

# Atlantic Herring Fishery Management Plan

## Framework Adjustment 8 and 2021-2023 Atlantic Herring Fishery Specifications

Including an Environmental Assessment and  
Initial Regulatory Flexibility Analysis



**DRAFT**

**September 2020**

**(New alternatives in Green)**

Prepared by the  
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### 1.3 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 <sub>MSY</sub> )
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)
EA	Environmental Assessment
EEZ	Exclusive economic zone
EFH	Essential fish habitat
ESA	Endangered Species Act
F	Fishing mortality rate
FMP	Fishery management plan
FW	Framework
FY	Fishing year
GARFO	Greater Atlantic Regional Fisheries Office
GB	Georges Bank
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
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
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

## 2.0 INTRODUCTION AND BACKGROUND

### 2.1 PURPOSE AND NEED

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

### 2.2 GOALS AND OBJECTIVES

This action has two goals. First, the 2021-2023 Atlantic herring fishery specifications are intended to meet the overall goal of the Atlantic Herring FMP, as modified in Amendment 1 to, “manage the Atlantic herring fishery at long-term sustainable levels consistent with the National Standards of the Magnuson-Stevens Fishery Conservation and Management Act.”

The specific measurable actions, or objectives identified to achieve the primary goal of this action were also defined in Amendment 1. Specifically, the stated objectives for setting specifications in this FMP are to: harvest the resource consistent with the definition of overfishing; prevent overfishing of discrete spawning components; avoid adverse effects on the age structure of the stock; optimize yield; minimize the race to fish; provide opportunities in other fisheries; promote and support research; promote compatible U.S. and Canadian management of this stock; and continue close coordination with other federal, state, and ASMFC management plans and promote real-time management of the fishery.

The secondary goal of this action is to consider adjustments to the herring plan that potentially inhibit the mackerel fishery from achieving optimum yield. The specific measurable actions, or objectives for the secondary goal of this action are: 1) consider an increase in the incidental herring possession limit up to 40,000 pounds; and 2) modify the seasonal closure of Area 1B, which is currently closed January through April.

## 3.0 ALTERNATIVES UNDER CONSIDERATION

### 3.1 2021-2023 ATLANTIC HERRING SPECIFICATIONS WITH ALTERNATIVES

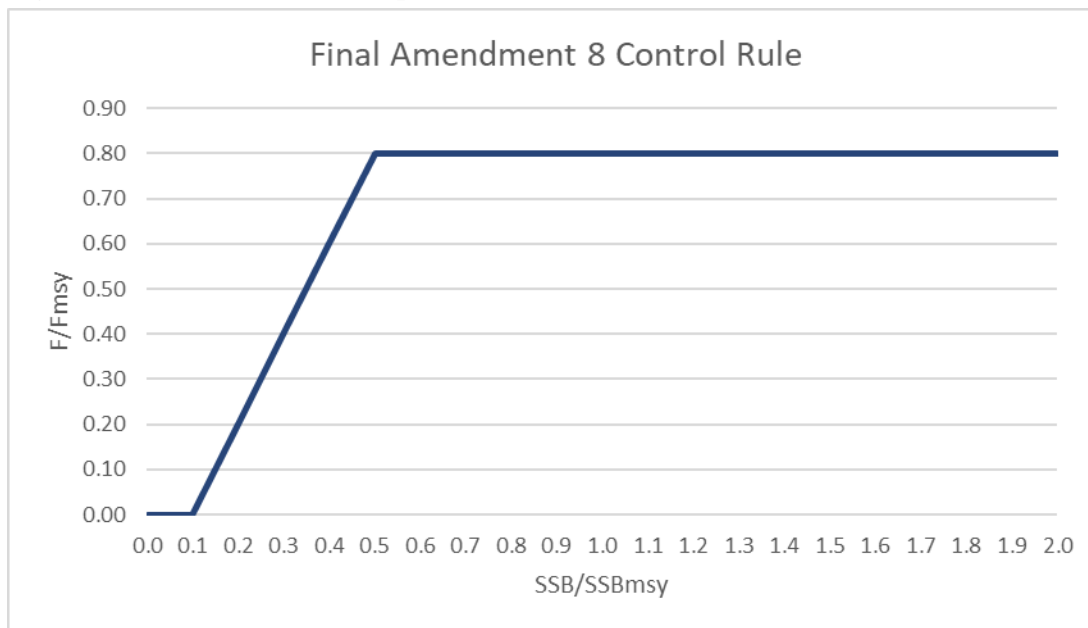
#### 3.1.1 Overfishing Limit and Acceptable Biological Catch

The SSC met July 29, 2020 and provided overfishing limit (OFL) and acceptable biological catch limit (ABC) recommendations for this action using the Amendment 8 ABC control rule (approved in November 2019), (See Appendix I).

***Amendment 8 ABC control rule:*** *The control rule is biomass-based, when biomass is greater than 0.5 for the ratio of  $SSB/SSB_{MSY}$ , the maximum fishing mortality allowed is 80% of  $F_{MSY}$ , so 20% of  $F_{MSY}$  is left for herring predators. Under this policy as biomass declines, fishing mortality declines linearly, and if biomass falls below 0.1 for the ratio of  $SSB/SSB_{MSY}$ , then ABC is set to zero, no fishery allocation (Figure 1).*

*Amendment 8 also implemented that ABC should be set for three years but with annual application of the control rule. This allows ABC to vary between years within a three-year period, the ABC may not be constant if biomass is projected to change during a specification timeframe.*

**Figure 1. ABC control rule adopted in Amendment 8.**



### 3.1.1.1 No Action OFL/ABC (Alternative 1)

No Action (Alternative 1) would maintain the 2021 Atlantic herring fishery specifications that were implemented by Framework 6 (Table 1). Specification of Atlantic herring ABC would be 16,131 mt for all three fishing years, which is higher than the SSC recommendation (Table 2).

**Table 1. OFL/ABC Alternative 1 (No Action) for 2021-2023 Atlantic herring specifications**

Year	OFL (mt)	ABC (mt)
2021	69,064	16,131
2022	69,064	16,131
2023	69,064	16,131

*Rationale:* No Action would maintain the same OFL and ABC values implemented under Framework 6. This would provide more stability for the fishery but would include OFL and ABC values above levels recommended by the SSC and would not be based on the best available data using more updated information.

### 3.1.1.2 OFL and ABC consistent with the Amendment 8 ABC control rule (Alternative 2)

Alternative 2 would implement the OFL and ABC consistent with the ABC control rule that was approved in Amendment 8, described in more detail in Section 3.1.1. These OFL and ABC recommendations were reviewed and approved by the SSC (Table 2).

**Table 2. OFL/ABC Alternative 2 for 2021-2023 Atlantic herring specifications (SSC Recommendation)**

<b>Year</b>	<b>OFL (mt)</b>	<b>ABC (mt)</b>
2021	23,423	9,483
2022	26,292	8,767
2023	44,600	8,767

*Rationale:* Alternative 2 would set OFL and ABC consistent with the ABC control rule approved in Amendment 8 but maintaining the ABC for 2022 for 2023 as well. The original projection for 2023 ABC was 11,025 mt; however, the SSC recommended the ABC for 2023 be reduced to better address scientific uncertainty (See SSC Memo for more details – Appendix I).

In summary, the SSC was prepared to implement the harvest control rule selected through the Amendment 8 MSE process. However, the SSC had reservations about the projections for Atlantic herring and were concerned about the assumptions regarding future recruitment. The SSC considered that the projected increase in biomass in 2023 was uncertain and were concerned about setting ABC based on this value. In addition, the SSC supported the NEFMC’s and NEFSC’s intent to conduct a management track assessment in 2022; therefore, 2023 values could be revised based on verified estimates of recruitment and projections.

### **3.1.2 Management Uncertainty and Annual Catch Limit**

The difference between the Atlantic herring ABC and the stock-wide annual catch limit (ACL) equates to what the Council specifies as management uncertainty. Beyond the precaution inherent to the ABC control rule, the management uncertainty specification further ensures that Atlantic herring catch will not exceed the ABC in a given year by buffering against uncertainty related to the management system. Management uncertainty is deducted from the ABC to derive a stock-wide ACL, which is the U.S. Atlantic herring optimum yield (OY).

During the 2019-2021 specifications process, the Council considered a range of deductions for management uncertainty based on three possible factors:

1. Canadian catch of Atlantic herring (New Brunswick (NB) Weir Fishery);
2. Uncertainty around estimates of state waters Atlantic herring catch; and
3. Uncertainty around estimates of Atlantic herring discards.

The potential sources of management uncertainty were reviewed for this action and it was determined that the same three sources likely encompass most of the management uncertainty in this fishery. After the options are described below there is a summary table comparing the alternatives under consideration (Table 3). Section ??? summarizes estimated catch levels for these sources of uncertainty and includes more detail about these aspects of the FMP.

#### **3.1.2.1 Management uncertainty options and associated ACLs**

##### **3.1.2.1.1 No Action management uncertainty buffer used in FY2020 (Option 1 - 4,560 mt)**

Under No Action, the management uncertainty buffer used in FY2020 would be implemented again for 2021-2023, 4,560 mt. That amount would be subtracted from the ABC to produce the fishery-wide ACL.



*Rationale:* The No Action alternative for management uncertainty is the allocation used in the previous specifications package. This value was calculated by taking the last ten years of NB weir catch to determine a potential management uncertainty buffer. NB weir catch has been very variable over the years with some high catches followed by lower catches. When this option was selected in Framework 6 the Council identified this alternative as preferred because there did not seem to be an apparent trend in recent NB weir catches; therefore, using more years could better capture the variability. While 2018 catch levels were relatively high for recent years, above 11,000 mt., at the time, the Council is not aware of any information to suggest this would happen again in 2019 or 2020. There have been high catches in the past as well that were not followed by high catches in subsequent years. This buffer is larger than all NB weir catch from the last ten years except for three years (2018, 2013 and 2010).

#### **3.1.2.1.2 3-year average (2017-2019) (Option 2 – 6,244 mt)**

The management uncertainty buffer for 2021-2023 would be based on the most recent 3-year average (2017-2019) catch totals from the NB weir fishery (Table 31), 6,244 mt. That amount would be subtracted from the ABC to produce the fishery-wide ACL.

*Rationale:* This alternative is based on the same *method* used to set the management uncertainty buffer in earlier specification packages, 3-year average of NB weir catch from the most recent three years available (2017-2019). Using the 3-year average as the management uncertainty buffer would be 6,244 mt, which is higher than the No Action alternative of 4,560 mt. This buffer is also larger than the annual NB weir catch from each of the last ten years except for three years (2018, 2013 and 2010).

#### **3.1.2.1.3 5-year average (2015-2019) (Option 3 – 4,587 mt)**

The management uncertainty buffer for 2021-2023 would be based on the most recent 5-year average (2015-2019) catch totals from the NB weir fishery (**Table 31**), 4,587 mt. That amount would be subtracted from the ABC to produce the fishery-wide ACL.

*Rationale:* This alternative uses the last five years of NB weir catch to determine a potential management uncertainty buffer. A five-year option was considered in previous action as well but was not selected. NB weir catch has been very variable over the years with some high catches followed by lower catches. This alternative is larger than the annual NB weir catch for over half of the last ten years, with several years above 4,587 mt (2018, 2013, and 2010).

#### **3.1.2.1.4 10-year average (2010-2019) (Option 4 – 4,669 mt)**

The management uncertainty buffer for 2021-2023 would be based on the most recent 10-year average (2010-2019) catch totals from the NB weir fishery (**Table 31**), 4,669 mt. That amount would be subtracted from the ABC to produce the fishery-wide ACL. The range of alternatives under consideration for management uncertainty are summarized in Table 3.

*Rationale:* This alternative uses the last ten years of NB weir catch to determine a potential management uncertainty buffer. This alternative produces a value in the middle of other options considered. NB weir catch has been very variable over the years with some high catches followed by lower catches. The Council selected this method as preferred in the last specifications package (2019-2021) because there is no apparent trend in recent NB weir catches; therefore, using more years could better capture the variability. This buffer is larger than all NB weir catch from the last ten years except for three years (2018, 2013 and 2010).

**Table 3. Management uncertainty buffer options for 2021-2023**

Management Uncertainty Option	Herring catch (mt)
No Action (Option 1)	4,560
3-year average (Option 2)	6,244
5-year average (Option 3)	4,587
10-year average (Option 4)	4,669

***Trigger values for reallocation of unused quota to Area 1A***

There is a provision in the Herring FMP that allows NMFS to reallocate 1,000 mt from the management uncertainty buffer to Area 1A if NMFS determines that the New Brunswick weir fishery lands less than a specified amount through October 1. The associated trigger, or specified amount varies based on the management uncertainty buffer option selected. The associated triggers for each option are in Table 4 and were calculated using the same ratio as a previous trigger and management uncertainty buffer (4,000 mt / 6,200 mt has a ratio of 0.645). These are not alternatives, the trigger associated with each management uncertainty buffer option is summarized in Table 4, the trigger values would not mix and match with the various management uncertainty buffer options. If estimated landings in the New Brunswick weir fishery are less than the appropriate trigger before October 1, NMFS will add 1,000 mt to Area 1A available catch through a *Federal Register* notice. The stock-wide ACL and Area 1A sub-ACL would remain in place.

**Table 4. Trigger values associated with each management uncertainty buffer option in this action.**

	No Action	3-year Option	5-year Option	10-year Option
<b>Uncertainty buffer value (mt)</b>	4,560	6,244	4,587	4,669
<b>Trigger (mt)</b>	2,942	4,027	2,959	3,012
<b>Rollback (mt)</b>	1,000	1,000	1,000	1,000

**3.1.3 Border Transfer**

The Border Transfer (BT) specification is U.S.-caught herring transshipped to Canada via Canadian carrier vessels and used for human consumption. This specification is not a set-aside; rather, it is a maximum amount of Atlantic herring caught by U.S. vessels from Area 1A that can be transshipped to Canadian vessels for human consumption. GARFO tracks BT utilization through a separate dealer code. Note that setting border transfer at a value above 0 does not require that such transfers occur, but it provides the possibility for transfer, as opposed to, for example, selling the herring for bait.

**3.1.3.1 No Action – maintain border transfer at 100mt (Alternative 1)**

Alternative 1 (No Action) would set border transfer at 100 mt for FY2021-2023. If selected, U.S. vessels would be permitted to transfer up to 100 mt of herring to Canadian vessels at-sea.

*Rationale:* While this specification has traditionally been set at 4,000 mt, for the 2019-2021 specifications the Council felt that level was too high under the recent quota levels. The Council selected 100 mt as the preferred alternative for 2019-2021. It was discussed that while this activity has not occurred in recent years (Table ???), it has been a traditional part of the U.S. herring fishery and is important for positive

trade relations between several U.S. and Canadian seafood companies. The Council recognized that this activity may not take place because the incentives to export herring for food may not be strong because of expected high domestic bait prices, but the Council wanted to help maintain positive trade relations between Canada and the U.S. and recognize this historical part of the fishery in some way by setting the limit above 0 mt.

The Council recommended border transfer be set to 0 mt in the 2019 in-season action. Overall quotas were being reduced substantially from about 50,000 mt to 15,000 mt so it was desirable to preserve as much herring as possible for the bait market in the U.S., compared to potentially transferring some herring to Canadian vessels at sea for the food market. The incentive for border transfer is not currently available and not likely to occur.

### **3.1.3.2 Set border transfer at 0 mt or up to 250 mt (Alternative 2)**

This alternative would allow border transfer to be set at 0mt or up to 250 mt for 2021-2023. If selected, and greater than 0mt, U.S. vessels would be allowed to transfer herring to Canadian vessels that have a permit for this activity. Vessels would be subject to additional reporting requirements for border transfer. At final action, the Council will need to specify what border transfer would be between 0mt and 250mt, the value could vary between years.

*Rationale:* This alternative is more flexible than No Action because it would enable the Council to select a lower border transfer value than Alternative 1 (100mt) or a slightly higher allocation, up to 250 mt. Incentives are still low to transfer fish to Canadian vessels, but this alternative provides that ability, or it could be set at zero to prevent border transfer.

### **3.1.4 Research Set-Aside**

The Research Set-Aside (RSA) program is a competitive grants process administered by the Northeast Fisheries Science Center. Proposals are requested for research, and incoming proposals are reviewed and ranked by a technical body. With competitive grants awarded through this process, different entities will apply. In the past, the Council has allocated either 0% or 3% of the sub-ACL for each management area for the RSA program. The regulations allow a set-aside of up to 3% in any or all herring management areas. The most recent specifications, FY2019-2021, deducted 3% of each sub-ACL for the RSA program and identified four research priorities: portside sampling, river herring bycatch avoidance, electronic monitoring, and research to support herring stock assessments.

#### **3.1.4.1 RSA allocation of 3% of each sub-ACL (No Action – Alternative 1)**

This alternative would allocate 3% of each sub-ACL for the research set-aside program (FY2021-2023).

Table 5 summarizes the range of possible RSA allocations at 3% of the ACL when combined with OFL/ABC Alternative 2 (applying the ABC control rule). With OFL/ABC Alternative 2 the range of possible RSA allocations would be about 97 mt to 148 mt for 2021 and about 76 mt to 126 mt for 2022 and 2023, depending on which options is selected for management uncertainty. The larger the management uncertainty buffer, the smaller the remaining ACL, thus RSA allocations are lower. If No Action (Alternative 1) for OFL/ABC is selected, RSA allocations would be larger since the total ACL is larger.

*Rationale:* The RSA program can be useful and provide important information about the herring resource and monitoring of this fishery when the set-aside can be effectively harvested. Improving overall data collection can improve the management of the herring resource.

### 3.1.4.2 RSA allocation of 3% of each sub-ACL for FY2021, and 0% for FY2022 and FY2023 (Alternative 2)

This alternative would allocate 3% of each sub-ACL for FY2021, but 0% for FY2022 and 2023. Table 5 summarizes the range of possible RSA allocations at 3% of the ACL for OFL/ABC Alternative 2 (applying the ABC control rule). RSA Alternative 2 is the column to the far right of that table (about 97 mt – 148 mt for 2021 depending on the various management uncertainty buffers under consideration, and 0mt for 2022 and 2023).

*Rationale:* An RSA award has already been granted for FY2021-2023 so this alternative would provide set-aside to support that previously approved project. However, with recent quota reductions it has proven more difficult to harvest RSA in recent years and if quota goes unharvested it reduces opportunities for the herring fishery overall. The Council recently conducted a review of all RSA programs in this region and the report highlighted several modifications that could be made to the program to improve effectiveness. Also, herring specifications are currently being set every two years, and Herring RSA awards have recently been granted on three years cycles. Taking a temporary pause in the program may provide time to better sync up the RSA program with the specifications cycle, and potentially address other issues with the herring RSA program. Future specifications packages can adjust these percentages up to 3%, including a set-aside for FY2023 since the next package will cover fishing years 2023-2025.

**Table 5. Range of potential RSA allocations under consideration combined with Alternative 2 for OFL/ABC and Options 1 and 2 for management uncertainty**

Year	OFL	ABC	Management Uncertainty Buffer Options	ACL = DAH	Area 1A (28.9%)	Area 1B (4.3%)	Area 2 (27.8%)	Area 3 (39%)	RSA (No Action)	RSA (Alt.2)
2021	23,423	9,483	4560	4,923	1,423	212	1,369	1,920	148	148
			6244	3,239	936	139	900	1,263	97	97
2022	26,292	8,767	4,560	4,207	1,216	181	1,170	1,641	126	0
			6,244	2,523	729	108	701	984	76	0
2023	44,600	8,767	4,560	4,207	1,216	181	1,170	1,641	126	0
			6,244	2,523	729	108	701	984	76	0

## 3.2 SUMMARY OF SPECIFICATIONS ALTERNATIVES UNDER CONSIDERATION

This section is not a separate alternative, it combines several alternatives from above to illustrate the combination of several alternatives together. Table 6 summarizes the potential specifications under consideration for all measure combined, including the total ACL and sub-ACLs for each combination. There are two alternatives for OFL/ABC (Section 3.1.1) and four alternatives for the management uncertainty buffer (Section 3.1.2.1). It is important to note that set-asides have not been removed from these sub-ACLs yet. After final sub-ACLs a fixed gear set-aside is removed from the Area 1A sub-ACL. In this case the Council recommends that remain at 30mt. If that is not harvested by November 1, it automatically reverts to the Area 1A sub-ACL. Furthermore, RSA would be removed before final sub-ACLs are allocated to the fishery. This action is considering a range of 0-3% for RSA.

**Table 6. Summary of Atlantic herring specifications for all OFL/ABC and management uncertainty buffer alternatives**

						Area Sub ACLs			
	Year	OFL	ABC	Management Uncertainty Buffer Options	ACL = DAH	Area 1A (28.9%)	Area 1B (4.3%)	Area 2 (27.8%)	Area 3 (39%)
<b>OFL / ABC Alternative 1</b>	2021	30,668	16,131	4,560	11,571	3,344	498	3,217	4,513
				6,244	9,887	2,857	425	2,749	3,856
				4,587	11,544	3,336	496	3,209	4,502
				4,669	11,462	3,313	493	3,186	4,470
	2022	30,668	16,131	4,560	11,571	3,344	498	3,217	4,513
				6,244	9,887	2,857	425	2,749	3,856
				4,587	11,544	3,336	496	3,209	4,502
				4,669	11,462	3,313	493	3,186	4,470
	2023	30,668	16,131	4,560	11,571	3,344	498	3,217	4,513
				6,244	9,887	2,857	425	2,749	3,856
				4,587	11,544	3,336	496	3,209	4,502
				4,669	11,462	3,313	493	3,186	4,470
<b>OFL / ABC Alternative 2</b>	2021	23,423	9,483	4,560	4,923	1,423	212	1,369	1,920
				6,244	3,239	936	139	900	1,263
				4,587	4,896	1,415	211	1,361	1,909
				4,669	4,814	1,391	207	1,338	1,877
	2022	26,292	8,767	4,560	4,207	1,216	181	1,170	1,641
				6,244	2,523	729	108	701	984
				4,587	4,180	1,208	180	1,162	1,630
				4,669	4,098	1,184	176	1,139	1,598
	2023	44,600	8,767	4,560	4,207	1,216	181	1,170	1,641
				6,244	2,523	729	108	701	984
				4,587	4,180	1,208	180	1,162	1,630
				4,669	4,098	1,184	176	1,139	1,598

### 3.3 2021-2023 STATUS QUO ATLANTIC HERRING SPECIFICATIONS

The Council does not always consider alternatives for all the herring fishery specifications. The specifications stemming from the ACL that are status quo measures are summarized in this section.

