder of the spawning season.

## **4.4 ACTION 4 - REQUIRED REVIEW PROGRAM**

### **4.4.1 Required Review Alternative 1 - No Action**

Alternative 1 (No Action) would not require the Council to complete a specific review of any measures implemented by this action to protect spawning of Atlantic herring on Georges Bank.



*Draft Rationale:* If any measures to protect Atlantic herring spawning on Georges Bank are implemented by this action, the Council would always have the flexibility to complete a review, but a review would not be required within a specific timeframe or for a stated purpose.

## **4.4.2 Required Review Alternative 2 - Implement a required review of the measures implemented in this action**

### **4.4.2.1 Required review of spawning closure areas**

Alternative 2 would develop a regular, strategic process to review the effectiveness of any spatial spawning closure areas that may be adopted in this action. The boundaries, scope, characteristics, and timing of spawning protection areas would be evaluated. The PDT shall prepare a technical review that evaluates the performance of spawning protection areas. This review will be completed at either:

Option A: 10-year intervals following implementation of spawning protection areas; or

Option B: several years (<5 years) after herring biomass is declared rebuilt (biomass above Bmsy).

The review and associated written report will be prepared using relevant available science and data to show whether the areas are meeting the objectives and advise the Council whether changes are warranted. Development of this technical review and report may be aided through review of new research and data, independent evaluation, a workshop convened by the Council, consultation with Council technical teams, and/or peer review by the Council's Scientific and Statistical Committee or the Center for Independent Experts. The review process is intended to be flexible and somewhat general but would include establishing metrics and indicators of how effective the spawning protection areas are.

This review should consider but is not limited to the following questions:

- How well does the timing of spawning coincide with the spawning closure areas?
- Does fishing disrupt spawning activity (apart from the effect of removing spawners)?
- Have the closed areas improved stock-wide recruitment?
- What is the variability of spawning activity (location and timing) over time?
- Are spawning closures as configured able to protect spawning activity, given this variability?
- Have new sub-populations of spawners been identified that require specific protection?
- Has the fishery changed behavior as a result of these measures? Has that had any biological or economic impacts? Have there been any unintended consequences?
- Has the monitoring and enforcement of the spawning protection area been adequate?

Based on this review, the Council may choose to initiate a framework adjustment to change spatial spawning protections. In addition, the Council could identify and periodically revise research priorities to improve spawning area monitoring.

*Draft Rationale:* This option would require the Council complete a review of any spawning closure area measures adopted in this action. At some point in the future, the Council is committing to reviewing and evaluating the effectiveness of any spawning closure areas approved in this action. This review could serve as the basis for future revisions.

#### 4.4.2.2 Required review of spawning tolerance measure

This alternative would develop a regular, strategic process to review the effectiveness of a spawning tolerance measure, if adopted in this action. The PDT shall prepare a technical review that evaluates the performance of the spawning tolerance measures. This review will be completed at either:

Option A: 10-year intervals following implementation of the spawning tolerance measures; or

Option B: several years after herring biomass rebuilds above  $B_{msy}$  ( $< 5$  years after  $B > B_{msy}$ ).

The review and associated written report will be prepared using relevant available science and data to show whether or not the measure is the objectives and advise the Council whether changes are warranted. Development of this technical review and report may be aided through review of new research and data, independent evaluation, a workshop convened by the Council, consultation with Council technical teams, and/or peer review by the Council's Scientific and Statistical Committee or the Center for Independent Experts. The review process is intended to be flexible and somewhat general but would include establishing metrics and indicators of how effective the spawning tolerance measure is.

This review should consider but is not limited to the following questions:

- Has the monitoring and enforcement of the spawning tolerance measure been adequate?
- How has compliance been with the spawning tolerance measure?
- Are there noticeable differences in proportion of catch with spawning fish by gear, area and season?
- Does fishing disrupt spawning activity (apart from the effect of removing spawners)?
- Has stock-wide recruitment improved since adoption of this measure?
- Has the fishery changed behavior as a result of these measures? Has that had any biological or economic impacts? Have there been any unintended consequences?

Based on this review, the Council may choose to initiate a framework adjustment to change the spawning tolerance measure. In addition, the Council could identify and periodically revise research priorities to improve monitoring of Atlantic herring spawning.

*Draft Rationale:* This option would require the Council complete a review of any spawning tolerance measure adopted in this action. At some point in the future, the Council is committing to reviewing and evaluating the effectiveness of any spawning tolerance measure approved in this action. This review could serve as the basis for future revisions.

## 5.0 ALTERNATIVES CONSIDERED BUT REJECTED

## 6.0 AFFECTED ENVIRONMENT

## 7.0 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

## 8.0 REFERENCES

- ASMFC. (2019). *Addendum 2 to Amendment 3 to the Atlantic Herring Interstate Fishery Management Plan*. Arlington, VA: Atlantic States Marine Fisheries Commission. 29 p.  
<http://www.asmfc.org/uploads/file/5cddb296Atl.HerringDraftAddendumIIFinalApprovedRevised.pdf>.
- NEFMC. (2019). *Review and analysis of Atlantic herring (Clupea harengus) spawning on Georges Bank, 2019 Discussion Document for the New England Fishery Management Council*. Newburyport, MA: New England Fishery Management Council. 92 p.  
[https://s3.amazonaws.com/nefmc.org/2\\_Herring-Spawning-Review-191122.final.pdf](https://s3.amazonaws.com/nefmc.org/2_Herring-Spawning-Review-191122.final.pdf).
- Overholtz WJ, Jacobson LD, Melvin GD, Cieri M, Power M, Libby DA & Clark K. (2004). *Stock assessment of the Gulf of Maine – Georges Bank Atlantic herring complex, 2003*. U.S. Department of Commerce. NEFSC Reference Document 04-06.