#### 3.3.1 Domestic Annual Harvest

The Atlantic Herring FMP specifies that domestic annual harvest (DAH) is set less than or equal to OY. Domestic annual harvest (DAH) is based on the expected catch from U.S. fishing vessels during the upcoming fishing year and equals OY for the U.S. fishery.

$$\text{Stock-wide ACL} = \text{OY} \leq \text{DAH}$$

The Herring FMP, as modified by Amendment 4, also specifies that domestic annual harvest (DAH) will be composed of domestic annual processing (DAP) and the amount of Atlantic herring that can be taken in U.S. waters and transferred to Canadian herring carriers for transshipment to Canada (border transfer or BT).

$$\text{DAH} = \text{DAP} + \text{BT}$$

When specifying DAH for the Atlantic herring fishery, important considerations relate to the actual and potential capacity of the U.S. harvesting fleet. Recent fishery performance (landings) is also an important factor in this fishery. The Herring FMP was implemented in 2001 and since that time total landings in the U.S. fishery have decreased.

Table ??? summarizes total Atlantic herring catch as a percentage of the total available catch in each year from 2003-2018. Atlantic herring catch has been somewhat consistent over the time period (and in previous years); however, the quota allocated to the fishery (stock-wide ACL/OY) has decreased 50% over the twelve-year period from 2003-2014. Allocations and landings increased after 2014 for several years, increased for several years, and decreased dramatically more recently.

In prior years when considering the DAH specification, the Council has evaluated the harvesting capacity of the directed Atlantic herring fleet and determined that the herring fleet is capable of fully utilizing the available yield from the fishery. Therefore, the DAH specification for the 2019-2021 fishing years would remain equal to the stock-wide Atlantic herring ACL, i.e., the U.S. OY specified by the Council for each of the 2019-2021 fishing years.

#### 3.3.2 Domestic Annual Processing

Domestic Annual Processing (DAP) is defined in the Herring FMP as the amount of U.S. harvest that domestic processors will use, combined with the amount of the resource that will be sold as fresh fish (including bait). DAP was set equal DAH in 2019 since border transfer was 0 mt, and minus 100 mt for BT for 2020-2021 (Section 3.1.3).

Processing, with respect to the Atlantic herring fishery, is defined in the regulations as the *preparation of Atlantic herring to render it suitable for human consumption, bait, commercial uses, industrial uses, or long-term storage, including but not limited to cooking, canning, roe extraction, smoking, salting, drying, freezing, or rendering into meat or oil*. The definition of processing does not include trucking and/or transporting fish.

Because quotas have been reduced substantially in recent years, it is likely that the U.S. will be able to utilize all the available DAP in 2019-2021. Therefore, the DAP specification for the 2019-2021 fishing years would remain equal to the DAH specification minus the BT specification.

### **3.3.3 U.S. At-sea Processing**

The Atlantic Herring FMP states that “part of DAP may be allocated for at-sea processing by domestic vessels that exceed the vessel size limits” (Herring FMP, Section 3.6.6). This allocation will be called the ‘U.S. at-sea processing’ (USAP) allocation. The term ‘at-sea processing’ refers to processing activities that occur in the Exclusive Economic Zone outside state waters. When determining this specification, the Council will consider the availability of other processing capacity, development of the fishery, status of the resource, and opportunities for vessels to enter the herring fishery.” The USAP specification serves as a cap for USAP activities, it is not a separate allocation but a limit within the domestic catch limit to be used for this purpose.

During the 2007-2009 fishing years, the Council maintained a USAP specification of 20,000 mt (Areas 2/3 only) based on information received about a new at-sea processing vessel that intended to utilize a substantial amount of the USAP specification. At that time, landings from Areas 2 and 3 – where USAP is authorized – were considerably lower than allocated sub-ACLs for each of the past several years. Moreover, the specification of 20,000 mt for USAP did not restrict either the operation or the expansion of the shoreside processing facilities during the 2007-2009 fishing years. However, this operation never materialized, and none of the USAP specification was used during the 2007-2009 fishing years. Consequently, the Council set USAP at zero for the 2010-2012, 2013-2015, and 2016-2018 fishing years. The Council has not received any information that would suggest changing this specification for the 2019-2021 fishing years. Therefore, the specification for the 2019-2021 fishing years will remain at 0 mt.

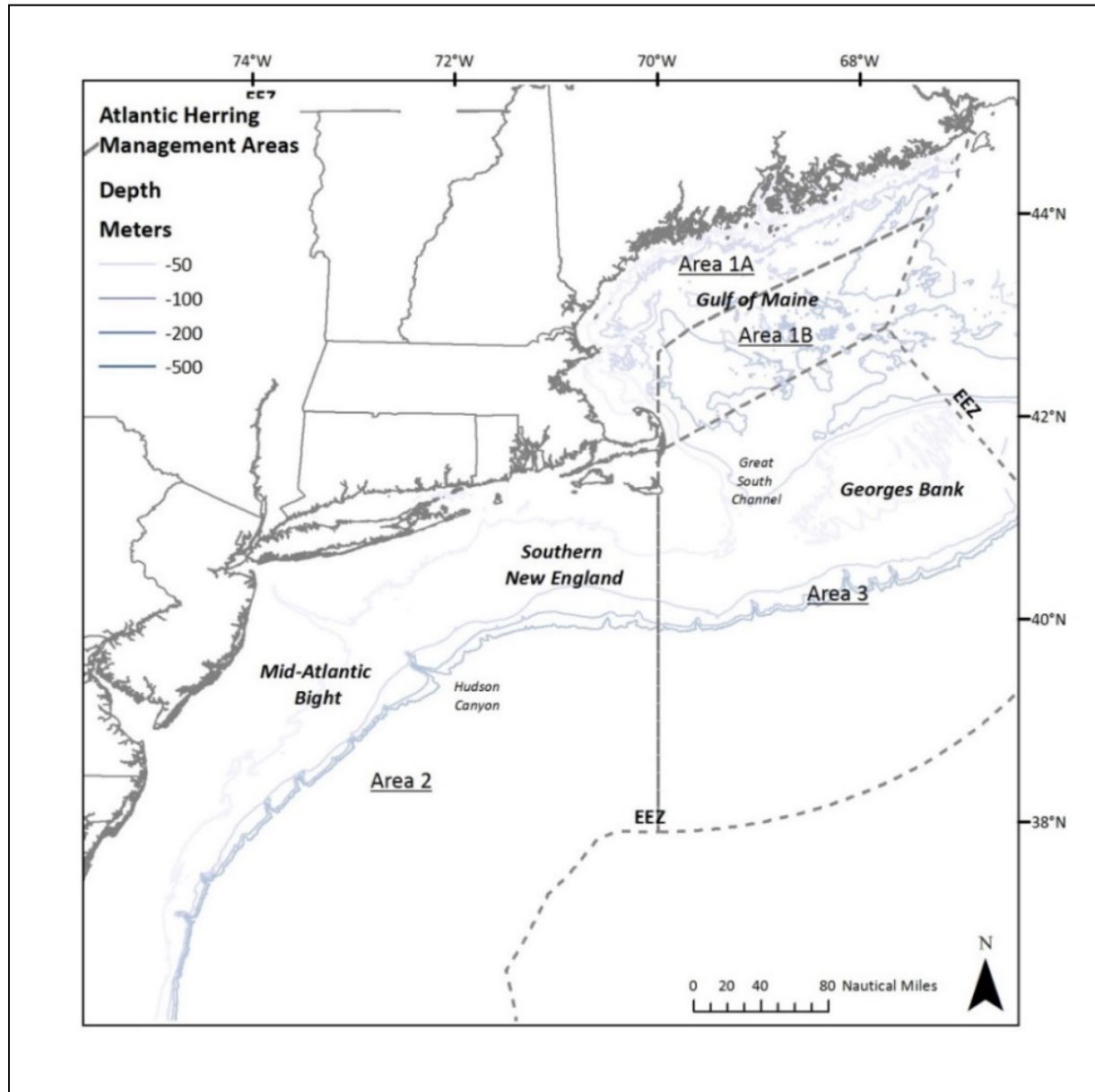
### **3.3.4 Management Area Sub-ACLs for 2021-2023**

The total ACL for Atlantic herring is divided into four separate sub-ACLs intended to minimize risk to individual stock components while maximizing opportunities for the fishery to achieve OY.

Area 1A is the inshore Gulf of Maine, Area 1B is considered offshore Gulf of Maine, Area 3 is primarily an offshore area of Georges Bank, and Area 2 includes all Southern New England and the Mid-Atlantic (Figure 2). The current herring management area boundaries have been in place since 2001 (Amendment 1). Since Framework 2, specifications for fishing years 2013-2015, the sub-ACLs have been allocated in the same proportions for the last seven fishing years: 28.9% for Area 1A, 4.3% for Area 1B, 27.8% for Area 2, and 39% for Area 3. The Council has specified that the sub-ACL proportions shall remain the same for 2021-2023 as well.



**Figure 2. Atlantic herring management areas**



### 3.3.5 Seasonal (monthly) Sub-ACL Divisions

The herring sub-ACL in two of the four management areas is allocated by season, allocating 0% for several months, essentially closing the area to directed herring fishing during those months. The Council has specified that the seasonal sub-ACL divisions that have been in place since 2013 remain in place for this action as well (unless changed by alternatives under consideration in Section 4.5.2):

- Area 1A: 0% January-May; 100% June-December;
- Area 1B: 0% January-April; 100% May-December.



### 3.3.6 Fixed Gear Set-Aside

Amendment 1 to the Atlantic Herring FMP allows up to 500 mt of the Area 1A sub-ACL to be allocated for the fixed gear fisheries in Area 1A (weirs and stop seines) that occur west of 67°16.8' W long. (Cutler, Maine). This Fixed-Gear Set-Aside (FGSA) is available for harvest by fixed gear within the specified area until November 1 of each fishing year. Any portion of this allocation that has not been harvested by November 1 is transferred back to the sub-ACL allocation for Area 1A. Because this set-aside is taken from and returned (if unused) to 1A, it was proportionally reduced relative to the 1A sub-ACL rather than the overall ACL. Table ??? has updated catch estimates from the fixed gear fishery through 2014. This set-aside acknowledges a historical, state water fishery that has taken place in Maine for many years. The set-aside has been 500 mt some years, was 295 mt from 2013-2018, and some years the Council has recommended it be set to zero. Most recently in 2019 it was set to 39 mt; this value was recommended by the Council as a reduction that would be proportional to other reductions in the fishery.

Amendment 2 to the Interstate FMP (ASMFC 2009) requires fishermen East of Cutler to report catch weekly through the federal IVR system, or any future reporting system. MEDMR requires the Maine state commercial fixed gear fishermen to comply with the federal IVR weekly reporting requirements and regulations as well as reporting monthly to MEDMR. That action also modified the date that FGSA reverts to Area 1A to December 31. The state of Maine has also implemented a closure to state permitted fixed gear operators when it is estimated that 92% of the fixed gear set-aside has been harvested. This state regulation coupled with mandatory daily reporting requirements has reduced the level of management uncertainty related to state water catch in the herring plan. The Council recommends that the fixed gear set-aside for 2021-2023 should be set at 30 mt, the same level as FY2020. This value maintains some level of catch to recognize the historical importance of this fishery in Maine. Since this fishery targets small fish, age 2 fish, the fishery is likely to be limited soon since recruitment has been well below average recently. Because our region does not have a robust survey for young fish, supporting a small, fixed gear fishery could provide additional observations of incoming year classes and potentially serve as an additional way to sample recruitment.

### 3.3.7 River Herring/Shad (RH/S) Catch Caps

The Council has specified that the RH/S catch caps implemented in the 2019 in-season adjustment implemented by NMFS will rollover for 2020 and 2021; MWT GOM = 76.7 mt, MWT Cape Cod = 32.4 mt, MWT SNE/MA= 129.6 mt, and BT SNE/MA = 122.3 mt (Table 7). These caps were first implemented in the 2016-2018 specifications package and were used again for 2019. These caps would be set based on removals from the reference period before caps were in place. Since there is no biologically based estimate of RH/S, these caps at least represent a maximum amount of bycatch from a reference period.

During the 2016-2018 specification process these values were derived from the method that was considered the best technical approach for determining recent RH/S catch estimates in support of the goals and objectives of Framework 3, primarily to provide strong incentive for the industry to continue to avoid RH/S and reduce RH/S catch to the extent practicable. When the PDT developed this method, it argued that these years represent a “reference period” before catch caps were adopted (2008-2014). Going forward, the PDT did not recommend adding additional years to this reference period. Including the years that the fishery is under a cap may provide incentive for fishermen to increase their RH/S catch, which is in opposition to the goal of the RH/S catch caps.

**Table 7. 2019 RH/S catch caps in the herring fishery, implemented by NMFS through in-season adjustment (mt)**

	MWT GOM	MWT Cape Cod	MWT SNE/MA	BT SNE/MA
<b>RH/S catch cap</b>	76.7	32.4	129.6	122.3

### 3.4 CARRYOVER OF UNHARVESTED CATCH

In the herring plan, any unharvested catch in a herring management area in a fishing year (up to 10% of that area's sub-ACL) shall be carried over and added to the sub-ACL for that herring management area for the fishing year following the year when total catch is determined (Framework 2, NEFMC 2013). Section 648.201 of the herring regulations specify the carryover provisions. In Framework 6, the Council recommended NMFS temporarily prohibit the automatic carryover of unharvested herring catch from 2018 to 2020 due to relatively large reductions in quota between the two fishing years. Carryover of unharvested quota from 2018 could have potentially negative unintended consequences on some participants in the fishery that fish in different areas and seasons (NEFMC, 2018).

This action is considering several alternatives related to carryover of unharvested catch from 2019 and 2020. Table 8 summarized the allocations and estimated catch for FY2019 that could be available for carryover to FY2021. Areas 1A, 1B and 3 all had at least 10% of sub-ACLs unharvested. 2019 catch values are not final yet, but based on these preliminary estimates, there would be an automatic carryover of about 1,155 mt from 2019 unharvested quota to FY2021. Overages for Area 2 (over 600 mt) would likely be reduced from the sub-ACL for Area 2 in FY2021 to account for the overage in that area from FY2019.

**Table 8. Summary of 2019 allocated quota, estimated catch, and potential carryover for FY2021**

Area	Allocated 2019 Quota	Estimated 2019 Catch*	%		Remaining Quota	10% Carryover to 2021
1A	5,223	4,689.50	89.79%		533.5	522.3
1B	628	140.6	22.39%		487.4	62.8
2	4,062	4,737.30	116.62%		-675.3	
3	5,700	3,144.70	55.17%		2,555.3	570
<b>Total</b>	<b>15,613</b>	<b>12,712.10</b>	<b>81.42%</b>			<b>1,155</b>
* Preliminary 2019 catch values, subject to change after final 2019 catch reports are final.						

#### 3.4.1 Automatic rollover of up to 10% of each sub-ACL not harvested (No Action – Alternative 1)

No action would maintain the automatic carryover of unharvested catch up to 10% of each sub-ACL. Specifically, up to 10% of each area's sub-ACL in 2019, 2020 and/or 2021 would automatically rollover and be added to the sub-ACL for each herring management area in 2021, 2022 and/or 2023, respectively. However, the overall ACL would not increase in 2021-2023.

*Rationale:* The primary intent is to help optimize yield overall. There are constraints in this fishery that can inhibit the ability for the fishery to harvest the full sub-ACL in each area. Allowing some unharvested catch to rollover gives some flexibility to provide additional access to unharvested catch. Because the total ACL is not also adjusted upwards to account for the rollover, there is no additional risk of the fishery exceeding overall catch limits or causing overfishing. The total fishery would still be closed when 95% of the total ACL is projected to be caught in the year that rollover was granted. Because this measure allows a sub-ACL increase for a management area, but it does not allow a corresponding increase to the stockwide ACL the overall harvest would remain constrained by the stock-wide ACL. Consequently, the fleet would be required to forego harvest in one or more management areas to harvest the carryover

available in a subarea. This measure maintains the management uncertainty buffer between ABC and the stock-wide ACL, while giving the fleet some flexibility in choosing where to harvest the stock-wide ACL

### **3.4.2 Prohibit automatic carryover of unharvested catch to fishing years 2021-2022 (Alternative 2)**

Under Alternative 2, unharvested quota from the 2019 or 2020 herring management area sub-ACLs would *not* automatically rollover to 2021 and /or 2022, respectively. This alternative is intended to be temporary, for this specifications package only. After the 2020 fishing year ends, the prohibition would automatically sunset or expire; and up to 10% of unharvested 2021 quota would automatically carryover to 2023 sub-ACLs, unless modified by a future action.

*Rationale:* Alternative 2 was considered because the amount of carryover from 2019 (about 1,100 mt) is a substantial amount relative to the total ACL for 2021 (about 4-5,000 mt depending on which alternative is selected for management uncertainty, about 20-30% of the total 2021 ACL). A rollover of that size could have negative unintended consequences on some participants in the fishery. Specifically, if some areas are fished first including carryover, other areas that typically see herring landings later in the year may have less access if the total ACL is already harvested and directed herring fishing is closed before each sub-ACL is harvested.

The Council is generally supportive of carryover in this fishery to help optimize yield, but when overall quotas are relatively small, and the carryover amounts are relatively large, the unintended consequences and distributional impacts on different vessels from different areas could be problematic. It was also noted that adding carryover could cause a race to fish mentality to gain as much access to the resource before other users if fish are concentrated in one area. Furthermore, if the herring resource is as low as currently estimated, it may not be advantageous to harvest additional catch at this time. While the fishery would still close when 95% of the total ACL is caught, the rollover could enable more fish to be removed from one area compared to total removals being more spread out across all areas. This measure was selected in Framework 6 to temporarily prohibit carryover of unharvested 2018 quota increasing 2020 allocations. However, it has been noted that the reductions from year 1 to year 3 in that case were greater than values under consideration in this action (about 5,000 mt unused quota in 2018 versus about 1,100 mt unused quota in 2019).

### **3.4.3 Allow up to 5% of each sub-ACL not harvested to automatically rollover to fishing years 2021-2022 (Alternative 3)**

Alternative 3 would maintain the automatic carryover of unharvested catch, but it would be changed from up to 10% to up to 5% of each sub-ACL. Specifically, up to 5% of each area's sub-ACL in 2019 or 2020 would automatically rollover and be added to the sub-ACL for each herring management area in 2021 and/or 2022, respectively. However, the overall ACL would not increase in 2021 or 2022. After the 2020 fishing year ends, the 5% automatic carryover would sunset or expire, and it would revert to 10% unless modified by a future action.

*Rationale:* This alternative was developed as a compromise between 0% (prohibition on carryover) and 10% carryover. This option considers the poor status of the stock by finding a balance that allows for an increased contribution to the recovering biomass but allows flexibility to carryover some unused quota to help support the depressed fishing industry.

## 3.5 ADJUST MEASURES THAT POTENTIALLY INHIBIT MACKEREL FISHERY FROM ACHIEVING OPTIMUM YIELD

Two specific measures in the herring plan have been identified that potentially inhibit the mackerel fishery from achieving optimum yield in that fishery – the 2,000 pound herring incidental catch possession limit and the seasonal closure of Area 1B from January through April. This action includes several options to adjust these measures to improve access to the mackerel fishery since many participants in the herring fishery also prosecute mackerel.

### 3.5.1 Increase the herring incidental possession limit

When 92% of the sub-ACL for a herring management area (Area 1A, 1B, 2 and 3) or 95% of the total ACL for the herring fishery is projected to be caught a 2,000 pound incidental catch limit is implemented to close the directed herring fishery. This relatively low possession limit makes it very challenging to target mackerel, especially in certain areas and seasons when herring and mackerel mix. The options under consideration for modifying the incidental herring possession limit are summarized in Table 13.

The action would not change measures in the Mackerel FMP: when 90% of the mackerel ACL is estimated to be caught, a 40,000-pound mackerel possession limit is implemented for that fishery, and when 98% is estimated to be caught a 2,000-pound incidental limit is implemented. Also, these measures do not impact Area 1A. Area 1A herring fishing would remain under the current measures in place for that management area - when 92% of the sub-ACL for Area 1A is projected to be caught a 2,000-pound possession limit is implemented.

#### 3.5.1.1 Option A – No Action (2,000 pounds)

When 92% of the sub-ACL for a herring management area (Area 1A, 1B, 2 and 3) or 95% of the total herring ACL is estimated to be caught, a 2,000 lb incidental catch limit is implemented to close the directed herring fishery in that area, or the entire area when 95% of the total herring ACL is estimated to be caught.

#### 3.5.1.2 Option B – Implement a two-step incidental possession limit (40,000 pounds first then 2,000 pounds)

Implement a two-step incidental possession limit similar to the mackerel plan, where a higher possession limit is implemented first to slow the directed fishery down, and a lower possession limit is implemented later when the fishery is very close to the full sub-ACL.

The first possession limit of 40,000 lb would be triggered at the current thresholds of 92% of a sub-ACL or 95% of the total ACL. And when herring catch is estimated to reach 95% of a sub-ACL or 98% of the total herring ACL a 2,000 lb incidental possession limit would be implemented in that area or fishery wide (Table 9).

The increased possession limit would be limited to Areas 1B, Area 2 and Area 3 only.

**Table 9. Possession limits proposed in Option B.**

Option B	Sub-ACL	Total ACL
STEP 1	40,000 lb possession limit at 92%	40,000 lb at 95%
STEP 2	2,000 lb possession limit at 95%	2,000 lb at 98%

### 3.5.1.3 Option C – Implement a two-step incidental possession limit (range of 5,000-20,000 pounds first than 2,000 pounds)

Implement a two-step incidental possession limit similar to the mackerel plan, where a higher possession limit is implemented first to slow the directed fishery down, and a lower possession limit is implemented later when the fishery is very close to the full sub-ACL.

The first possession limit would be between 5,000 and 20,000 pounds and would be triggered when the estimated herring catch is 90% of a sub-ACL, there is no step 1 relative to the total ACL. And when the estimated herring catch reaches 95% of a sub-ACL or 95% of the total herring ACL, a 2,000 lb incidental possession limit would be implemented in that area, or in all areas if the total herring ACL is projected to be caught (Table 10). Before final action the Council will need to identify the specific possession limit between 5,000 and 20,000 pounds if this option is selected.

The increased possession limit would be limited to Areas 1B, Area 2 and Area 3 only.

**Table 10. Possession limits proposed in Option C.**

Option C	Sub-ACL	Total ACL
STEP 1	5,000-20,000 lb possession limit at 90%	N/A
STEP 2	2,000 lb possession limit at 95%	2,000 lb at 95%

### 3.5.1.4 Option D – Herring Management Area 2 only - Implement a two-step incidental possession limit (40,000 pounds first than 5,000 pounds)

Implement a two-step incidental possession limit with the same possession limits as the mackerel plan, where a higher possession limit of 40,000 pounds is implemented first to slow the directed fishery down, and a lower possession limit of 5,000 pounds is implemented later when the fishery is very close to the full sub-ACL. This measure is only under consideration for the Area 2 sub-ACL; it does not relate to possession limits in other areas and has no bearing on the possession limits related to the total ACL, only the Area 2 sub-ACL.

The first possession limit of 40,000 lb would be triggered when herring catch is estimated to be 90% of the Area 2 sub-ACL. And when herring catch is estimated to be 98% of the Area 2 sub-ACL a 5,000 lb incidental herring possession limit would be in place for the remainder of the fishing year (Table 10). This alternative does not change the possession limits related to the total ACL, that would remain the same, when estimated catch reaches 95% of the total ACL a 2,000 lb. possession limit is implemented in all areas.

This alternative could be selected with other options under consideration in this action. For example, this action may change the incidental herring possession limits in Areas 1B and 3 under a different option and this option could be selected for Area 2 only.

**Table 11. Possession limits proposed in Option D.**

Option D - Area 2 only	Area 2 Sub-ACL	Total ACL
STEP 1	40,000 lb poss limit at 90%	N/A
STEP 2	5,000 lb poss limit at 98%	2,000 lb at 95%

*Rationale:* The Council developed additional alternatives for Area 2 to increase the flexibility in that area to harvest mackerel. Implementing an incidental herring possession limit earlier, when 90% of a sub-ACL is estimated to be caught provides more herring to target other fisheries.

### **3.5.1.5 Option E – Herring Management Areas 2 and 3 only - Implement a two-step incidental possession limit (40,000 pounds first than 5,000 pounds)**

Implement a two-step incidental possession limit with the same possession limits as the mackerel plan, where a higher possession limit of 40,000 pounds is implemented first to slow the directed fishery down, and a lower possession limit of 5,000 pounds is implemented later when the fishery is very close to the full sub-ACL. This measure is only under consideration for the Area 2 and Area 3 sub-ACL; it does not relate to possession limits in other areas and has no bearing on the possession limits related to the total ACL, only the Area 2 and Area 3 sub-ACLs.

The first possession limit of 40,000 pounds would be triggered when herring catch is estimated to be 85% of the Area 2 and/or Area 3 sub-ACLs. When herring catch is estimated to be 98% of the Area 2 and/or Area 3 sub-ACLs a 5,000 pounds incidental herring possession limit would be in place for the remainder of the fishing year (Table 10).

This alternative could be selected with other options under consideration in this action. For example, this action may change the incidental herring possession limits in Areas 1B under a different option and this option could be selected for Area 2 and Area 3 only. This alternative does not change the possession limits related to the total ACL, that would remain the same, when estimated catch reaches 95% of the total ACL a 2,000 lb. possession limit is implemented in all areas.

**Table 12. Possession limits proposed in Option E.**

<b>Option E - Area 2 and 3 only</b>	<b>Area 2 and/or Area 3 Sub-ACL</b>	<b>Total ACL</b>
STEP 1	40,000 lb poss limit at 85%	N/A
STEP 2	5,000 lb poss limit at 98%	2,000 lb at 95%

*Rationale:* The Council developed additional alternatives for Area 2 and Area 3 to increase the flexibility in those areas to harvest mackerel. Implementing an incidental herring possession limit earlier, when 85% of a sub-ACL is estimated to be caught, provides more herring to be used more incidentally for vessels targeting other fisheries.



**Table 13. Summary of incidental herring possession limits alternatives under consideration**

<b>Option A (All Areas)</b>	<b>Sub-ACL</b>	<b>Total ACL</b>
No Action	2,000 lb at 92%	2,000 lb at 95%
<b>Option B (Areas 1B, 2 and 3)</b>	<b>Sub-ACL</b>	<b>Total ACL</b>
Step 1	40,000 lb at 92%	40,000 lb at 95%
Step 2	2,000 lb at 95%	2,000 lb at 98%
<b>Option C (Areas 1B, 2 and 3)</b>	<b>Sub-ACL</b>	<b>Total ACL</b>
Step 1	5,000-20,000 lb at 90%	N/A
Step 2	2,000 lb at 95%	2,000 lb at 95%
<b>Option D (Area 2 only)</b>	<b>Sub-ACL</b>	<b>Total ACL</b>
Step 1	40,000 lb at 90%	N/A
Step 2	2,000 lb at 98%	2,000 lb at 95%
<b>Option E (Areas 2 and 3)</b>	<b>Sub-ACL</b>	<b>Total ACL</b>
Step 1	40,000 lb at 85%	N/A
Step 2	2,000 lb at 98%	2,000 lb at 95%

### 3.5.2 Modify the seasonal closure of Area 1B

Area 1B has been closed January through April for over five years since Framework 2 (2014). The Council approved allowing sub-ACL splitting during the specifications process, to provide more flexibility to allocate the herring ACL among the management areas in the most effective way possible. Allowing sub-ACLs to be split seasonally (by month) may help to reduce derby fishing and distribute the catch throughout the fishing year, allowing for additional fishing opportunities, and reducing the probability that the entire sub-ACL would be caught early in the fishing year. The Council noted that this may allow the fishery to maximize opportunities when market conditions may be more favorable.

The Area 1B sub-ACL is relatively small, and overages have been observed in several of the years before Framework 2 was implemented. The proposed split in Area 1B was intended, in part, to address this problem. Delaying the fishery in 1B until May would allow more time for overage or carryover determinations. Amendment 8 later considered eliminating the seasonal closure in Area 1B as a measure to reduce potential negative impacts of localized depletion on other users of the herring resource, but that alternative was not selected as part of the preferred alternative.

#### 3.5.2.1 No Action (maintain the seasonal closure of Area 1B)

Area 1B would remain closed January-April. The seasonal split of this herring management area, as well as other herring management areas, could always be revisited in future specification packages.

#### 3.5.2.2 Eliminate the seasonal closure of Area 1B

The seasonal closure of Area 1B that has been in place from January – April would be removed. A seasonal closure of that area could be considered again in a future action in the Herring FMP, but if this alternative is selected, the seasonal closure would be removed.

## 4.0 AFFECTED ENVIRONMENT

The Affected Environment is described in this action based on valued ecosystem components (VECs), including target species, non-target species, predator species, physical environment and Essential Fish Habitat (EFH), protected resources, and human communities. VECs represent the resources, areas and human communities that may be affected by the alternatives under consideration in this amendment. VECs are the focus since they are the “place” where the impacts of management actions occur.

The Council recently completed Amendment 8 to the Atlantic Herring FMP that included a detailed Affected Environment. This action updates several key tables and figures with data through 2018, but for the most part references the information recently included in Amendment 8 (NEFMC, 2018).

### 4.1 TARGET SPECIES (ATLANTIC HERRING)

This section describes the life history and stock population status for Atlantic herring, as well as herring’s role as forage in the ecosystem. A complete description of the Atlantic herring resource is in the FEIS for Amendment 1 to the Atlantic Herring FMP (NEFMC 2006, Section 7.1). Updated information is in Amendment 5 and Amendment 8 to the Atlantic Herring FMP. Information in this section has been updated through 2018 where possible. Based on the best available science, the Atlantic herring resource is *neither overfished nor subject to overfishing*.

Life history details about the Atlantic herring resource are described in Amendment 8. In summary, Atlantic herring, *Clupea harengus*, is widely distributed in continental shelf waters of the Northeast Atlantic, from Labrador to Cape Hatteras. Spawning occurs in the summer and fall, starting earlier along the eastern Maine coast and southwest Nova Scotia (August – September) than in the southwestern Gulf of Maine (early to mid-October in the Jeffreys Ledge area) and Georges Bank (as late as November – December; Reid et al. 1999). In general, GOM herring migrate from summer feeding grounds along the Maine coast and on GB to SNE/MA areas during winter, with larger individuals tending to migrate farther distances.

In the past, the herring resource along the east coast of the United States was divided into the Gulf of Maine and Georges Bank stocks (Anthony & Waring 1978). However, no methods are available to identify stock of origin for fish caught in the mixed stock fishery or during fishery-independent surveys. Consequently, herring from the Gulf of Maine and Georges Bank are combined for assessment and management purposes into a single stock complex, although three spawning stock components occupy three distinct locations: in the Gulf of Maine, southwest Nova Scotia-Bay of Fundy, and Georges Bank. A more detailed description of this stock definition is in Amendment 1.

#### 4.1.1 Stock Assessment

The Atlantic herring stock was most recently assessed during spring 2020 Management Track Assessment (NEFSC, 2020). The 2020 assessment used all the same data sources of the previous assessment (NMFS spring, fall, acoustics collected in fall, and summer shrimp bottom trawl survey). Overall, SSB generally declined from 1965 to a time series low in 1978 and then generally increased from 1978 through the mid-1990s. SSB declined again from 1997 to 2010, increased for several years until 2014, and has been declining since. In addition, fishing mortality has been relatively stable since the decreases in the 1990s, with a gradual increase in 2009, followed by a general declining fishing mortality since then (Figure 3).

With data updates, the 2019 SSB was estimated to be 77,883 mt (80% probability interval: 57,150-111,125 mt), compared to the full range of estimated biomass of 62,007 mt in 1978 to 1,152,400 mt in 1967 (Figure 3). The average F between ages 7 and 8 was used for reporting results related to fishing mortality (F7-8) because these ages are fully selected by the mobile gear fishery, which has accounted for



most of the landings since 1986. F7-8 in 2019 equaled 0.25 (80% probability interval: 0.17-0.37) and ranged from 0.12 in 1965 to 1.02 in 1975 (Figure 3).

Age-1 recruitment has been below average since 2013 (Figure 4). The time series high for recruitment was in 1971 (1.4 billion age-1 fish). The time series low (2.8 million fish) occurred in 2016, and the second lowest (4.1 million fish) occurred in 2018, although this estimate is highly uncertain. Five of the six lowest annual recruitment estimates have occurred since 2015 (2015, 2016, 2017, 2018, and 2019).

**Figure 3. 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 age structured assessment program (ASAP model) for 1965-2019 (NEFSC 2020)**

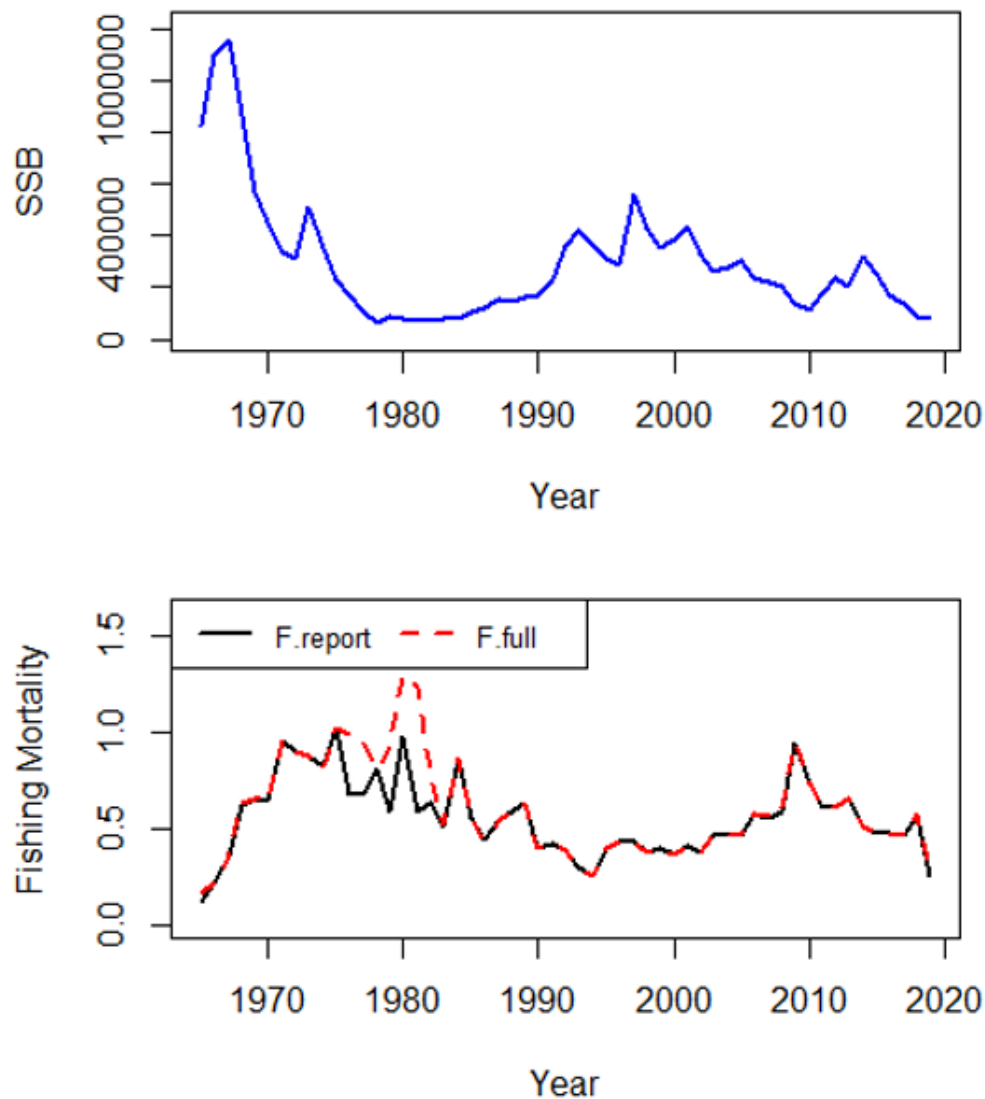
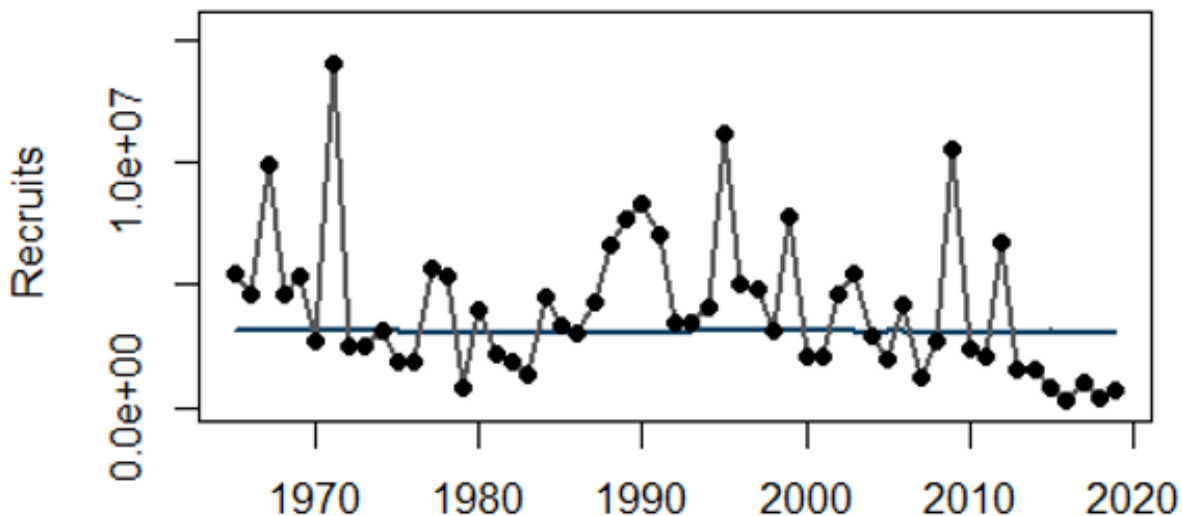


Figure 4. Atlantic herring annual recruit (000s) time series, 1965-2019. The horizontal line is the average over the time series (NEFSC 2020)



#### 4.1.2 Stock Status

MSY reference points from the 65<sup>th</sup> Stock Assessment Workshop (NEFSC 2018) were based on a selectivity curve aggregated between the mobile and fixed gear fleets. The proportion of the catch coming from the fixed gear fleet has increased in recent years, which made the MSY reference points unduly affected by the Canadian, fixed gear catches, which are not quota controlled. Thus, MSY reference points in the 2020 assessment were estimated based on the mobile fleet selectivity pattern, which is an entirely US fleet. MSY reference points were still premised on a proxy of F40%, as in SAW 65. The newly proposed reference points from the 2020 assessment are no longer affected by the relative amount of mobile and fixed fleet catches.

$$F_{MSYproxy} = 0.543$$

$$SSB_{MSYproxy} = 269,000 \text{ mt}$$

$$(\frac{1}{2} SSB_{MSYproxy} = 134,500), \text{ and}$$

$$MSY_{proxy} = 99,400 \text{ mt.}$$

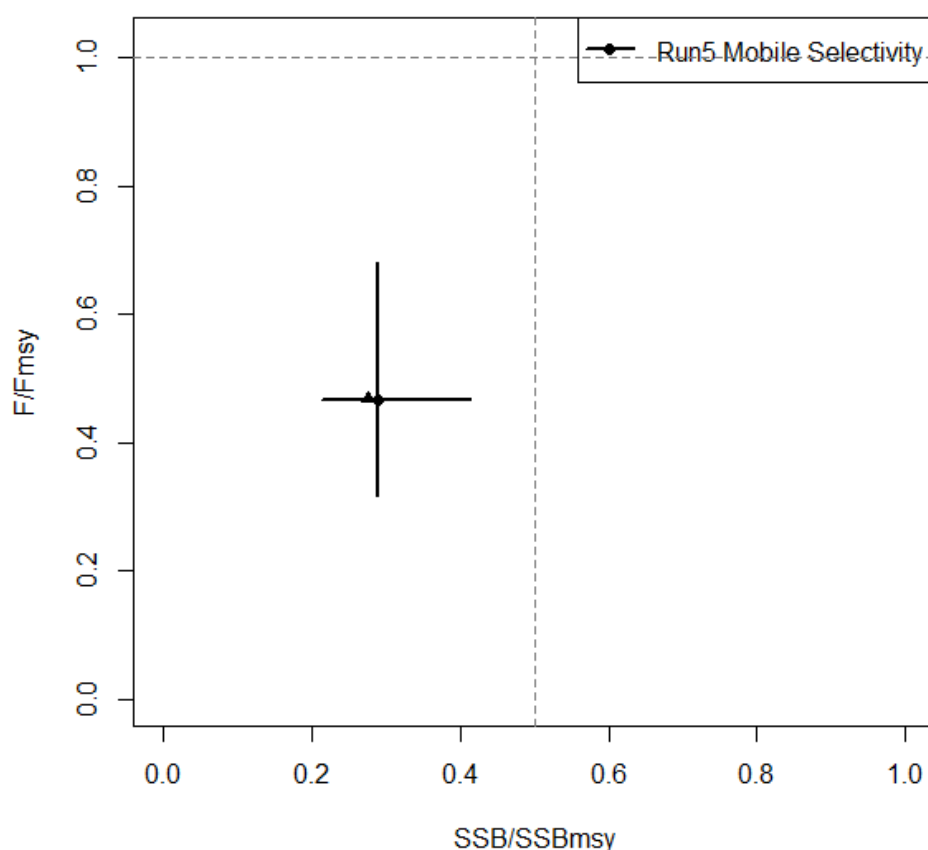
The 2020 management track assessment concluded that for the terminal year of the assessment, 2019, the Atlantic herring resource is below its biomass target (2019 biomass of 77,883 mt), and fishing mortality is below the  $F_{MSY}$  threshold (2019  $F_{7-8} = 0.253$ ; Figure 5). Therefore, Atlantic herring is **overfished but not subject to overfishing**.

The assessment did include some cautionary notes about the status of the stock. In the short-term, the relatively poor recruitments in 2013-2019 will increase the probability of the stock remaining overfished. Growth (i.e., weight at age) also continues to be relatively low relative to the 1990s, and this seems to be a longer-term feature of the stock that also reduces production. The stock, however, seems to be capable

of producing relatively large and small year classes regardless of growth, and so recruitment is likely the more significant driver of short-term vulnerability.

The major sources of uncertainty are natural mortality, stock-recruit relationship and stock structure. Natural mortality ( $M$ ), was assumed constant in the 2020 management track, as in SAW 65, but  $M$  is likely to vary among time and age (size). A definitive explanation for the continued poor recruitment has not been identified, and there may be multiple factors causing below average recruitment. Finally, stock structure remains an uncertainty for this stock assessment, particularly mixing with the Nova Scotian stock. Migration can be conflated with changes in mortality or fishery selectivity and contribute to retrospective patterns.

**Figure 5. Atlantic herring stock status based on the ASAP model. Error bars represent the 80% probability intervals. The triangle represents the model result if an adjustment were to be made for the retrospective pattern (NEFSC 2020).**



### 4.1.3 Importance of Herring as Forage

Atlantic herring play an important role as forage in the Northeast U.S. shelf ecosystem. They are eaten by a wide variety of fish, marine mammals, birds, and (historically) by humans in the region. The structure of the Northeast U.S. shelf ecosystem features multiple forage species rather than a single dominant forage species. Herring share the role of forage here with many other species including sand lance, mackerels, squids, and hakes, although herring are distinguished by a high energy density (caloric content) relative to other pelagic prey in the ecosystem. This diversity of forage options leads to a complex and diverse food web supporting many different predators. The relative importance of herring as

forage varies by predator group, due to differences in predator life history, foraging style, and bioenergetics. Therefore, predator responses to changing herring populations vary, and depend on the extent to which other forage is available.

Amendment 8 detailed the information available on herring as forage including the species that consume herring in the Northeast and the food habits of Atlantic herring (NEFMC, 2018). Similarly, the 2018 assessment updated the estimate of consumption of herring at various life stages (NEFSC, 2018). Total consumption of herring by fish predators has been variable, with lesser total amounts of herring predation earlier in the time series compared to later. Prey length shows that much of the predation is on larger fish, and this is likely due to the design of the bottom trawl survey sampling design that focuses offshore. It is believed that similar or even greater amounts of predation on juvenile herring is likely occurring in nearshore areas by fish predators, as well as other predators such as birds and marine mammals.

Climate and environmental conditions can be major drivers of pelagic fish dynamics. In the Northeast U.S., Atlantic herring and other pelagics have lower sensitivity to climate risks than other species due to high mobility but have high potential to change distribution. The impact of climate change on Atlantic herring is negative to neutral relative to other Northeast species. All Northeast U.S. species have high or very high exposure to climate change risks, as this ecosystem is changing more rapidly than much of the world ocean (Hare et al. 2016).

## 4.2 NON-TARGET SPECIES (BYCATCH)

*Non-target species* refers to species other than Atlantic herring which are caught/landed by federally permitted vessels while fishing for herring. The MSA defines *bycatch* as fish that are harvested in a fishery, but are not retained (sold, transferred, or kept for personal use), including economic discards and regulatory discards (16 U.S.C. § 1802(2)). The MSA mandates the reduction of *bycatch*, as defined, to the extent practicable (16 U.S.C. § 1851(a)(9)). Incidental catch, on the other hand, is typically considered to be non-targeted species that are harvested while fishing for a target species and is retained and/or sold. In contrast to bycatch, there is no statutory mandate to reduce incidental catch. When non-target species are encountered in the Atlantic herring fishery, they are either discarded (bycatch) or they are retained and sold as part of the catch (incidental catch). Most catch by herring vessels on directed trips is Atlantic herring, with extremely low percentages of bycatch (discards). In some cases, Atlantic mackerel is targeted in combination with Atlantic herring during some of the year in the southern New England and Mid-Atlantic areas and is therefore not considered a non-target species because in many cases, vessels are targeting and landings herring and mackerel on the same trip.

Due to the high-volume nature of the Atlantic herring fishery, non-target species, including river herring (blueback herring and alewives), shad (hickory shad and American shad), and some groundfish species (particularly haddock), are often retained once the fish are brought on board (NEFMC 2012, p. 173). The catch of non-target species in the directed Atlantic herring fishery can be identified through sea sampling (observer) data collected by the Northeast Fisheries Observer Program (NEFOP). Portside sampling data collected by MADMF and MEDMR can be used to estimate catch of any non-target species that are landed. Dealer and VTR data can be used to identify/cross-check incidental landings of some non-target species that may be separated from Atlantic herring.

The primary non-target species in the directed Atlantic herring fishery are groundfish (particularly haddock) and the river herring/shad (RH/S) species. There are accountability measures in place for both haddock and river herring/shad if area and gear specific catch cap is exceeded. Dogfish, squid, butterfish, and Atlantic mackerel are also common species encountered in the directed Atlantic herring fishery. However, in some cases (especially Atlantic mackerel), while herring is often the target species, mackerel is also landed, and some trips are quite mixed in terms of mackerel and herring landings. Therefore, Atlantic mackerel is not considered a non-target species since there can be substantial landings of that species for various segments of the fishery during certain seasons and in certain areas. Comprehensive

information about the catch of these species in the Atlantic herring fishery is in Section 5.2 of Amendment 5 and Sections 3.2 and 3.3 of Framework 3 to the Atlantic Herring FMP.

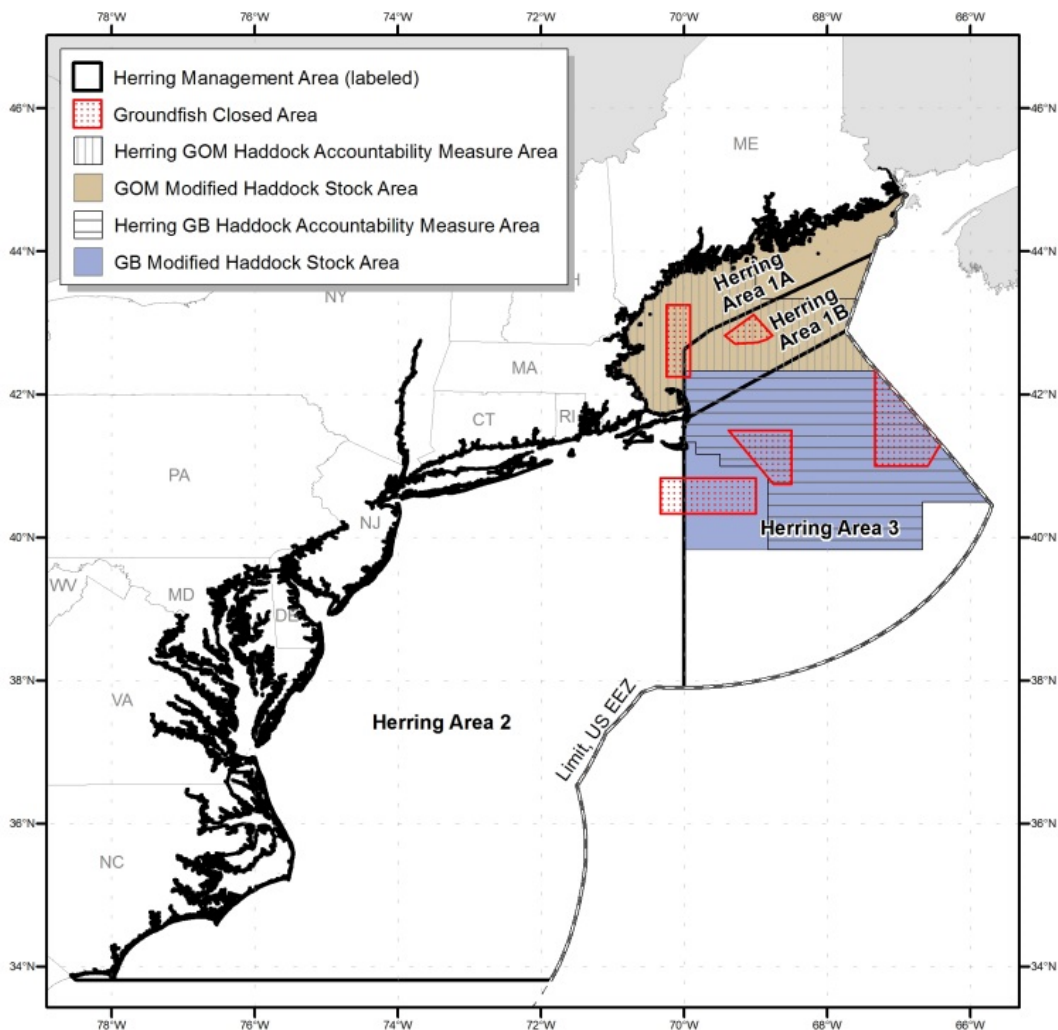
### ***Haddock***

Haddock has two stocks, Gulf of Maine and Georges Bank. For Gulf of Maine haddock, as of the 2019 groundfish operational assessments, the stock is not overfished and overfishing is not occurring, with 2018 SSB estimated to be at 82,763 mt, which is 1,035% of the biomass target (NEFSC 2020a). Recreational catch estimates were re-estimated in this update by using the re-calibrated MRIP data. In general, inclusion of the re-calibrated data resulted in an increase in SSB, F, and recruitment. The GOM haddock stock has experienced several large recruitment events since 2010. The population biomass is currently at an all-time high and overall, the population is experiencing low mortality (NEFSC 2017).

The GB haddock stock is a transboundary stock co-managed by the U.S. and Canada. The stock is not overfished, and overfishing is not occurring (NEFSC 2020a). There has been a steady increase in SSB from ~15,000 mt in the early 1990s, to about 252,000 mt in 2007. The dramatic increase 2005 - 2007 is due to the exceptionally large 2003-year class reaching maturity. From 2007 - 2010, SSB decreased 35% as that 2003-year class decreased due to natural and fishing mortality. The fishing mortality rate for this stock has been low in recent years. The retrospective adjusted 2018 SSB was estimated to be at 507,130 mt, which is 365% of the biomass target. The GB haddock stock shows a broad age structure, and broad spatial distribution. This stock has produced several exceptionally strong year classes in the last 15 years, leading to record high SSB in recent years. Catches in recent years have been well below the total quota (US + Canada). While all survey indices support the finding that this stock is at an all-time high, weights at age have been declining since the large 2003-year class and show further declines with the most recent data (NEFSC 2020a).

Haddock is managed by the NEFMC under the Northeast Multispecies FMP. Framework Adjustment 59 to the Northeast Multispecies FMP increased the midwater trawl Atlantic herring fishery sub-ACL for Georges Bank haddock to 2% for FY2020-2022 (NEFMC 2020), up from 1.5% for a few fishing years before that and, and up from 1% from even earlier years. The GOM haddock sub-ACL has been maintained at 1%. When the haddock incidental catch cap for a particular haddock stock (GOM or GB) has been caught, all herring vessels fishing with MWT gear are prohibited from fishing for, possessing, or landing, more than 2,000 lb of herring in the respective haddock accountability measure area for the rest of the multispecies fishing year (**Map 1**). There is also a pound-for-pound payback for any overages. This has only occurred once since 2012 for GB haddock (**Table ???**).

**Map 1. GOM and GB haddock stock areas (shaded) with herring MWT accountability measures (hatched).**



### ***River Herring/Shad***

In 2017, there was an updated river herring assessment that concluded, that the coastwide meta-complex of river herring stocks on the U.S. Atlantic coast remains depleted to near historic lows. There is evidence for declines in abundance due to several factors, but their relative importance could not be determined. The overfished and overfishing status is unknown for the coastwide stock complex, as estimates of total biomass, fishing mortality rates and corresponding reference points could not be developed. While status on a coastwide basis remains unchanged, there are some positive signs of improvement for some river systems, with increasing abundance trends for several rivers in the Mid-Atlantic throughout New England region. While abundance in these river systems are still at low levels, dam removals and improvements to fish passage have had a positive impact on run returns (ASMFC 2017).

The 2020 American Shad Benchmark Stock Assessment and Peer Review Report indicate American shad remain depleted on a coastwide basis. Multiple factors, such as overfishing, inadequate fish passage at dams, predation, pollution, water withdrawals, channelization of rivers, changing ocean conditions, and climate change are likely responsible for shad decline from historic abundance levels. Additionally, the

assessment finds that shad recovery is limited by restricted access to spawning habitat. Current barriers partly or completely block 40% of historic shad spawning habitat, which may equate to a loss of more than a third of spawning adults. The “depleted” determination was used instead of “overfished” because the impact of fishing on American shad stocks cannot be separated from the impacts of all other factors responsible for changes in abundance. The benchmark assessment was endorsed by the Peer Review Panel and accepted by the Shad & River Herring Management Board for management use (ASMFC 2020).

River herring is primarily managed under Amendment 2 to the ASMFC FMP for Shad and River Herring (ASMFC 2009), which addresses concerns regarding declining river herring populations. Like shad, states and jurisdictions had to develop Sustainable Fishery Management Plans (SFMPs) to maintain a commercial and/or recreational river herring fishery past January 2012.

In December 2014, NMFS implemented river herring and shad catch caps for the Atlantic herring fishery for 2014 and 2015 (**Map 2**). Catch of river herring and shad on fishing trips that land over 6,600 lb of herring count towards the caps. Caps in the herring fishery are area and gear specific. If NMFS determines that 95% of a river herring and shad cap has been harvested, a 2,000 lb herring possession limit for that area and gear will become effective for the rest of the fishing year. This low possession limit essentially turns the area into a closed area for directed herring fishing until the start of the next fishing year. Bycatch is monitored and reported on the GARFO website:

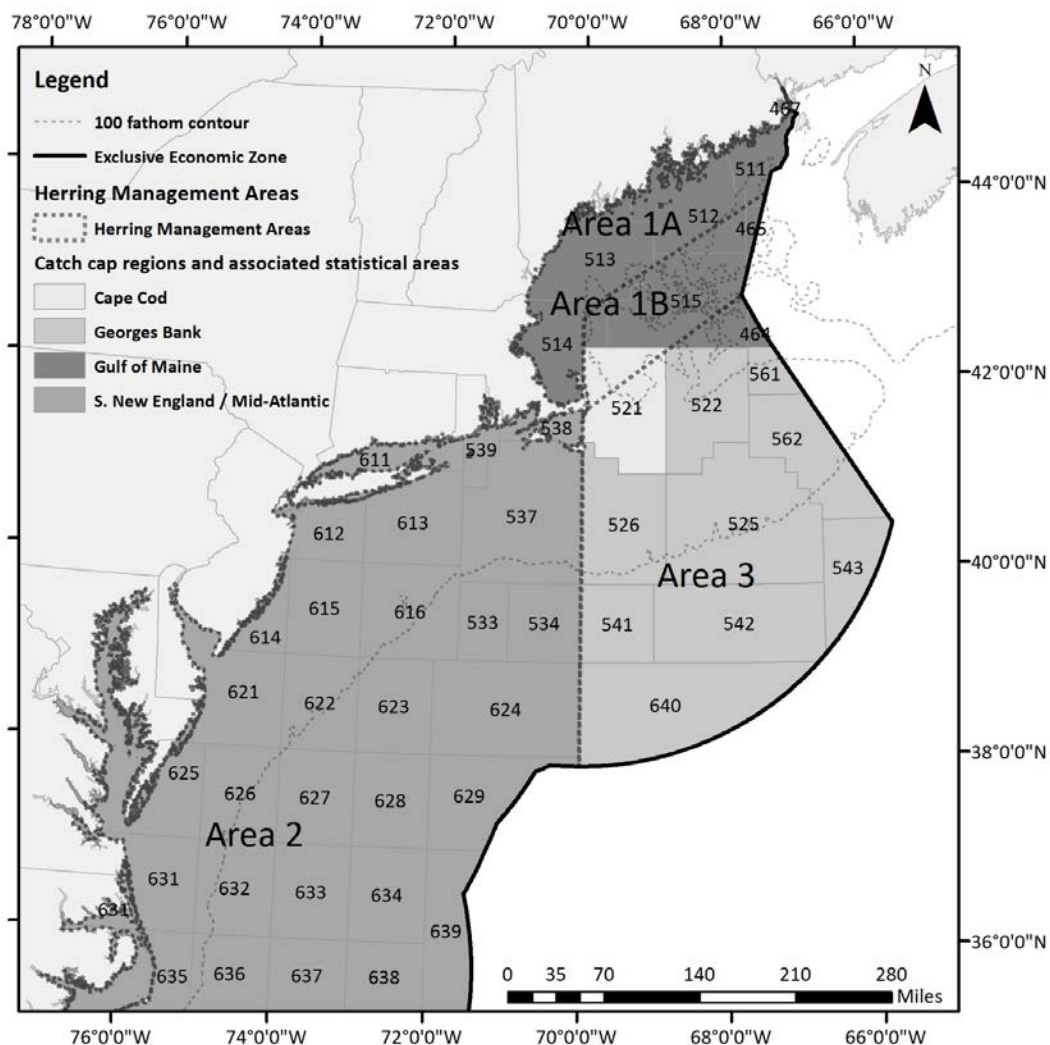
<https://www.greateratlantic.fisheries.noaa.gov/aps/monitoring/riverherringshad.html>.

In 2018, the Council developed a white paper to support its consideration of adding river herring and shad as stocks in the Atlantic herring fishery. The white paper reviewed previous decisions on this issue, reviewed the legal requirements, summarized the species and fishery information, described updated actions taken related to RH/S, summarized new research, and identified potential actions for this issue (NEFMC 2018b). The Council discussed the issue at its April and June 2018 meetings and decided to maintain the current management structure for river herring and shad, and not add these as stocks in the Atlantic Herring FMP at this time.

In June 2019, NMFS completed a review of the status of alewife and blueback herring. They determined that listing these species under ESA is not warranted at this time (*Federal Register* notice: <https://deferalregister.gov/d/2019-12908>). The determination found that while river herring have declined from historical numbers, and overutilization remains a risk to these species, recent fisheries management efforts have helped to reduce risks from fishing mortality. NMFS found that while the abundance of river herring in some rivers continues to be depleted, there are robust populations in other areas.



**Map 2. Atlantic herring management areas and RH/S catch cap areas.**



#### 4.2.1 Monitoring of Non-target Species in the Herring Fishery

Fishery bycatch is monitored primarily using Federal fishery observers, though observer rates have varied annually and by fishery. Calculating an observer rate by gear type is difficult due to the overlap with other fisheries (e.g., overlap with squid and whiting in the small-mesh bottom trawl (SMBT) fishery). Thus, the data in Table 14 were pulled in a more general approach and included all trips by the three main gear types used in the Atlantic herring fishery. Observed purse seine and midwater trawl trips are predominantly targeting Atlantic herring, while non-herring trips are included in the SMBT coverage rates reported here. Amendment 8 includes detailed analyses of the bycatch species for each gear type used in the herring fishery.



**Table 14. Midwater trawl (MWT), purse seine (PS), and small mesh bottom trawl (SMBT) observer coverage rates, SBRM (April-March) years 2012-2019**

Gear	2012	2013	2014	2015	2016	2017	2018	2019
Midwater Trawl	40.5%	24.3%	19.9%	5.3%	20.9%	10.7%	4.1%	8.7%
Purse Seine	5.2%	6.0%	3.7%	2.1%	2.2%	1.7%	1.0%	*
Smallmesh Bottom Trawl	4.3%	8.0%	10.1%	9.1%	10.9%	17.2%	13.8%	14.1%

*Source:* DMIS and ODBS databases as of September 1, 2020.  
*Notes:* MWT includes both single and paired midwater trawl gears; PS excludes tuna purse seine trip; SMBT includes bottom trawl gear with codend mesh size less than 5.5" excluding bottom otter twin trawl, scallop and shrimp trawl trips.  
Includes observer trips with at least 1 observed haul divided by VTR trips reporting kept catch, and all fisheries using these gear types, **not** just herring and mackerel fisheries.  
\* Denotes confidential vessel activity information

In February 2020, NOAA Fisheries implemented the New England Industry-Funded Monitoring (IFM) Omnibus Amendment to allow industry-funded monitoring in any fishery managed by the Council to better assess catch and reduce uncertainty around catch estimates. The amendment also established IFM in the herring fishery.

Beginning in 2020, vessels issued Category A or B herring permits are required to pay for at-sea monitoring coverage on trips selected for IFM coverage. IFM coverage is in addition to observer coverage required by the Standardized Bycatch Reporting Methodology (SBRM). The IFM coverage target for the herring fishery is 50 percent of trips and will be calculated by combining SBRM coverage with IFM coverage. This additional coverage will help reduce uncertainty around catch estimates in the herring fishery, especially catch tracked against haddock and river herring/shad catch caps.

Midwater trawl vessels have the option of being issued an exempted fishing permit (EFP) to use electronic monitoring and portside sampling instead of at-sea monitoring coverage to satisfy IFM requirements. NOAA Fisheries worked with interested vessels to develop the terms and conditions of the EFP.

The amendment maintains the requirement that midwater trawl vessels must carry an observer to fish in the Groundfish Closed Areas; however, beginning in 2020 vessel owners will have the option of purchasing observer coverage to access Groundfish Closed Areas.

The start date to begin assigning IFM coverage in the herring fishery is delayed until later in 2020. The training class for new portside samplers in the herring fishery was delayed due to the health mandates and travel restrictions in place in 2020 and will be rescheduled for later in 2020. Until this training occurs, IFM portside sampling coverage will not be available for midwater trawl herring vessels that are enrolled in the electronic monitoring and portside sampling EFP. NOAA Fisheries does not intend to select herring vessels for IFM at-sea monitoring coverage until IFM portside sampling coverage is also available for EFP vessels. For this reason, NOAA Fisheries will not be selecting any herring vessels for IFM coverage until after the portside sampling training has been completed.

Framework 6 included a detailed description of the monitoring program in place before implementation of IFM as well as the various reporting requirements and methods used to monitor herring and bycatch in the herring fishery.

## 4.3 PROTECTED SPECIES

Protected species are those afforded protections under the Endangered Species Act (ESA; species listed as threatened or endangered under the ESA) and/or the Marine Mammal Protection Act (MMPA). **Table 15** lists protected species that occur in the affected environment of the Atlantic herring FMP and have the potential to be impacted by the proposed action (i.e., based on the most recent 10 years of data, there have been observed/documentated interactions in the fishery or with gear type(s) similar to those primarily used in the fishery (i.e., midwater trawl and purse seine gear)).

**Table 15. Species protected under the ESA and/or MMPA that may occur in the affected environment of the herring FMP.**

Species	Status <sup>2</sup>	Potential to interact with Atlantic herring fishing gear?
<b>Cetaceans</b>		
<b>North Atlantic right whale (<i>Eubalaena glacialis</i>)</b>	<b>Endangered</b>	<b>No</b>
Humpback whale, West Indies DPS, ( <i>Megaptera novaeangliae</i> )	Protected (MMPA)	Yes
<b>Fin whale (<i>Balaenoptera physalus</i>)</b>	<b>Endangered</b>	<b>Yes</b>
<b>Sei whale (<i>Balaenoptera borealis</i>)</b>	<b>Endangered</b>	<b>Yes</b>
<b>Blue whale (<i>Balaenoptera musculus</i>)</b>	<b>Endangered</b>	<b>No</b>
<b>Sperm whale (<i>Physeter macrocephalus</i>)</b>	<b>Endangered</b>	<b>No</b>
Minke whale ( <i>Balaenoptera acutorostrata</i> )	Protected (MMPA)	Yes
Pilot whale ( <i>Globicephala</i> spp.) <sup>3</sup>	Protected (MMPA)	Yes
Pygmy sperm whale ( <i>Kogia breviceps</i> )	Protected (MMPA)	No
Dwarf sperm whale ( <i>Kogia sima</i> )	Protected (MMPA)	No
Risso's dolphin ( <i>Grampus griseus</i> )	Protected (MMPA)	Yes
Atlantic white-sided dolphin ( <i>Lagenorhynchus acutus</i> )	Protected (MMPA)	Yes
Short Beaked Common dolphin ( <i>Delphinus delphis</i> )	Protected (MMPA)	Yes
Atlantic Spotted dolphin ( <i>Stenella frontalis</i> )	Protected (MMPA)	No
Striped dolphin ( <i>Stenella coeruleoalba</i> )	Protected (MMPA)	No
Beaked whales ( <i>Ziphius and Mesoplodon</i> spp) <sup>4</sup>	Protected (MMPA)	No
<b>Bottlenose dolphin (<i>Tursiops truncatus</i>)<sup>5</sup></b>	<b>Protected (MMPA)</b>	<b>No</b>
Harbor porpoise ( <i>Phocoena phocoena</i> )	Protected (MMPA)	No
<b>Pinnipeds</b>		
Harbor seal ( <i>Phoca vitulina</i> )	Protected (MMPA)	Yes
Gray seal ( <i>Halichoerus grypus</i> )	Protected (MMPA)	Yes
Harp seal ( <i>Phoca groenlandicus</i> )	Protected (MMPA)	No
Hooded seal ( <i>Cystophora cristata</i> )	Protected (MMPA)	No
<b>Sea Turtles</b>		
Leatherback sea turtle ( <i>Dermochelys coriacea</i> )	Endangered	No
Kemp's ridley sea turtle ( <i>Lepidochelys kempii</i> )	Endangered	No

Species	Status <sup>2</sup>	Potential to interact with Atlantic herring fishing gear?
Green sea turtle, North Atlantic DPS ( <i>Chelonia mydas</i> )	Threatened	No
Loggerhead sea turtle ( <i>Caretta caretta</i> ), Northwest Atlantic Ocean DPS	Threatened	No
Hawksbill sea turtle ( <i>Eretmochelys imbricate</i> )	Endangered	No
<b>Fish</b>		
Cusk ( <i>Brosme brosme</i> )	Candidate	No
Giant manta ray ( <i>Manta birostris</i> )	Threatened	No
Atlantic salmon	Endangered	No
Atlantic sturgeon ( <i>Acipenser oxyrinchus</i> )		
Gulf of Maine DPS	Threatened	No
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	No
<b>Critical Habitat</b>		
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA (Protected)	No
North Atlantic Right Whale Critical Habitat	ESA (Protected)	No
<p><i>Notes:</i> Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks.<sup>1</sup> Shaded rows indicate species who prefer continental shelf edge/slope waters (i.e., &gt;200 meters).</p> <p><sup>1</sup> A strategic stock is defined under the MMPA as a marine mammal stock for which: (1) the level of direct human-caused mortality exceeds the potential biological removal level; (2) based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Section 3 of the MMPA of 1972).</p> <p><sup>2</sup> Status is defined by whether the species is listed under the ESA as endangered (i.e. at risk of extinction), threatened (i.e. at risk of endangerment), or protected under the MMPA. Marine mammals listed under the ESA are also protected under the MMPA. Candidate species are those species for which ESA listing may be warranted.</p> <p><sup>3</sup> There are 2 species of pilot whales: short finned (<i>G. melas melas</i>) and long finned (<i>G. macrorhynchus</i>). Due to the difficulties in identifying the species at sea, they are often referred to as <i>Globicephala spp.</i></p> <p><sup>4</sup> There are multiple species of beaked whales in the Northwest Atlantic. They include the cuvier's (<i>Ziphius cavirostris</i>), blainville's (<i>Mesoplodon densirostris</i>), gervais' (<i>Mesoplodon europaeus</i>), sowerbys' (<i>Mesoplodon bidens</i>), and trues' (<i>Mesoplodon mirus</i>) beaked whales. Species of <i>Mesoplodon</i> are difficult to identify at sea, therefore, much of the available characterization for beaked whales is to the genus level only.</p> <p><sup>5</sup> This includes the Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal Stocks of Bottlenose Dolphins.</p>		

Cusk is a NMFS "candidate species" under the ESA. Candidate species are those petitioned species for which NMFS has determined that listing may be warranted under the ESA and those species for which NMFS has initiated an ESA status review through an announcement in the *Federal Register*. If a species is proposed for listing, the conference provisions under Section 7 of the ESA apply (50 CFR 402.10); however, candidate species receive no substantive or procedural protection under the ESA. Thus, cusk will not be discussed further in this and the following sections; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on

candidate species from any proposed action. Additional information on cusk can be found at: <https://www.greateratlantic.fisheries.noaa.gov/protected/pcp/cs/index.html>.

### **4.3.1 Protected Species and Critical Habitat Not Likely to be Impacted (via interactions with gear or destruction of essential features of critical habitat) by the Atlantic herring FMP**

Based on available information, it has been determined that this action is not likely to impact (via interactions with gear or destruction of essential features of critical habitat) multiple ESA listed and/or marine mammal protected species or any designated critical habitat (**Table 15**). This determination has been made because either the occurrence of the species is not known to overlap with the area primarily affected by the action and/or, based on the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports, there have been no documented interactions between the species and the primary gear type used to prosecute the Atlantic herring fishery (i.e., purse seine and midwater (including pair trawl) Marine Mammal Stock Assessment Reports: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region>; MMPA List of Fisheries (LOF): <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries>; NMFS Observer Program, unpublished data; Sea Turtle Disentanglement Network (STDN) (unpublished data); NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): <https://nefsc.noaa.gov/publications/crd/>).<sup>1</sup> In the case of critical habitat, this determination has been made because operation of the Atlantic herring fishery will not affect the essential physical and biological features of North Atlantic right whale or loggerhead (NWA DPS) critical habitat and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2014a; b; 2015).

### **4.3.2 Protected Species Potentially Impacted by the Proposed Action**

#### **4.3.2.1 Large Whales**

Large whales, such as humpback, fin, sei, and minke whales are found throughout the waters of the Northwest Atlantic Ocean. Generally, these species follow an annual pattern of migration between low latitude (south of 35°N) wintering/calving grounds and high latitude spring/summer foraging grounds (primarily north of 41°N; Hayes et al. 2019; NMFS 1991; 2010; 2011). This is a simplification of whale movements, particularly as it relates to winter movements. It is unknown if all individuals of a population migrate to low latitudes in the winter, although increasing evidence suggests that for some species (e.g., humpback whales), some portion of the population remains in higher latitudes throughout the winter (Brown et al. 2002; Clapham et al. 1993; Cole et al. 2013; Khan et al. 2010; 2011; 2012; Khan et al. 2009; NOAA 2008; Swingle et al. 1993; Vu et al. 2012; Waring et al. 2014). Although further research is needed to provide a clearer understanding of large whale movements and distribution in the winter, the distribution and movements of large whales to foraging grounds in the spring/summer is well understood. Large whales consistently return to these foraging areas each year, therefore these areas can be considered important areas for whales (Baumgartner et al. 2003; Baumgartner & Mate 2003; Brown, et al. 2002; Kenney 2001; Kenney et al. 1986; Kenney et al. 1995; Mayo & Marx 1990; Payne et al. 1986; Payne et

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<sup>1</sup> For marine mammals protected under the MMPA the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports are from 2007-2016; for ESA listed species, it is from 2010-2019.

al. 1990; Schilling et al. 1992). For additional information on the biology, status, and range wide distribution of whale species, see the marine mammal stock assessment reports provided at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region>.

#### 4.3.2.2 Small Cetaceans and Pinnipeds

**Table 15** lists the small cetaceans and pinnipeds that may occur in the affected environment of the Atlantic herring fishery. Small cetaceans can be found throughout the year in the Northwest Atlantic Ocean; however, within this range, there are seasonal shifts in species distribution and abundance. Pinnipeds are primarily found throughout the year or seasonally from New Jersey to Maine; however, increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, North Carolina (35°N). For additional information on the biology and range wide distribution of each species of small cetacean and pinniped in **Table 15**, see the marine mammal stock assessment reports at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region>.

### 4.3.3 Gear Interactions with Protected Species

As in Section 4.3.4, based on VTR data, the Atlantic herring fishery is primarily prosecuted with purse seine and midwater trawl (single or pair) gears, and to a lesser extent by small mesh bottom trawl gear. Specifically, since 2008, VTR data indicates that small mesh bottom trawl vessels account for under 10% of herring landings. Given that bottom trawl effort in the Atlantic herring fishery is so small, as seen by the small amount of catches of this species by this gear type, and because the alternatives described in this document are not expected to result in a notable change in fishing effort using this gear types, there is low likelihood that any protected species interactions with the Atlantic herring fishery will be due to interactions with bottom trawl gear. Thus, the following sections only focus on interaction risks to protected species associated with purse seine and midwater trawl (single or pair) gears.

#### 4.3.3.1 Gear Interactions with Marine Mammals

Depending on species, marine mammal interactions have been observed in purse seine, and/or midwater trawl gear. Pursuant to the MMPA, NMFS publishes a List of Fisheries (LOF) annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery (i.e., Category I=frequent; Category II=occasional; Category III=remote likelihood or no known interactions). The most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports are from 2007-2016. MMPA LOF's issued between 2015 and 2020 encompass this timeframe, with each year the LOF was issued categorizing the Gulf of Maine herring purse seine fishery as a Category III fishery, and commercial midwater trawl fisheries (Northeast or Mid-Atlantic) as Category II fisheries.

##### 4.3.3.1.1 Large Whales

**Midwater Trawl.** Based on the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports (i.e., 2007-2016), minke whales are the only large whale species in which an interaction with midwater trawl gear has been observed or documented. There has been only one observed minke whale incidentally taken in midwater trawl gear. The incident occurred in 2009 and was a result of a minke whale becoming entangled in NOAA research midwater trawl gear (whale was released alive, but seriously injured; Henry *et al.* 2015). Since this incident, there have been no observed or

reported interactions between minke whales and midwater trawl gear.<sup>2</sup> In fact, the most recent marine mammal stock assessment report, which covers the years 2012-2016, estimates the annual average minke whale mortality and serious injury from the Northeast Midwater Trawl Fishery to be zero (Hayes, et al. 2019). Based on this information, although interactions between midwater trawl gear and minke whales are possible, the risk of an interaction is expected to be low.

**Purse Seine.** Since 2008, three humpback whales and one (1) fin/sei whale (species could not be identified) were reported as possibly interacting with purse seine gear operating in the Gulf of Maine targeting Atlantic herring (i.e., animals were incidentally encircled as purse seine was being closed, but no indication contact with the seine was made). All interactions, however, resulted in the animals being released from the nets unharmed (Cole, et al. 2013; Henry et al. 2017; Henry et al. 2014; 2015; 2016; Henry et al. 2019; Morin et al. 2010) (<https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region>). Thus, although interactions are possible with large whales, purse seines are **not expected to be a source of injury or mortality** to them.

#### 4.3.3.1.2 Small Cetaceans and Pinnipeds

**Midwater Trawl Gear.** Several species of small cetaceans and pinnipeds are at risk of interacting with midwater trawl gear.<sup>3</sup> For marine mammals protected under the MMPA, the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports are from 2007-2016. MMPA LOF's issued between 2015 and 2020 encompass this timeframe and were reviewed to provide a list of species that have been observed (incidentally) seriously injured and/or killed between 2007 and 2016 by List of Fisheries Category II midwater trawl fisheries that operate in the affected environment of the Atlantic herring fishery.

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<sup>2</sup> Refer to: Marine Mammal Stock Assessment Reports: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region>; Cole et al. 2013; and, Henry et al. 2014, 2015, 2016, 2017, 2019.

<sup>3</sup> For additional information on small cetacean and pinniped interactions, see: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region>, as well as the MMPA LOF at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries>



**Table 16. Small cetacean and pinniped species observed seriously injured and/or killed by Category II midwater trawl fisheries in the affected environment of the Atlantic herring fishery.**

Fishery	Category	Species Observed or reported Injured/Killed
Mid-Atlantic Midwater Trawl (including Pair Trawl)	II	Harbor seal
		Gray Seal
		White-sided dolphin
		Risso’s dolphin
		Short-beaked common dolphin
		Pilot whale (long- and short-finned)
Northeast Midwater Trawl (including Pair Trawl)	II	Gray seal
		Harbor seal
		Short-beaked common dolphin
		White-sided dolphin
		Pilot whale (long- and short-finned)
Sources: MMPA 2015-2020 LOFs at: <a href="https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries">https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries</a>		

In 2006, based on observed midwater trawl interactions with long-finned pilot whales, short -finned pilot whales, common dolphins, and white sided dolphins, the Atlantic Trawl Gear Take Reduction Team (ATGTRT) was convened to address the incidental mortality and serious injury of these species incidental to bottom and midwater trawl fisheries operating in both the New England and Mid-Atlantic regions. Because none of the marine mammal stocks of concern to the ATGTRT are classified as a “strategic stock”, nor do they currently interact with a Category I fishery,<sup>4</sup> it was determined that development of a take reduction plan was not necessary. In lieu of a take reduction plan, the ATGTRT agreed to develop an Atlantic Trawl Gear Take Reduction Strategy (ATGTRS). The ATGTRS identifies informational and research tasks, as well as education and outreach needs that it believes are necessary to provide the basis for decreasing mortalities and serious injuries of marine mammals to insignificant levels approaching zero. The ATGTRS also identifies several voluntary measures that can be adopted by certain trawl fishing sectors to potentially reduce the incidental capture of marine mammals.<sup>5</sup>

**Purse Seine.** There have been no observed small cetacean interactions with purse seines used to prosecute any Greater Atlantic Region fishery (primarily Gulf of Maine Atlantic herring). As a result, this gear type is not expected to pose an interaction risk with small cetacean species, and therefore, is not expected to be source of serious injury or mortality to any small cetacean.

Purse seines, however, specifically those operating in the Gulf of Maine targeting Atlantic herring, are known to interact with pinniped species. Between 2007 and 2016, pinniped species have been observed in purse seine gear; none of these interactions have resulted in mortality or confirmed serious injury to the seal (Table 5) (Hayes, et al. 2019; Josephson et al. 2019). As a result, although interactions are possible with seals, we do not expect purse seines to pose a serious injury or mortality risk to these species. This conclusion is further supported by the fact that the List of Fisheries has identified the Gulf of Maine

<sup>4</sup> Category I fisheries have frequent incidental mortality and serious injury of marine mammals.

<sup>5</sup> For additional details on the ATGTRS, visit: <http://www.greateratlantic.fisheries.noaa.gov/Protected/mmp/atgtrp/>

Atlantic herring purse seine fishery as a Category III fishery, that is, a fishery that causes a remote to no likelihood of causing serious injury or mortality to marine mammals.

**Table 17. 2007-2016 Observed gray and harbor seal interactions with the Gulf of Maine Atlantic herring purse seine fishery.**

Seal Species	Number of Observed Interactions	Released Alive (No Serious Injury or Mortality)
Unknown	12	Yes
Harbor Seal	6	Yes
Gray Seal	85	Yes

#### 4.3.4 Seabirds

Section 3.4.4 of Amendment 8 includes detailed information on seabirds of the North Atlantic. Over 20 species of seabirds in the northeast rely on herring as prey during parts of their lifecycle, and some of these species are identified as species of Greatest Conservation Need (NEFMC 2018a, Table 19). Some of these species are also known to be caught incidentally during herring fishing operations (Hatch 2018; Hatch et al. 2016). The United States Fish and Wildlife Service (USFWS) is responsible for the conservation and management of seabirds and works with state agencies and NGO's to manage seabird colonies along the entire eastern seaboard.

### 4.4 PHYSICAL ENVIRONMENT AND ESSENTIAL FISH HABITAT

The Atlantic herring fishery occurs in four areas defined as Areas 1A, 1B, 2, and 3 (Map ???). These areas collectively cover the entire Northeast U.S. shelf ecosystem, which has been defined as the Gulf of Maine south to Cape Hatteras, North Carolina, extending from the coast seaward to the edge of the continental shelf, including offshore to the Gulf Stream (Sherman et al. 1996). Roughly, Areas 1A and 1B cover the Gulf of Maine, Area 2 covers southern the New England/Mid-Atlantic region, and Area 3 covers Georges Bank. Amendment 5 to the Atlantic Herring FMP includes a detailed characterization of these areas.

The current EFH designation for Atlantic herring was developed through Omnibus Habitat Amendment 2 (OHA2). The designations for adults and juveniles identify nearly the entire Gulf of Maine as EFH and designate additional areas on the southern half of Georges Bank and throughout the Mid-Atlantic Bight. The larval designation includes scattered locations throughout the Gulf of Maine and Georges Bank. The egg designation includes shallower waters of the Gulf of Maine and Georges Bank. Interactive maps of EFH for each species and life stage are on the NOAA EFH Mapper:

<http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html>. Details are in OHA2 Volume 2 (designations), Appendix A (designation methods), and Appendix B (supplementary information; <http://www.nefmc.org/library/omnibus-habitat-amendment-2>).

The environment that may be affected by the Proposed Action has been identified as EFH for the benthic life stages of several species (**Table 18**). Additional information is in the FMP document that most recently updated each species' EFH designation and NOAA the EFH mapper referenced above.



**Table 18. Current EFH designation information sources (Note OHA2 = Omnibus Habitat Amendment 2)**

Species	Authority	Plan Managed Under	Most recent update
Monkfish	NEFMC, MAFMC	Monkfish	OHA2
Atlantic herring	NEFMC	Atlantic Herring	OHA2
Atlantic salmon	NEFMC	Atlantic salmon	OHA2
Atlantic sea scallop	NEFMC	Atlantic Sea Scallop	OHA2
American plaice	NEFMC	NE Multispecies	OHA2
Atlantic cod	NEFMC	NE Multispecies	OHA2
Atlantic halibut	NEFMC	NE Multispecies	OHA2
Atlantic wolffish	NEFMC	NE Multispecies	OHA2
Haddock	NEFMC	NE Multispecies	OHA2
Ocean pout	NEFMC	NE Multispecies	OHA2
Offshore hake	NEFMC	NE Multispecies	OHA2
Pollock	NEFMC	NE Multispecies	OHA2
Red hake	NEFMC	NE Multispecies	OHA2
Redfish	NEFMC	NE Multispecies	OHA2
Silver hake	NEFMC	NE Multispecies	OHA2
White hake	NEFMC	NE Multispecies	OHA2
Windowpane flounder	NEFMC	NE Multispecies	OHA2
Winter flounder	NEFMC	NE Multispecies	OHA2
Witch flounder	NEFMC	NE Multispecies	OHA2
Yellowtail flounder	NEFMC	NE Multispecies	OHA2
Barndoor skate	NEFMC	NE Skate Complex	OHA2
Clearnose skate	NEFMC	NE Skate Complex	OHA2
Little skate	NEFMC	NE Skate Complex	OHA2
Rosette skate	NEFMC	NE Skate Complex	OHA2
Smooth skate	NEFMC	NE Skate Complex	OHA2
Thorny skate	NEFMC	NE Skate Complex	OHA2
Winter skate	NEFMC	NE Skate Complex	OHA2
Red crab	NEFMC	Red Crab	OHA2
Spiny dogfish	MAFMC/NEFMC	Spiny Dogfish	Original FMP
Atlantic surfclam	MAFMC	Atlantic Surfclam Ocean Quahog	Amendment 12
Ocean quahog	MAFMC	Atlantic Surfclam Ocean Quahog	Amendment 12
Bluefish	MAFMC	Bluefish FMP	Amendment 1
Atlantic mackerel	MAFMC	Squid, Mackerel, Butterfish	Amendment 11
Butterfish	MAFMC	Squid, Mackerel, Butterfish	Amendment 11
Longfin squid	MAFMC	Squid, Mackerel, Butterfish	Amendment 11
Shortfin squid ( <i>Illex</i> )	MAFMC	Squid, Mackerel, Butterfish	Amendment 11
Black sea bass	MAFMC	Summer Flounder, Scup, and Black Sea Bass	Amendment 12
Scup	MAFMC	Summer Flounder, Scup, and Black Sea Bass	Amendment 12
Summer flounder	MAFMC	Summer Flounder, Scup, and Black Sea Bass	Amendment 12
Golden Tilefish	MAFMC	Tilefish	Amendment 1
Blueline Tilefish	MAFMC	Tilefish	Amendment 6
Chub Mackerel	MAFMC	Atlantic Mackerel, Squid, Butterfish	Amendment 21

## 4.5 HUMAN COMMUNITIES

This action evaluates the effect management alternatives may have on the economy, way of life, and traditions of human communities. These social and economic impacts may be driven by changes in fishery flexibility, opportunity, stability, certainty, safety, and/or other factors. While social and economic impacts could be solely experienced by individuals, it is more likely that impacts would be experienced across communities, gear types, and/or vessel size classes.

Summarized here are the fisheries and human communities most likely to be impacted by the Alternatives under Consideration. Social, economic and fishery information herein helps describe the response of the fishery to past management actions and predicting how the Framework 8 alternatives may affect human communities. Also, this section establishes a descriptive baseline to compare predicted and actual changes resulting from management. Additional information is contained in Amendment 8 (NEFMC 2018a, Volume I, Section 3.6).

MSA Section 402(b), 16 U.S.C. 1881a(b) states that no information gathered in compliance with the Act can be disclosed, unless aggregated to a level that obfuscates the identity of individual submitters. The fishery data in this amendment are thus aggregated to at least three reporting units, to preserve confidentiality. Additional standards are applied to reporting the fishing activity of specific states or fishing communities. To report landings activity to a specific geographic location, the landings have been attributed to at least three fishing permit numbers and the landings must be sold to three dealer numbers. However, the dealers do not necessarily have to be in the same specific geographic location.

### 4.5.1 Herring Fishery

The U.S. Atlantic herring fishery occurs in the Northwest Atlantic shelf region from Cape Hatteras to Maine, including an active fishery in the inshore Gulf of Maine and seasonally on Georges Bank (**Map 2**). Atlantic herring is managed as one stock complex, but this stock likely has inshore and offshore components that segregate during spawning. In recognition of the spatial structure of the herring resource, the Atlantic herring Annual Catch Limit (ACL) is divided into sub-ACLs and assigned to four herring management areas. Area 1 is the Gulf of Maine (GOM) divided into an inshore (Area 1A) and offshore section (Area 1B); Area 2 is in the coastal waters between MA and NC (generally referred to as southern New England/Mid-Atlantic), and Area 3 is on Georges Bank (GB).

The Atlantic herring fishery generally occurs south of New England in Area 2 during the winter (January-April), and oftentimes as part of the directed mackerel fishery. There is overlap of the herring and mackerel fisheries in Area 2 and in Area 3 during the winter months, although catches in Area 3 tend to be relatively low. The herring summer fishery (May-August) generally occurs throughout the GOM in Areas 1A, 1B and in Area 3 (GB) as fish are available. Restrictions in Area 1A have pushed the fishery in the inshore GOM to later months (late summer). The midwater trawl (single and paired) fleet is restricted from fishing in Area 1A in the months of January through September because of the Area 1A sub-ACL split (0% January-May) and the purse seine-fixed gear only area (all Area 1A) that is effective June-September. A sub-ACL split for Area 1B (0% January – April, 100% May – December) has been effective for all vessels since 2014.

Autumn and winter fishing (September-December) tends to be more variable and dependent on fish availability; the Area 1A sub-ACL is almost always fully used (except in 2017 and 2018), and the inshore GOM fishery usually closes around November. As the 1A and 1B quotas are taken, larger vessels become increasingly dependent on offshore fishing opportunities (Georges Bank, Area 3) when fish may be available. Atlantic herring is caught in state waters and in the New Brunswick weir fishery.

#### 4.5.1.1 Atlantic Herring Permits and Vessels

Amendment 1 to the Atlantic Herring FMP established a limited access program in the herring fishery with three limited access (A, B, C) and one open access (D) permit categories (**Table 19**). The vessels that have not been issued a limited access herring permit but have been issued a limited access mackerel permit, are eligible for a Category E permit, a category established through Amendment 5 (implemented March 2014).

**Table 19. Atlantic herring permit categories.**

	Category	Description
Limited Access	A	Limited access in all management areas.
	B	Limited access in Areas 2 and 3 only.
	C	Limited access in all management areas, with a 25 mt (55,000 lb) Atlantic herring catch limit per trip and one landing per calendar day.
Open Access	D	Open access in all management areas, with a 3 mt (6,600 lb) Atlantic herring catch limit per trip and one landing per calendar day.
	E	Open access in Areas 2 and 3 only, with a 9 mt (20,000 lb) Atlantic herring catch limit per trip and landing per calendar day.

#### *Active Vessels in the Atlantic Herring Fishery*

The following describes the vessels recently participating in the Atlantic herring fishery, including nominal revenues for herring trips. Here, an active herring trip is defined liberally as any trip in which at least one pound of Atlantic herring is retained.

Since 2008, the number of vessels with an Atlantic herring permit has generally decreased (**Table 20**) (NEFMC 2018a, Section 3.6.1.4). This includes a decrease in the limited access directed fishery vessels (Categories A and B), with 39 permitted in 2019. In 2019, 39% of the limited access vessels were active.

Many of the limited access herring vessels (Categories A-C) are also active in the Atlantic mackerel fishery (managed by the MAFMC). For the open access vessels, just 2-4% of the Category D permits have been active since 2008 (**Table 20**) (NEFMC 2014). The Category E permit was implemented during permit year 2013 (May-April) and about 50-55 E permits have been issued annually since, mostly to vessels with a D permit as well; about 4-10% of the E permits have been active.

Although there have been far fewer active limited access versus open access vessels, the limited access vessels account for about 99% of annual Atlantic herring landings and revenues (

**Table 21**).

**Table 20. Fishing vessels with federal Atlantic herring permits, permit years 2011-2019 (May-April).**

Atlantic Herring Permit Year (May-April)										
Permit Category		2011	2012	2013	2014	2015	2016	2017	2018	2019
Limited Access	A only	42 (60%)	42 (57%)	39 (67%)	40 (63%)	42 (50%)	39 (56%)	39 (56%)	38 (58%)	39 (59%)
	B and C only	4*	4*	4 (75%)	4*	4*	4*	4*	3*	4*
	C only	47 (23%)	47 (32%)	44 (30%)	42 (24%)	41 (27%)	41 (24%)	41 (34%)	41 (27%)	40 (20%)
	Total	<b>93 (41%)</b>	<b>93 (44%)</b>	<b>87 (48%)</b>	<b>86 (43%)</b>	<b>87 (39%)</b>	<b>84 (41%)</b>	<b>84 (46%)</b>	<b>82 (43%)</b>	<b>83 (39%)</b>
Open Access	D only	2,147 (3.9%)	2,065 (3.5%)	1,957 (3.3%)	1,838 (3.6%)	1,762 (3.4%)	1,776 (2.9%)	1,759 (3.2%)	1,747 (2.7%)	1,728 (2.0%)
	D and E only			6*	52 (9.6%)	54 (5.6%)	53 (5.7%)	54 (7.4%)	49 (4.1%)	49 (4.1%)
	E only			0	1*	1*	1*	1*	1*	1*
	Total	<b>2,147 (3.9%)</b>	<b>2,065 (3.5%)</b>	<b>1,963 (3.3%)</b>	<b>1,891 (3.8%)</b>	<b>1,817 (3.5%)</b>	<b>1,830 (3%)</b>	<b>1,817 (3.4%)</b>	<b>1,797 (2.8%)</b>	<b>1,778 (2%)</b>
Source: GARFO Permit database and DMIS as of August 2020. ( ) = Percent of vessels in the category that were active.										
*Confidential vessel activity data										

**Table 21. Contribution of herring vessels by permit category to total landings, 2013-2019 (Jan.-Dec.).**

Permit Category		Fishing Year (Jan-Dec)						
		2013	2014	2015	2016	2017	2018	2019
Limited Access	A and BC	96.9%	98.0%	99.0%	98.7%	98.3%	98.7%	98.7%
	C	2.6%	1.7%	0.9%	1.0%	1.0%	0.6%	0.9%
	D, DE, and E	0.1%	0.1%	0.1%	0.2%	0.6%	0.2%	0.4%
Source: GARFO Permit database and DMIS as of August 2020.								

#### 4.5.1.2 Effort in the Herring Fishery

Atlantic herring vessels primarily use purse seines or single or paired midwater trawls (MWT). The MWT fleet has harvested most landings since 2008 (**Table 22**) (NEFMC 2018a, Section 3.6.1.5). Some herring vessels use multiple gear types during the fishing year. Single and pair trawl vessels generally fish in all areas (October-December in Area 1A), though Areas 1A and 1B account for less of their total landings in recent years. The purse seine fleet fishes primarily in Area 1A and to a minor extent, Areas 1B and Area 2. Single MWT vessels have been most active in Area 3. Small mesh bottom trawl vessels account for 4% of herring landings recently; other gear types (e.g., pots, traps, shrimp trawls, hand lines) are under 0.5% of the fishery. Purse seine catch is a larger percentage of total landings, 43% recently (**Table 22**).

**Table 22. Atlantic herring landings (mt) by fishing gear type and area, 2017-2019.**

<b>Gear Type</b>	<b>Area 1A</b>		<b>Area 1B</b>		<b>Area 2</b>		<b>Area 3</b>		<b>Total</b>	
Bottom Trawl	528	1%	49	1%	3,143	20%	168	1%	3,887	4%
Single, Paired Midwater	12,187	21%	4,856	97%	12,146	79%	26,748	99%	55,937	53%
Purse Seine	45,701	78%	103	2%	48	0%			45,852	43%
Other	121	0%			65	1%	212	0%	399	0%
<b>Total</b>	<b>58,536</b>	<b>100%</b>	<b>5,009</b>	<b>100%</b>	<b>15,402</b>	<b>100%</b>	<b>27,128</b>	<b>100%</b>	<b>106,075</b>	<b>100%</b>

*Source:* GARFO. August 2020.  
*Note:* Data include all vessels that landed one pound or more of Atlantic herring. Single and pair midwater trawl data are combined due to data confidentiality restrictions.

#### 4.5.1.3 Atlantic Herring Catch

The Atlantic herring stock-wide ACL and management area sub-ACLs are tracked/monitored based on the total catch, – landings and discards, which is provided and required by herring vessels through the vessel monitoring system (VMS) catch reports and vessel trip reports (VTRs) as well as through Federal/state dealer data. Atlantic herring harvesters are required to report discards in addition to landed catch through these independent reporting methods.

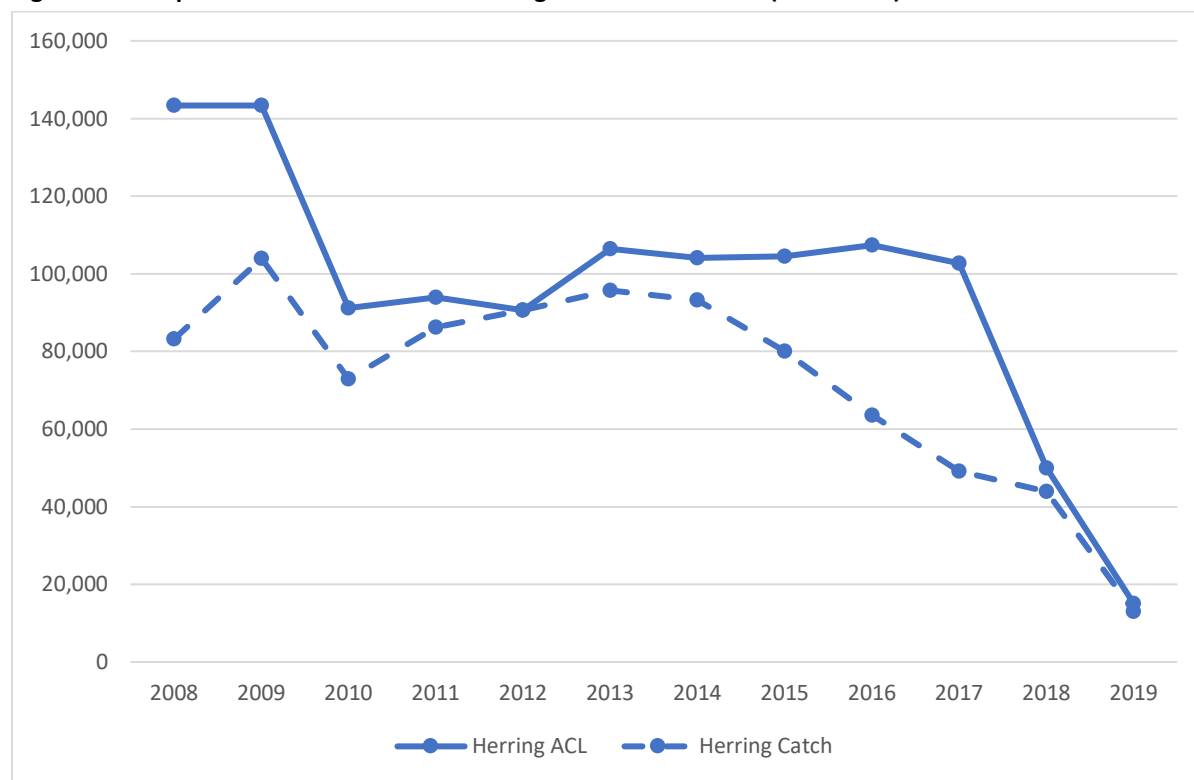
Herring catch limits have declined over time since the FMP was implemented in 1999. The first reduction was in 2006 to about 140,000 mt, followed by another relatively large reduction starting in 2010 with total quotas under 100,000 mt. The total catch limit has remained over 100,000 mt until it was dramatically reduced in 2018 to just under 50,000 mt and again in 2019 to just over 20,000 mt.

Table 23 and Figure 6 compare the annual Atlantic herring ACL and actual catch for 2008-2019. Utilization was relatively high in 2010-2015, and decreased starting in 2016, until ACLs were dramatically reduced in more recent years (2018 and 2019). It should be noted that the ACL is divided into four management areas (1A, 1B, 2 and 3), and the utilization does vary by area. In most years Area 1A is completely utilized, as well as Area 1B; however, Areas 2 and 3 are not usually fully utilized. In several years, some management areas have been closed to directed herring fishing (a 2,000 lb. possession limit is implemented when 92% of that area's sub-ACL is projected to be caught). The right hand column in Table 23 highlights the years when in-season possession limits have been implemented, or in-season bycatch caps were reached (RH/S and GB haddock), also closing an area to directed herring fishing.

**Table 23. Summary of Atlantic annual ACL compared to final catch estimates (2008-2019) including relevant in-season actions**

<b>FY</b>	<b>Herring ACL</b>	<b>Herring Catch</b>	<b>Usage (%)</b>	<b>In-season actions that were implemented</b>
2008	143,350	83,240	58.1%	
2009	143,350	103,943	72.5%	
2010	91,200	72,851	79.9%	
2011	93,905	86,245	91.8%	
2012	90,683	90,561	99.9%	<i>Herring Area 2, 3 and 1A closed early</i>
2013	106,375	95,764	90.0%	<i>Herring Area 2, 1A and 3 closed early</i>
2014	104,088	93,247	89.6%	<i>Herring 1B, 1A and 3 closed early</i>
2015	104,566	80,011	76.5%	<i>GB haddock catch cap in-season AM, Herring Area 1A closed early</i>
2016	107,360	63,581	59.2%	<i>Herring Area 1B closed early</i>
2017	102,656	49,072	47.8%	
2018	49,900	43,878	87.9%	<i>RHS:Mack Closure; RHS:Herr SNE MW and CC MW closures, Herring 1B closure</i>
2019	15,065	13,066	86.7%	<i>RHS:Mack Closure; Herring Area 2 closure</i>

**Figure 6 – Comparison of annual Atlantic herring ACL and final catch (2008-2019)**



#### 4.5.1.4 Border Transfer

“Border Transfer” (BT) is U.S.-caught herring shipped to Canada via Canadian carrier vessels and used for human consumption. This specification is not a set-aside; rather, it is a maximum amount of Atlantic herring caught from Area 1A that can be transshipped to Canadian vessels for human consumption. GARFO tracks BT use through a separate dealer code. Specification of BT has remained at 4,000 mt since the implementation of the Atlantic Herring FMP. For the 2019-2021 specifications BT was set at 100mt. While this activity has not occurred recently, the Council wanted to recognize this traditional part of the fishery and felt it was important for positive trade relations between several U.S. and Canadian seafood companies. However, in the 2019 in-season adjustment BT was set to zero considering the large quota reductions implemented by that action. The Council recommended NMFS set border transfer at 0 mt temporarily to leave as much herring in the U.S. for bait as possible.

Use of border transfer generally decreased from 1994-2013, with 838 mt used in 2013 (21% of 4,000 mt; **Table 24**). No BT was used from 2008-2010, some in 2011-2015, and no BT occurred in 2016-2018. Several Canadian vessels did apply for permits in 2018 to transship U.S.-caught herring to be carried to Canadian processing facilities for human consumption, but there ultimately was no activity.

**Table 24. Use of border transfer, 2013-2018.**

Year	Herring (mt)	Year	Herring (mt)
2013	838	2017	0
2014	796	2018	0
2015	45	2019	0
2016	0		

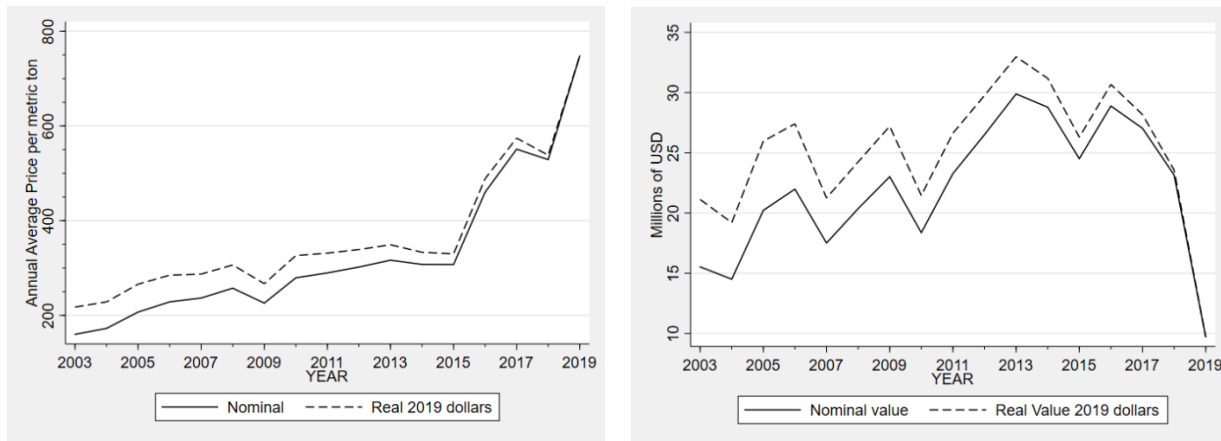
*Source: CFDEERS dealer reported landings as of August 2020.*



#### 4.5.1.5 Fishery Economics

**Fishery prices and value.** From 2004-2015, herring experienced moderate and steady increases in prices (in both real and nominal terms, **Figure 7**). From 2015 to 2019, prices increased dramatically, as total landings decreased (**Error! Reference source not found.**). The price increases offset the decline in landings; however, in 2019, landings and fishery value were historically low.

**Figure 7. Annual average herring prices and total value in real and nominal terms. US GDP Implicit price deflator, 2019=100.**



Source: NMFS dealer data.

Note: U.S. GDP Implicit price deflator, 2019=100.

**Usage, substitutes, and downstream industries.** A large proportion of herring landings are sold as bait, 80-95% over 2015-2019 (**Figure 8**). Herring is used as bait for many fisheries, such as lobster, tuna, and recreational fisheries. Historically, Atlantic herring is used for bait by smaller inshore vessels more than larger offshore vessels, because it is typically less expensive; in addition, alternative bait options like skates tend to be preferred for longer soaks in offshore waters and in southern waters. Generally, the herring used for bait goes through a large wholesale dealer to smaller dealers and lobster wharfs along the coast. The wholesale dealers generally have facilities where they sort, barrel, freeze and store bait for redistribution. The locations and processing and selling techniques also vary. Amendments 1, 5 and 8 further describe the ways in which herring is processed and sold.

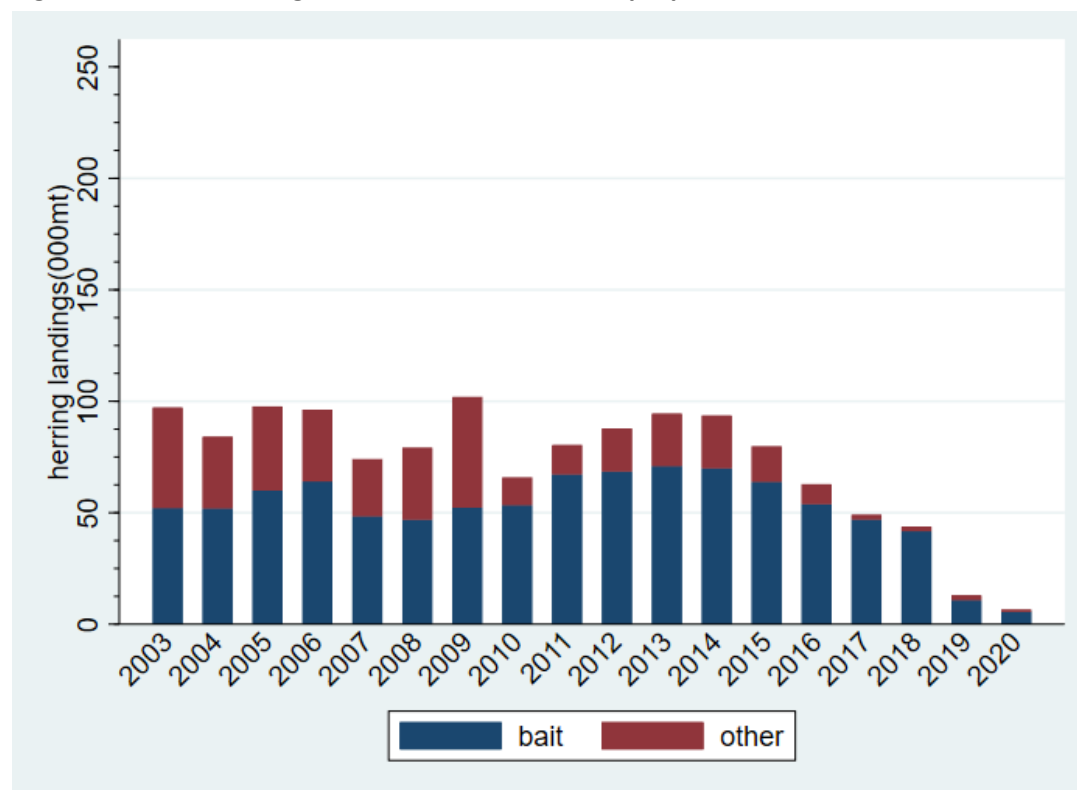
From 2015 to 2019, the annual average price of Atlantic herring has increased from about \$300 to \$750 per metric ton (**Figure 7, Figure 9**). During this time, landings have declined (**Error! Reference source not found.**). Prices are generally highest in the late spring through summer and lowest in the winter. In recent years, landings have been low in late spring/summer often for regulatory reasons.

The lobster industry is the primary consumer of herring as bait. Lobster fishing typically occurs in the second half of the year (June/July through November/December). Lobster prices tend to be highest the late spring and early summer. Annual average lobster prices have been about \$4/lb, except for 2019 (\$5/lb).

The ability of lobstermen to obtain substitute baits for Atlantic herring is constrained by state regulations, storage capacity of bait dealers, and economics. Menhaden is a commonly cited substitute product. The menhaden fishery typically has higher volumes in the second half of the year (June –October/November). Yearly average menhaden prices have been steady around \$200/metric ton (**Figure 10**). As herring landings have declined from 2014-2019, the quantity of menhaden used as bait has increased. The increase in menhaden used as bait has been less than decrease in herring landings. Use of menhaden for

bait has increased in importance relative to fish meal and oil. From 2014 to 2019, the percent of total menhaden landings that were used for bait rose from about 11% to just over 15% (33mt) in 2019 (**Figure 11**). During 2018, *ex-vessel* menhaden prices averaged \$551 per mt in the State of Maine.<sup>6</sup> This was about 4% higher than average *ex-vessel* herring prices that year (\$530/mt).

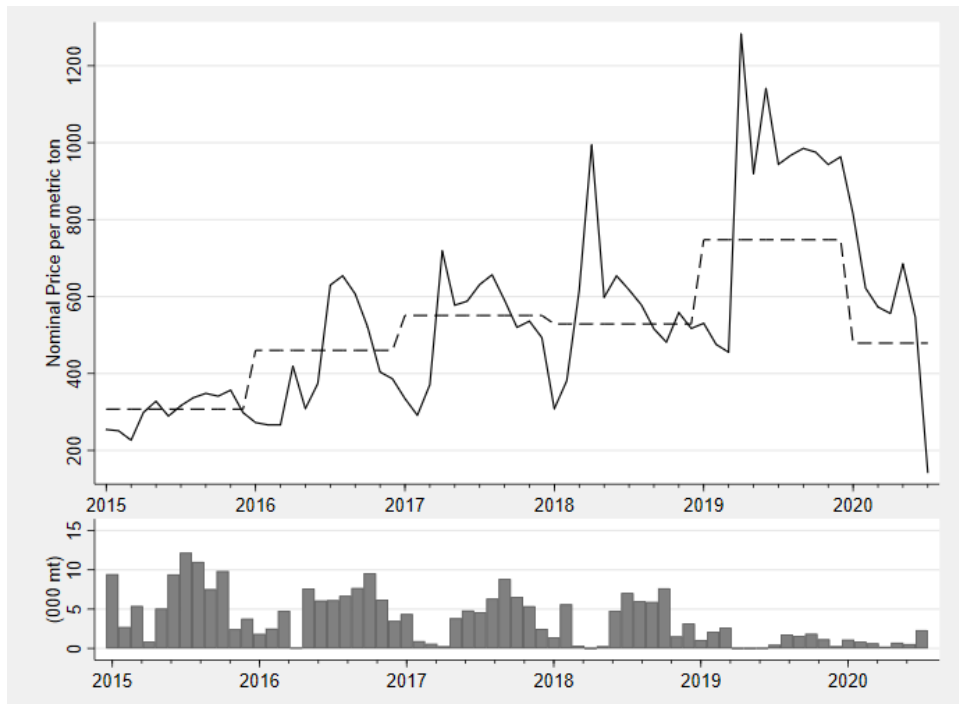
**Figure 8. Annual herring sold for bait and non-bait purposes, 2003-2020.**



Note: Extracted on August 13, 2020; 2020 is preliminary partial year data.

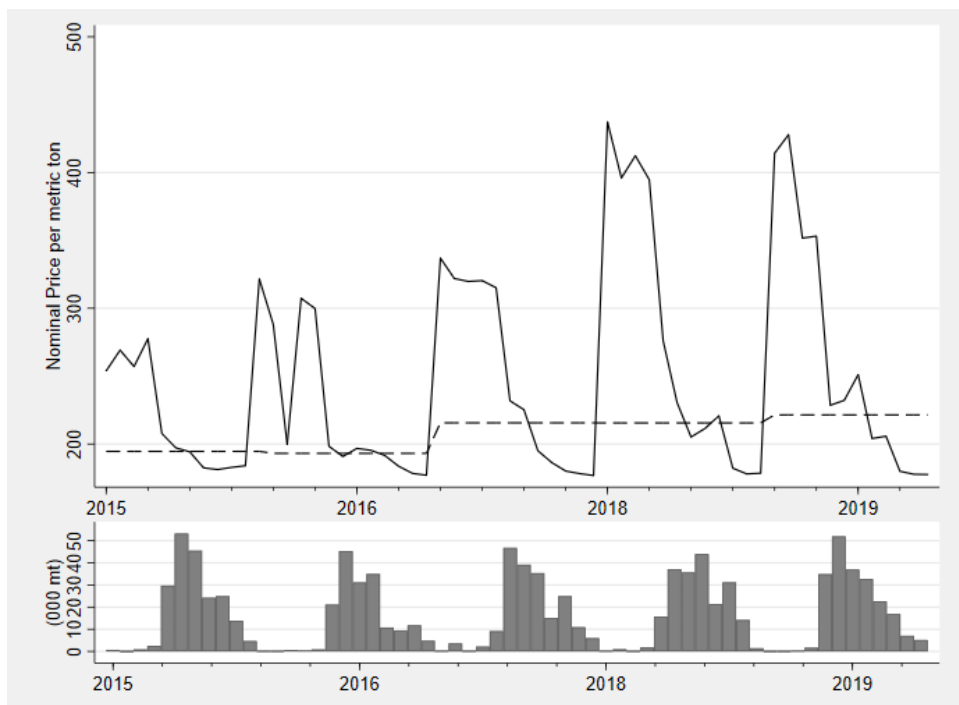
<sup>6</sup> <https://www.maine.gov/dmr/commercial-fishing/landings/documents/14-18LandingsBySpecies.Table.pdf>

**Figure 9. Monthly nominal herring prices (solid); average annual prices (dashed); and monthly landings (bars below), 2003-2020.**



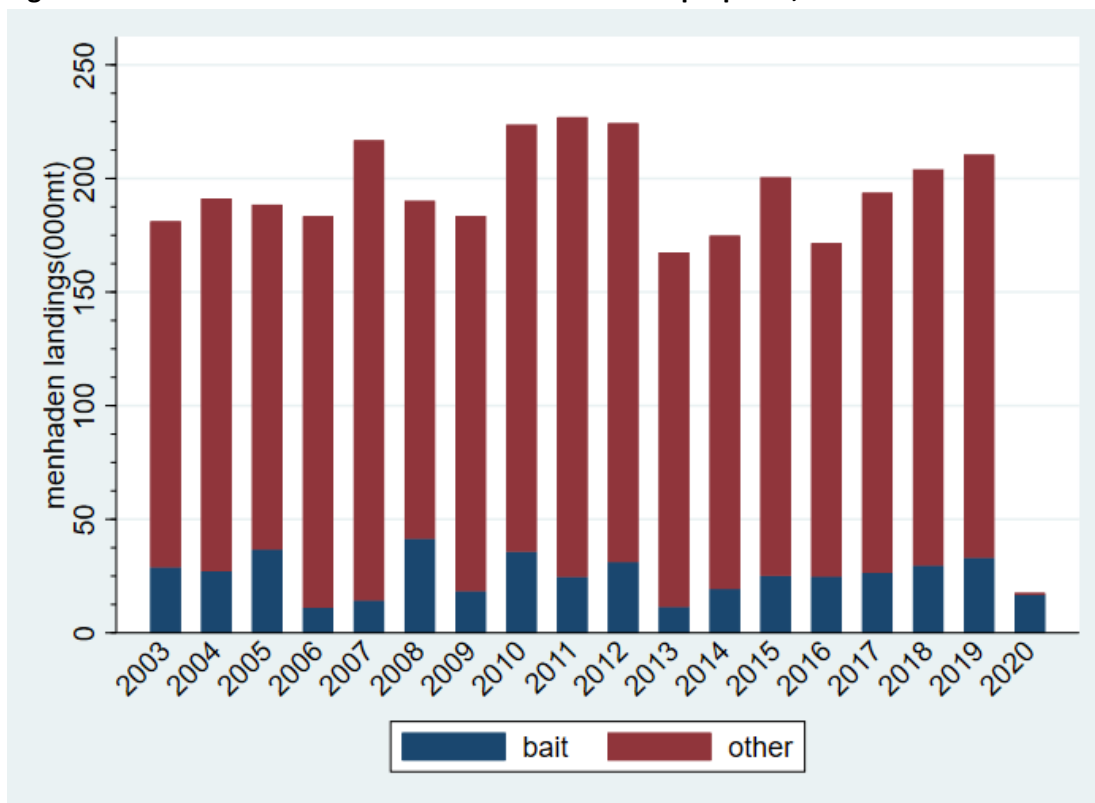
*Note:* Extracted on August 13, 2020; 2020 is preliminary partial year data.

**Figure 10. Monthly menhaden prices (solid); average annual prices (dashed); and monthly landings (bars below), 2003-2019.**



*Note:* Extracted on August 13, 2020.

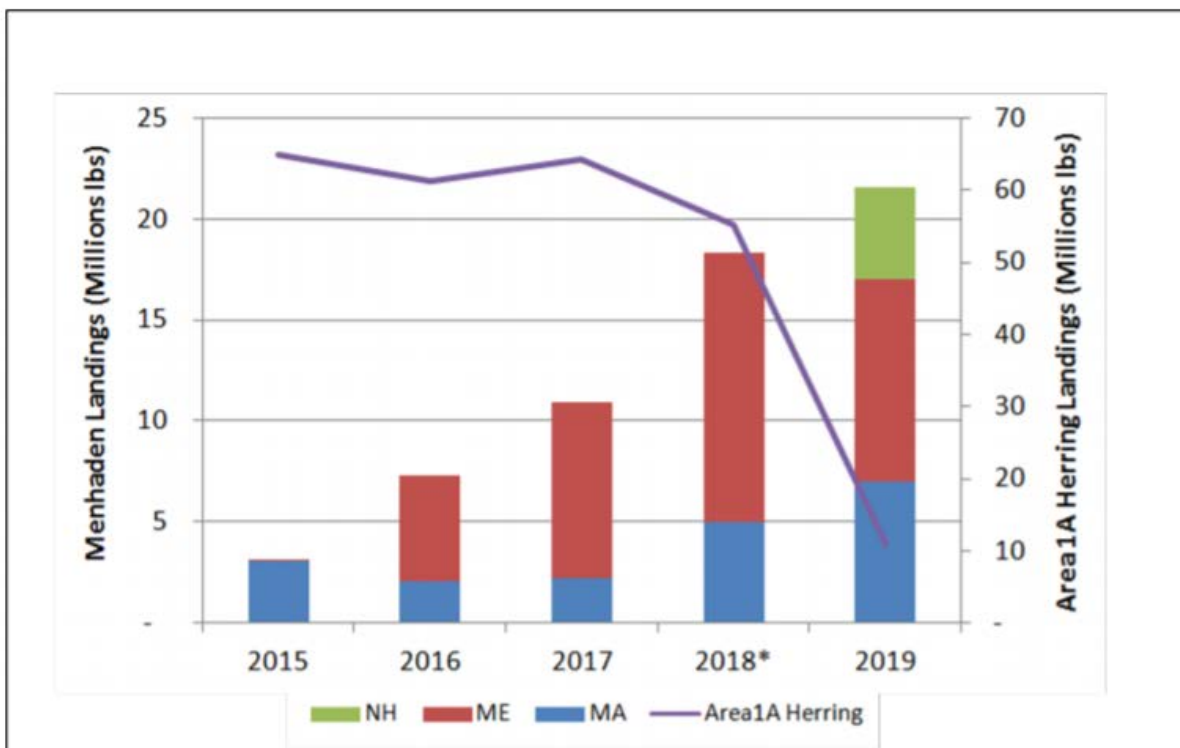
**Figure 11. Annual menhaden sold for bait and non-bait purposes, 2003-2020.**



*Note:* Extracted on August 13, 2020; 2020 is preliminary partial year data.

Other sources of bait for the lobster fishery have increased in recent years as herring has become less available in the GOM. The harvest of menhaden in the GOM has increased for Maine, NH, and Massachusetts (Figure 3, from Draft Addendum III, ASMFC, 2020). This increase has helped supplement the shortage left by the reduced Atlantic herring quota during summer months.

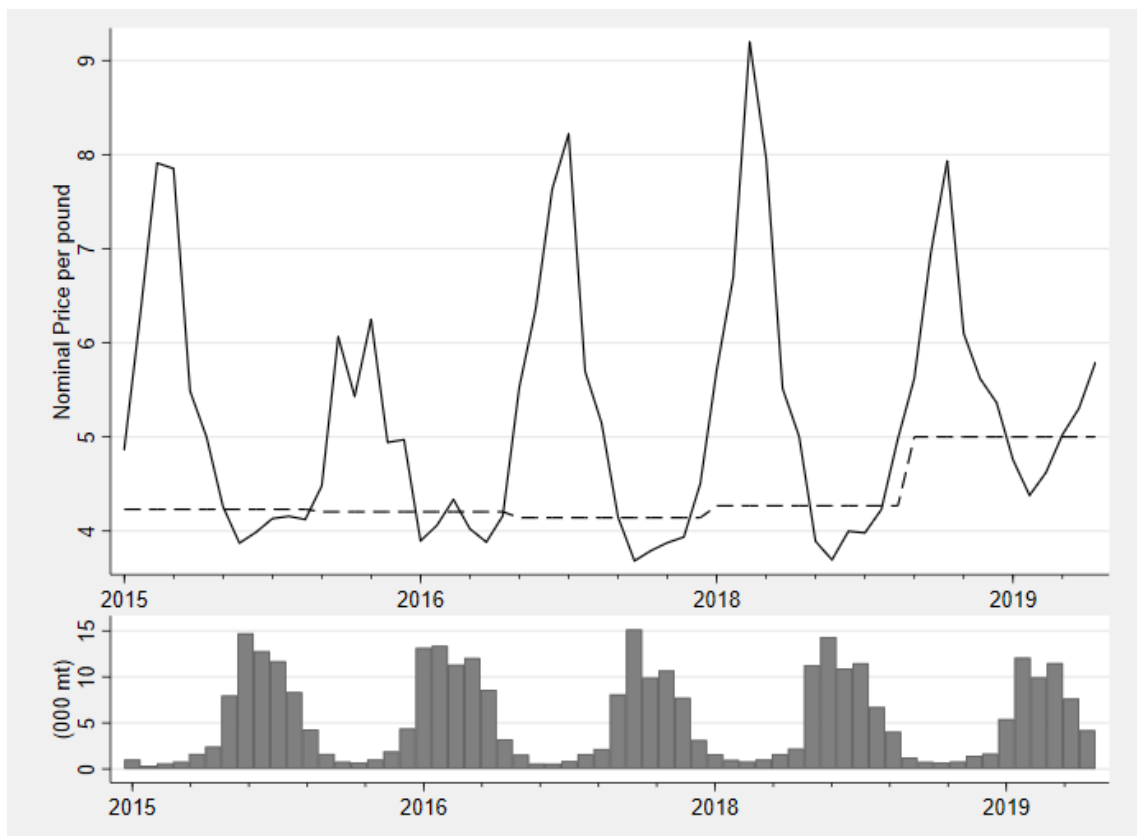
**Figure 12. Annual menhaden landings by state and Area 1A herring landings, 2015-2019**



Source: ACCSP Data Warehouse and NOAA VTR Data NOTE: 2019 data are preliminary and values are subject to change. Confidential data is omitted for some 2018 landings data (From ASMFC, 2020)

Alewife may be another potential substitute. Although volumes of alewife landings are low compared to herring. Landings from Maine sustainable rivers (as outlined by ASMFC) rose from about 588 mt in 2015 to 890 mt. The volume of alewife landings in 2018 was just 3% of the volume of herring bait sales in 2018. The price of alewife in 2018 was \$760/mt, making them a more expensive alternative for use as lobster bait. An ASMFC work group on lobster bait is currently surveying lobstermen and herring dealers to help determine how demand for herring and use of substitute baits may be changing, given recently low herring catch limits.

**Figure 13. Monthly nominal lobster prices (solid); average annual prices (dashed); and monthly landings (bars below), 2003-2019.**



Note: Extracted on August 13, 2020.

**Dependence on Herring.** Herring is the primary source of revenue for the purse seine vessels, a major source of revenue for midwater trawls, and a minor revenue source for bottom trawls (Table 25), though herring fishing enables participation in other fisheries. Vessels active in the Atlantic herring midwater trawl fishery generally also have limited access permits in the Atlantic mackerel fishery and permits in a variety of other fisheries, but are not necessarily active in all fisheries in which permits are held due to management or logistical constraints.

**Table 25 - Revenue (in thousands \$) by gear type for vessels that land Atlantic herring, 2012-2016**

Area	Species	2012	2013	2014	2015	2016
Midwater trawl	Herring	\$18,116	\$18,864	\$17,881	\$15,908	\$13,998
	Mackerel	\$935	\$2,205	\$2,938	\$1,920	\$3,111
	Menhaden	\$0	\$0	\$388	\$141	\$50
	Squid	\$0	\$0	\$0	\$0	\$0
	Other	\$674	\$127	\$134	\$50	\$64
Small mesh bottom trawl	Herring	\$1,783	\$3,537	\$1,551	\$1,177	\$1,280
	Mackerel	\$2,963	\$316	\$361	\$1,340	\$510
	Menhaden	\$0	\$0	\$56	\$56	\$0
	Squid	\$20,884	\$13,808	\$20,781	\$21,991	\$35,012
	Other	\$22,839	\$26,560	\$46,227	\$43,320	\$37,455

Purse Seine	Herring	\$6,655	\$7,890	\$9,486	\$7,793	\$14,571
	Mackerel	\$0	\$0	\$0	\$0	\$0
	Menhaden	c	c	c	c	\$1,656
	Squid	\$0	\$0	\$0	\$0	\$0
	Other	\$0	\$0	\$0	\$0	\$0
Other	Herring	\$0	\$0	\$0	\$0	\$0
	Mackerel	\$0	\$0	\$10	\$0	\$0
	Menhaden	\$0	\$0	\$0	\$0	\$0
	Squid	\$0	c	\$56	\$14	\$52
	Other	\$24,874	\$20,056	\$36,445	\$38,763	\$46,692
Total	Herring	\$26,554	\$30,291	\$28,918	\$24,878	\$29,849
	Mackerel	\$3,898	\$2,521	\$3,309	\$3,260	\$3,261
	Menhaden	c	c	>\$444	>\$197	\$1,822
	Squid	\$20,884	>\$13,808	\$20,837	\$22,005	\$35,064
	Other	\$48,387	\$46,743	\$82,806	\$82,133	\$84,211
Source: NMFS VTR data C = confidential						

#### 4.5.1.6 Atlantic Herring Research Set-Aside Program

Research Set-Aside (RSA) programs generate research funds through the sale of set-aside allocations, awarded through a competitive grant process managed by the [NEFSC](#). The Herring RSA program was established in 2007 through Amendment 1 to the Atlantic Herring FMP (NEFMC 2006, Section 4.8), which authorizes 0-3% of the Herring ACL from each management area to be allocated for RSA. The percent of herring RSA quota that is harvested has varied annually (**Table 26**) and usage is generally lower than other programs (scallops and monkfish). When herring management areas remain open for the entire fishing year, the incentive to participate in RSA compensation fishing is reduced. RSA from Area 1A is really the only area that has seen RSA harvest consistently, over 75% most year. However, in the last three years, even RSA harvest in Area 1A has declined and overall RSA usage in the last three years has decreased dramatically from about 40% overall to about 5%. Amendment 8 (NEFMC 2018a) and the [RSA program review final report](#) have more information.

**Table 26 - Herring research set aside vessel participants and landings, 2014-2019**

Herring Year	Number of Vessels (all areas)	Awarded (MT, all areas)	Landed (MT, all areas)	% landed (all areas)
<b>2014</b>	7	1,974	767	39
<b>2015</b>	8	1,974	739	37
<b>2016</b>	10	2,196	698	32
<b>2017-2019</b>	6	4,843	227	5
Source: GARFO IVR database as of August 2020.				



## 4.5.2 Other Managed Resources and Fisheries

In addition to Atlantic herring, many other fisheries could be impacted by the Alternatives under Consideration. Atlantic mackerel is targeted in combination with Atlantic herring during some of the year particularly in the southern New England and Mid-Atlantic areas. The lobster fishery is highly dependent on herring as bait. Herring is either a fishery bait source and/or a natural prey item for bluefin tuna, groundfish, and striped bass, which have commercial and recreational fisheries associated with them. Herring is also a prey for whales, other marine mammals, and sea birds, which have ecotourism industries associated with them. Amendment 8 (NEFMC 2018a, Section 3.6.2) contains extensive descriptions of the population status, management and fisheries and ecotourism for these species, and is incorporated herein by reference.

### 4.5.2.1 Mackerel Fishery

**Population status:** The Atlantic mackerel stock was most recently assessed in 2017, with 2016 as the terminal year of data (NEFSC 2018). Fishing mortality (F) in 2016 was estimated to be 0.47, so **overfishing** was occurring in 2016. The 2016 spawning stock biomass (SSB) was estimated to be 43,519 metric tons (MT), or 22% of the SSB target so mackerel is “**overfished**” (below 50% of the target). The MAFMC developed a rebuilding program for mackerel with the 2019-2021 specifications.

**Management:** Many vessels that participate in the Atlantic herring fishery are also active in the Atlantic mackerel fishery managed by the Mid-Atlantic Fishery Management Council through the Atlantic Mackerel, Squid, and Butterfish (MSB) Fishery Management Plan. More information about mackerel management is at: <http://www.mafmc.org/msb>. There is no resource sharing agreement between Canada and the U.S. for Atlantic mackerel. The U.S. sets an upper limit on total catch, and simply deducts expected Canadian catch from the total catch. This has not caused issues to date but at the current low quotas, if Canada raises its quota/catches, then the U.S. may be shut out of the fishery under the current FMP.

**Fishery:** There are three commercial limited access Atlantic mackerel permit categories. When the directed fishery is open, there are no trip limits for Tier 1, Tier 2 has a 135,000 lb. trip limit and Tier 3 has a 100,000 lb. trip limit, which is reduced to 20,000 lb. if it catches 7% of the commercial quota. Open access incidental permits have a 20,000 lb. trip limit. There is also a smaller recreational fishery for mackerel (including private/rental and party/charter).

The directed fishery is primarily composed of Tier 1 vessels. In 2020, there were 31 Tier 1 vessels (Table 27), 24 (77%) of which also had an Atlantic herring Category A permit. The Tier 1 vessels are primarily (71%) over 80 ft in length (Table 28).

Total landings of Atlantic mackerel (foreign and domestic) peaked at about 400,000 mt in 1973 but have been under 100,000 mt per year since 1977. Except for a peak in the early 2000s of about 40,000-55,000 mt, U.S. domestic landings have generally been under 30,000 mt since the 1960s (MAFMC 2015) and under 10,000 mt since 2011 (Table 29). Mackerel catches since 2008 have generally been under 50% of the total mackerel quota (NEFSC 2016). Revenue from the mackerel fishery has been under \$5M per year since 2010 (MAFMC 2016b). Most landings are on MWT gear vessels and some bottom trawl vessels (Figure 14).

**Table 27. Number of vessels with Atlantic mackerel permits by Atlantic herring permit category, 2020**

Mackerel Permit Category	Herring permit categories							Total
	A	B/C	C	D	D/E	E	none	
Tier 1	24	0	6	0	1	0	0	31
Tier 2	2	1	5	3	13	0	0	24
Tier 3	1	1	12	22	31	1	2	70

Source: NMFS Permit database. Data as of September 2020.  
<https://www.greateratlantic.fisheries.noaa.gov/aps/permits/data/index.html>.

**Table 28. Length of limited access Atlantic mackerel permit vessels, 2020**

		Tier 1	Tier 2	Tier 3	Total
Vessel length	<60	1	2	17	25
	60-80	8	14	43	71
	>80	22	8	10	37
	Total	31	24	79	134

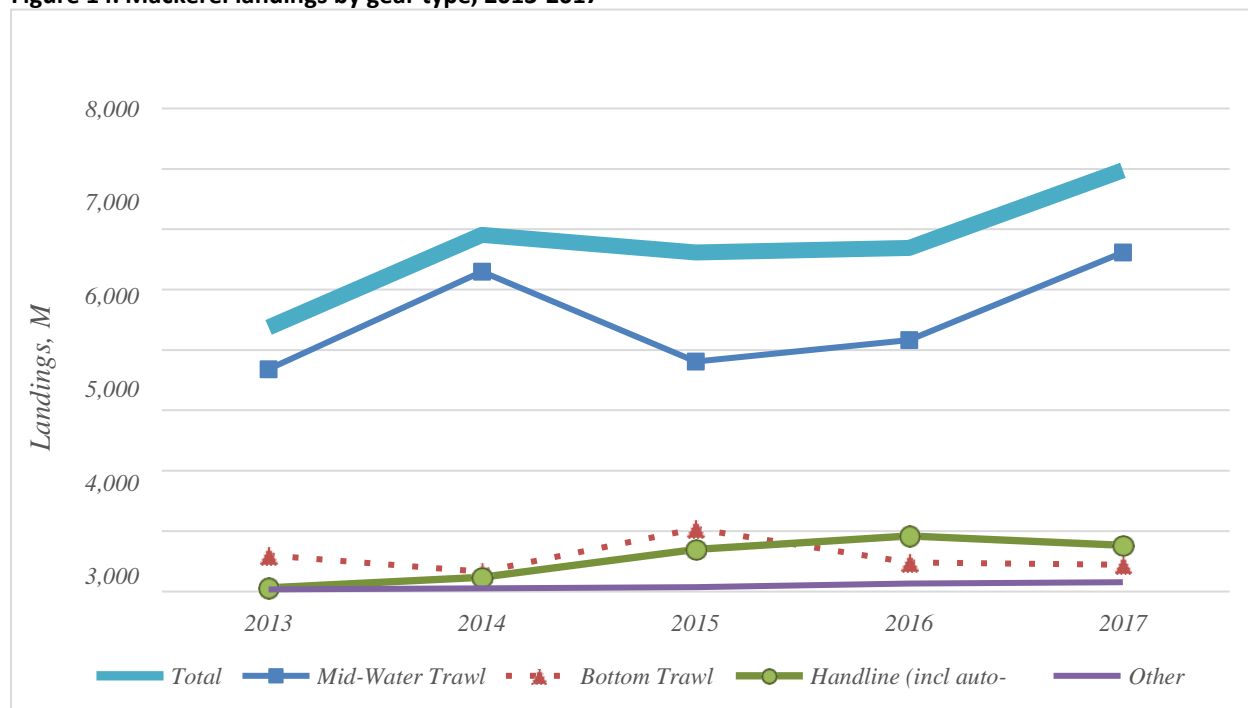
Source: NMFS Permit database. Data as of September 2020.  
<https://www.greateratlantic.fisheries.noaa.gov/aps/permits/data/index.html>.

**Table 29. Atlantic mackerel catch (mt) and quota, 2007-2016**

Year	U.S. Domestic			Canadian Catch	Total Catch	Quota (U.S. + Canada)	% Quota Caught (US + Canada)
	Commercial Landings	Commercial Discards	Recreational Landings + Discards (Mostly Landings)				
2007	25,546	159	633	53,394	79,733	238,000	34%
2008	21,734	747	857	29,671	53,008	211,000	25%
2009	22,634	125	684	42,232	65,675	211,000	31%
2010	9,877	97	938	38,736	49,648	211,000	24%
2011	533	38	1,042	11,534	13,147	80,000	16%
2012	5,333	33	767	6,468	12,601	80,000	16%
2013	4,372	20	951	9,017	14,360	80,000	18%
2014	5,905	52	1,142	6,872	13,971	80,000	17%
2015	5,616	13	1,384	4,937	11,950	40,165	30%
2016	5,687	18	1,611	8,000	15,316		

Source: NEFSC (NEFSC 2016; 2020b).

**Figure 14. Mackerel landings by gear type, 2013-2017**



Source: MAFMC (2019).

During 2005-2009, when annual domestic mackerel landings were 23,000-58,000 mt, the fishery was primarily focused in the waters of Mid-Atlantic and Southern New England, though there was fishing in the Gulf of Maine and the southern flank of Georges Bank (Appendix II maps). In more recent years, with much lower landings, the fishery has been less concentrated in the Mid-Atlantic, and waters of Rhode Island and in the Gulf of Maine have continued to be important, as have both the northern and southern flank of Georges Bank. Mackerel fishing also varies by season, depending on the mackerel resource conditions, as well as other fisheries. Herring fishing patterns for example can impact when and where mackerel fishing occurs. The seasonality of the mackerel fishery has changed over time, back when mackerel landings were high (e.g., 2006) the fishery was dominated by Jan-Mar landings, and in more recent years that has shifted to Nov-Dec as well, but at much lower levels.

In 2013, the first year that the mackerel fishery became limited access, there were 149 vessels issued a limited access mackerel permit (Tier 1-3). Of those, 45 (30%) had over 1% of their total revenue from mackerel, but just 9 (6%) had over 25% of their total revenue from mackerel. Generally, mackerel is a primary fishery for a small handful of vessels (MAFMC 2015).

Members of the MAFMC MSB Advisory Panel reported in May 2016 that shifting of thermal habitat suitability is likely impacting the distribution and/or productivity of MSB species, a topic that was discussed in the 2017 mackerel assessment. The AP also noted that Atlantic herring management limits mackerel fishing, such as the summer closure of Herring Management Area 1A to midwater trawl gear, herring spawning closures, and recently, the Georges Bank haddock catch cap accountability measure, which closed most of Georges Bank to herring fishing October 22, 2015 to April 30, 2016 (MAFMC 2016a).

Herring and mackerel are often caught together, and many trips that land herring also land mackerel. For this action, the PDT evaluated the distribution of herring and mackerel catches for MWT vessels since some alternatives may restrict the use of MWT gear in certain areas and seasons. Overall, about a dozen

MWT vessels are active in these fisheries and the average percent of herring per trip has varied over time (from 2011 through 2016). About half of MWT herring trips had over 90% herring, and only a small fraction, about 10%, had over 90% mackerel landings. Many trips had more mixed trips of herring and mackerel (Table 30).

**Table 30. Herring and Mackerel landings in the MWT fishery, 2012-2019**

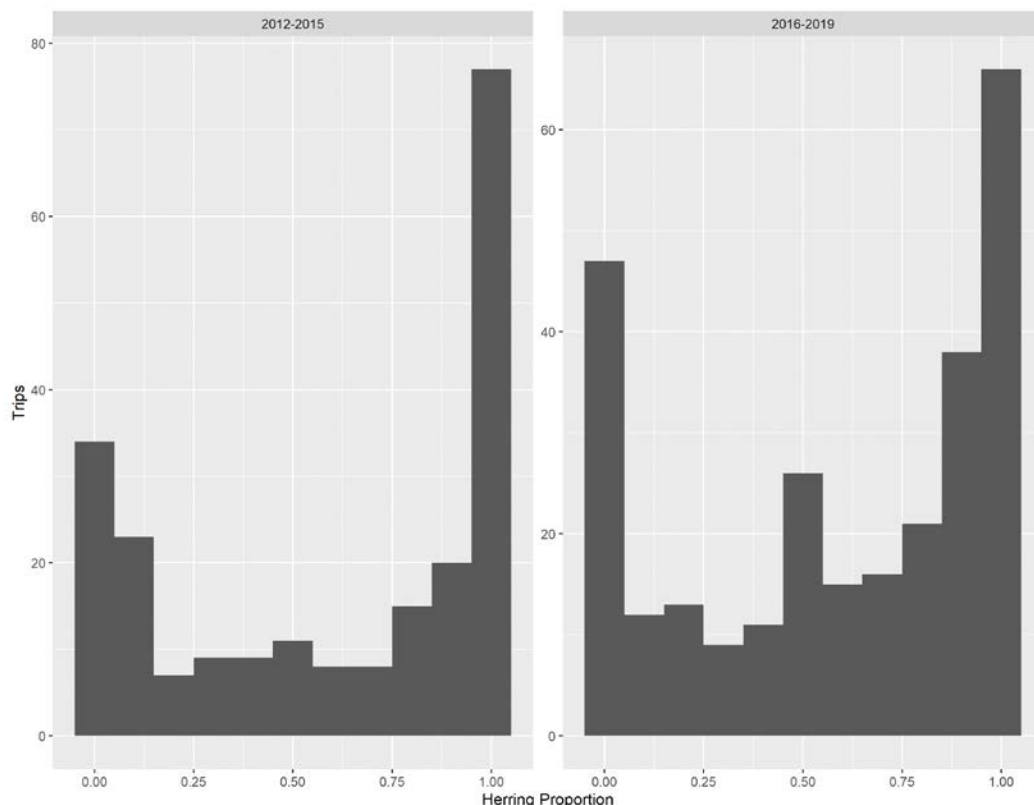
Year	Permits	Trips	Trips landing herring	Trips landing ≥90% herring	Trips landing ≥90% Mackerel	Herring Live Pounds	Mackerel live Pounds	Avg. Herring Percent per Trip <sup>1</sup>
2012	12	41	36	15	11	9,145,718	5,877,851	52%
2013	16	58	57	33	6	13,853,901	8,118,382	74%
2014	11	55	52	15	12	18,979,555	11,790,823	54%
2015	11	67	59	29	19	15,811,332	8,445,115	57%
2016	12	91	85	41	23	20,629,936	9,550,446	65%
2017	13	83	77	23	9	19,443,277	12,530,608	58%
2018	10	62	51	17	14	11,051,743	14,022,232	54%
2019	10	38	35	8	7	7,523,581	8,265,476	53%

Source: GARFO DMIS Database as of May 6, 2020.

Note: Includes all midwater trips landing >0 pounds of Atlantic mackerel that filed a VTR. Excludes carrier and party/charter trips.

<sup>1</sup> Average percentage of herring from combined Atlantic mackerel and Atlantic herring landings for each trip.

**Figure 15. Proportion of herring landed on MWT trips landing A. mackerel, 2012-2015 and 2016-2019**



#### 4.5.2.2 Industries Reliant of the Predators of Herring

Analysis of species that are known to feed on herring was conducted in support of the NEFMC's Amendment 8 to the herring FMP. This analysis contained, among other things, a quantitative model designed to examine the effects of different herring control rules on outcomes for Bluefin tuna, common and arctic terns, and spiny dogfish. Bluefin tuna models suggested that the major factor in tuna outcomes was determined by individual herring growth rates, a life history trait which is not affected by managers. Term metrics were sensitive to certain types of control rules (which featured either constant quotas or fixed quotas for 3 years with a limit on how much they could change). These were not adopted by the NEFMC. Spiny dogfish outcomes were also poor under those types of control rules. Like Bluefin tuna, spiny dogfish outcomes were influenced by herring life-history traits that are not within the control of fishery managers.

Bluefin tuna are known to feed on herring, and the tuna fishery also uses herring as bait. In 2016, about 7,000 commercial and 21,000 bluefin tuna permits were issued. The bluefin tuna fishery (recreational and commercial combined) landed an average of 862.3 mt from the years 2012 to 2016, with most catch coming from the commercial rod and reel and longline fisheries in the northwest Atlantic. In 2015, over 856 mt was caught by commercial vessels in U.S. waters, with revenues of \$8,820,000. Common and arctic terns are protected under the Migratory Bird Treaty Act; US Fish and Wildlife. To the best of our knowledge there is no directed tourism or recreation activities focusing on these species. Spiny dogfish prices have declined to about \$0.20 per pound; landings in 2018 were 17.2M pounds.

Other fisheries of species that feed on herring include Striped bass, groundfish. Ecotourism, in the form of whale watching, also depends on marine life that forages on herring.

#### 4.5.3 Management Uncertainty

This section updates information about the primary sources of management uncertainty in this FMP, namely Canadian catch of Atlantic herring, catch in state waters, and the estimate of discard mortality.

##### 4.5.3.1 Uncertainty about Canadian catch of Atlantic herring (New Brunswick weir fishery)

Catch of the Atlantic herring stock complex in Canadian waters consists primarily of fish caught in the New Brunswick (NB) weir fishery. During the benchmark stock assessment for Atlantic herring (2012), the SARC 54 Panel noted that the contribution of the Atlantic herring stock on the Scotian Shelf region is unknown. It is generally assumed that juvenile fish (age 1 and 2) caught in the NB weir fishery are from the inshore (GOM) component of the Atlantic herring stock complex, while adult fish (age 3+) caught are from the SW Nova Scotia stock complex (Area 4WX).

NB weir fishery catch is not tracked in-season against the U.S. Atlantic herring ACL. Rather, the annual expected catch in the NB weir fishery is estimated and then subtracted from the ABC, as an element of the management uncertainty buffer, to calculate the stock-wide Atlantic herring ACL, which is OY for the U.S. fishery.

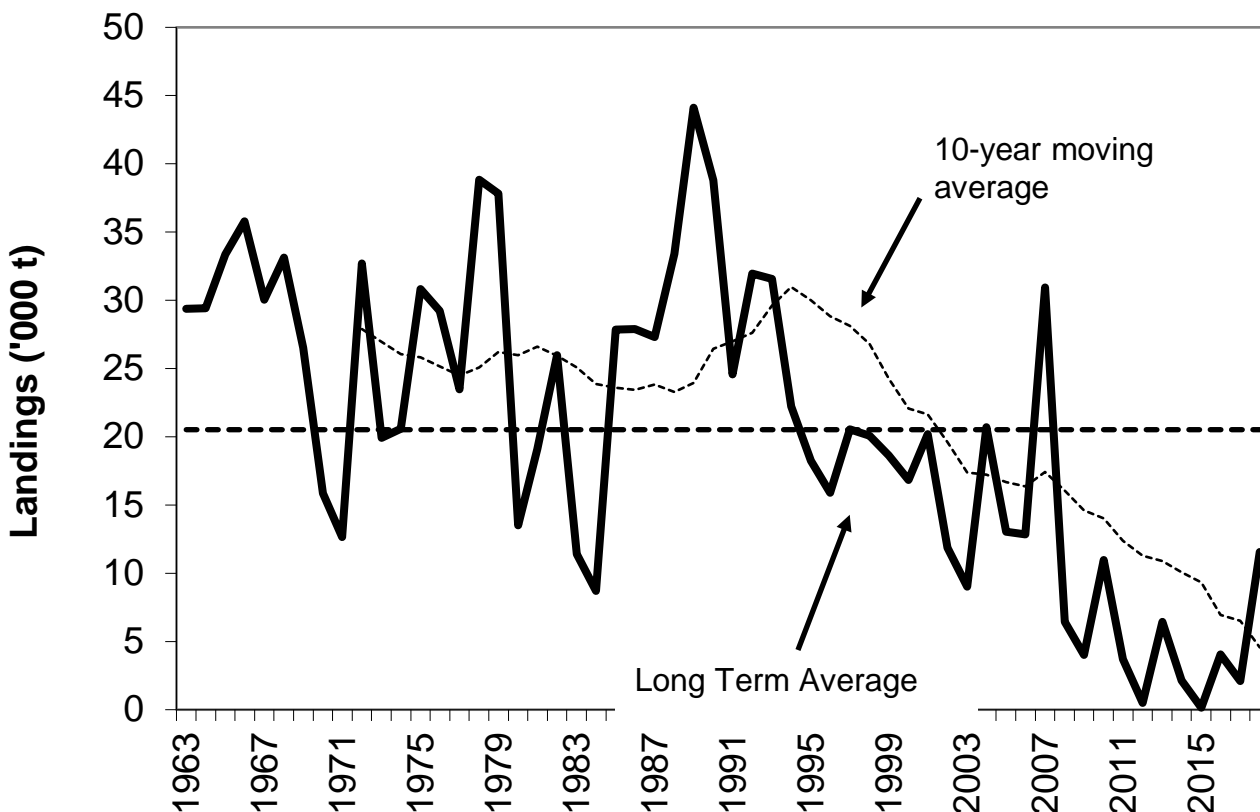
The overall trend in Canadian herring landings since 1990 has been downward (**Figure 16**) with a long-term average of 20,000 mt. Catches are variable over time; total catch dropped below 1,000 mt in 2013 and 2015 but was above 30,000 in 2007. The most recent five-year average of NB weir landings is about 4,500 mt, and just over 6,000 mt for the last 3 years, about 1,500 mt (**Table 31**).

There was a dramatic increase in landings from shut offs in New Brunswick in 2018. Shut offs operate in the same areas, target the same schools of herring but they are mobile and can move from cove to cove

(Personal communication, Rabindra Singh DFO). In most years they make up a small fraction of total landings, but in 2018 it seems to have exceeded weir landings.

The fishery occurs primarily during the late summer and autumn (June-October), with highest landings in July and August (Table 28); however, dependent on many factors including weather, fish migration patterns, and environmental conditions. Catch from this fishery after October has averaged under 4% of the yearly total.

**Figure 16. Herring landings in New Brunswick, Canada (weir and shutoff)**



For this action, the PDT calculated possible deductions from the ABC to account for management uncertainty based on updated (most recent) 3-year, 5-year, and 10-year average catch totals from the NB weir fishery (**Table 31**). These are the same options considered in the previous specifications package for 2019-2021.

**Table 31. Canadian weir and shut-off landings from 2010-2019 with possible deductions for management uncertainty based on No Action, 3-year, 5-year and 10-year averages.**

		<b>Year</b>	<b>NB Weir catch</b>
		2010	10,958
		2011	3,711
		2012	504
		2013	6,431
		2014	2,149
		2015	146
		2016	4,060
		2017	2,103
		2018	11,574
		2019	5,054
<b>MU Option</b>			
<b>1</b>	<b>No Action</b>	<b>(2020 rollover)</b>	<b>4,560</b>
<b>2</b>	<b>3-year</b>	<b>(2017-2019)</b>	<b>6,244</b>
<b>3</b>	<b>5-year</b>	<b>(2015-2019)</b>	<b>4,587</b>
<b>4</b>	<b>10-year</b>	<b>(2010-2019)</b>	<b>4,669</b>

#### 4.5.3.2 Uncertainty about State water catch

The management uncertainty buffer includes any uncertainty about state waters catch, or more precisely, the catch not sold to Federal dealers. Most of the Atlantic herring landings are harvested in Federal waters. Catch by Federal permit holders that occurs in state waters must be sold to a Federal dealer and is reported and counted in-season against the sub-ACLs. Catch by state-only permit holders not sold to a Federal dealer is monitored by the ASMFC. The state-only permitted landings of Atlantic herring not sold to a Federal dealer are exclusively by harvesters from Maine, primarily using fixed gear and a small number of seines and gillnets. State-only landings data are supplied regularly to GARFO/APSD and counted against the overall quota (fixed gear catches against the Fixed Gear Set-Aside, catch by other gears against the sub-ACL). State-only landings are not large enough to substantially affect management of the Federal fishery and the ability to remain under the sub-ACLs (**Table 32**).



**Table 32. Total Atlantic herring catch in Area 1A by state-only harvesters fishing in state waters**

FY	Area 1A Total Catch (mt)	Catch in Area 1A by state-only permits	
		(mt)	%
2015	29,406	19	0.06%
2016	27,831	20	0.07%
2017	28,685	33	0.12%
2018	24,815	11	0.04%
2019	???	69	???
<i>Source:</i> GARFO, APSD; state-only landings from ME DMR.			

The Council specifies a set-aside for West of Cutler fixed gear fishermen (FGSA)<sup>7</sup>; it was 295 mt in 2016-2018 and was reduced to 39 mt in the 2019 in-season adjustment). Any unused portion of the FGSA is returned to the Area 1A fishery after November 1. Fixed gear landings peaked in 2010 at 823 mt, but are typically well under 100 mt per year (53 mt in 2019, **Table 32**).

Regarding the uncertainty of state-only catch, the ASMFC's requirement that fixed gear fishermen must report through IVR (and therefore have catch counted against the sub-ACL) has reduced management uncertainty associated with state waters landings to an unsubstantial amount. Therefore, while state-only permitted landings of Atlantic herring is a potential source of management uncertainty, there is a set-aside for it in the Federal plan, and to date, landings from this segment of the fishery have been very low.

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<sup>7</sup> Landings east of Cutler, ME are included in the New Brunswick weir and shut-off fishery.

**Table 33. Atlantic herring landings from fixed gear fishery, before and after November 1 rollover date**

Year	Sub-ACL Closure Date	Area 1A Sub-ACL (mt)	Cumulative Catch (mt) by Dec 31	Fixed Gear Landings (mt)	
				Jan-Oct	Nov-Dec
2004	11/19/2004	60,000	60,071	49	0
2005	12/2/2005	60,000	61,570	53	0
2006	10/21/2006	50,000	59,980	528	0
2007	10/25/2007	50,000	49,992	392	0
2008	11/14/2008	43,650	42,257	24	0
2009	11/26/2009	43,650	44,088	81	0
2010	11/17/2010	26,546	28,424	823	0
2011	10/27/2011	29,251	30,676	23	0
2012	11/5/2012	27,668	24,302	0	0
2013	10/15/2013	29,775	29,820	C	C
2014	10/26/2014	33,031	32,898	C	C
2015	11/02/2015	30,580	29,406	15	0
2016	10/18/2016	30,524	27,831	20	0
2017	NA	31,115	28,685	33	0
2018	NA	27,743	24,815	11	0
2019	NA	5,184	4,947	53	0
<i>Source:</i> GARFO, APSD; Fixed gear landings from ME DMR. <i>Note:</i> Fixed gear includes stop seines, weirs, pound nets, and traps. "C" denotes that the value cannot be reported due to confidentiality. **Adjusted August 22, 2018 from 31,962 mt to 27,743 mt					

#### 4.5.3.3 Uncertainty about Atlantic herring discards

The management uncertainty buffer includes any uncertainty about herring discards. The 2012 benchmark assessment for Atlantic herring incorporated Atlantic herring discards from Vessel Trip Report (VTR) data. Discard estimates have been available since 1996 and are generally under 1% of the landings and do not represent a substantial source of mortality. However, this is not problematic to the Atlantic herring stock assessment, according to SAW 54 (NEFSC 2012).

Atlantic herring discards are estimated by NMFS using vessel and observer data and are counted against the management area sub-ACLs. To date, uncertainty related to estimating Atlantic herring discards has not been a substantial source of management uncertainty. There does not appear to be a need to change this conclusion when considering management uncertainty for the 2019-2021 Atlantic herring fishery specifications. It is anticipated that when the IFM Amendment is fully implemented catch monitoring and the accuracy of herring discard estimates will continue to improve.

Atlantic herring discards are low (**Table 34**), a very small fraction of total catch. For example, discards were 0.03% of the total Atlantic herring catch in 2017 (49,072 mt), need to check years of table ???). Discard levels are calculated based on observer data. Given recent actions to enhance catch monitoring and reporting, there is no indication that the uncertainty regarding the Atlantic herring discard estimation will likely increase during the upcoming fishery specifications cycle.

**Table 34. Atlantic herring discards, 2010-2019 (checking values – title does not match???)**

Year	Discards (mt)		Year	Discards (mt)
2010	137		2015	12
2011	210		2016	62
2012	87		2017	14
2013	18		2018	39
2014	10		2019	5
Source: GARFO. August 2020.				

#### 4.5.4 Fishing Communities

Consideration of the economic and social impacts on fishing communities from proposed fishery regulations is required by the National Environmental Policy Act (NEPA 1970) and the Magnuson-Stevens Fishery Conservation and Management Act, particularly National Standard 8 (MSFCMA 2007).

To gain a better perspective on the nature of the Atlantic herring fishery and the character of the affected human environment, a broader interpretation of fishing community has been applied to include almost all communities with a substantial involvement in or dependence on the Atlantic herring fishery. Some of the communities identified in this section may not fit the strict interpretation of the National Standard 8 (NS 8) criteria for substantial dependence on fishing. The fishing communities that meet the legal definition (as promulgated through NS 8) are likely to be considered a subset of the broader group of communities of interest that are engaged in the herring fishery and identified in this document.

Because Atlantic herring is widely used as bait for the lobster fishery, especially in Maine, it is impractical to identify every community with substantial involvement in the lobster fishery (and consequently some dependence on the herring fishery) for assessment in this document. Instead, some of the communities of interest are selected, in part, because of their involvement in or dependence on the lobster fishery; assessment of the impacts of measures on these communities should provide enough context to understand the potential impacts on any community with substantial involvement in the lobster fishery. Parallels can be drawn between the communities that are identified in this section and other similar communities engaged in the lobster fishery.

##### *Atlantic Herring Fishery*

The primary ports for the Atlantic herring fishery, as defined in Amendment 8 (NEFMC 2018a, Section 3.6.3.2) meet at least one of the following criteria:

1. A ranking of medium-high or high for engagement in or reliance on the Atlantic herring fishery on average in 2011-2015, according to the NMFS Community Vulnerability Indicators (Jepson & Colburn 2013).
2. Atlantic herring landings of at least 10M pounds (4,536 mt) per year from 2007-2016, or anticipated landings above this level based on interviews and documented fishery-related developments (Table 35).
3. Port infrastructure dependent in part or whole on Atlantic herring (e.g., herring dealers, pump stations).
4. Dependence on herring as bait (e.g., for lobster and/or tuna fisheries).
5. Geographic isolation in combination with some dependence on the Atlantic herring fishery.
6. Use of Atlantic herring for value-added production.

Based on the above criteria, there are 17 primary ports for the Atlantic herring fishery (**Table 35**). During the period 2007-2016, Atlantic herring was landed in over eight states, mostly in Maine (82M lb (37K

mt)/year) and Massachusetts (79M lb (36K mt)/year;), and in 130 ports. Gloucester and Portland were the top two landing ports during that time. Primary ports are further described in Amendments 5 and 8. Community profiles are available from the NEFSC Social Sciences Branch website (Clay et al. 2007).

### ***Other Fisheries/Ecotourism***

There are several other fisheries, as well as the ecotourism industry, that are potentially impacted by this action. Many ports have coexisting fisheries, including the Atlantic herring fishery. In all, about 140 communities have been identified as potentially impacted (NEFMC 2018a, Section 3.6.3.2.2).

**Table 35. Annualized Atlantic herring landings to states and primary ports, 2010-2019**

<b>State/Port</b>	<b>Top port ranking</b>	<b>2010-2019 Avg. landings (mt)</b>	<b>Herring permits<sup>a</sup></b>	<b>Herring dealers<sup>a</sup></b>
Maine		34,308	38	96
Portland	#1	17,812	26	77
Rockland	#3	11,573	13	60
Stonington	#7	1,447	8	28
Jonesport		767	9	12
S. Bristol	#10	244	5	5
Other (n=29)	#19	2,466	26	62
New Hampshire		790	25	32
Massachusetts		25,441	50	83
Gloucester	#2	14,253	28	68
New Bedford	#4	10,125	17	49
Other (n=9)		1,063	24	45
Rhode Island		4,705	50	30
Point Judith	#5	2,824	45	25
Newport	#13	417	4	4
Other (n=5)		1,464	8	6
Connecticut		10	16	8
New York		31	71	32
Montauk	#34	13	45	19
Hampton Bays/Shinnecock	#39	12	28	15
Other (n=5)		6	11	15
New Jersey		1,440	45	13
Cape May	#8	1,405	10	4
Other (n=5)		35	3	9
Confidential state(s)		297	9	3
<b>Total (115 ports)</b>		<b>67,021</b>	<b>256</b>	<b>176</b>
<i>Note:</i> Some herring primary ports are confidential.				
<sup>a</sup> Totals may not equal the sum of the parts, because permits can land in multiple ports/states.				
<i>Source:</i> Dealer data, accessed July 2020.				

## 5.0 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

*See separate document*