

Proposed Atlantic Herring Fishery Specifications

**for the 2013-2015 Fishing Years
(January 1, 2013 – December 31, 2015)**



**Prepared by the
New England Fishery Management Council**

in consultation with
Atlantic States Marine Fisheries Commission
National Marine Fisheries Service
Mid-Atlantic Fishery Management Council

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LIST OF ACRONYMS

ACL	Annual Catch Limit
AM	Accountability Measure
ASMFC	Atlantic States Marine Fisheries Commission or Commission
B	Biomass
BH	Beverton-Holt Stock-Recruitment Curve
BT	Border Transfer
CAA	Catch at Age
CZMA	Coastal Zone Management Act
DAH	Domestic Annual Harvest
DAP	Domestic Annual Processing
DMF	Division of Marine Fisheries
DMR	Department of Marine Resources
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
E.O.	Executive Order
ESA	Endangered Species Act of 1973
F	Fishing Mortality Rate
FEIS	Final Environmental Impact Statement
FGSA	Fixed Gear Set-Aside
FMP	Fishery Management Plan
FSEIS	Final Supplemental Environmental Impact Statement
FY	Fishing Year
GB	Georges Bank
GMRI	Gulf of Maine Research Institute
GOM	Gulf of Maine
IRFA	Initial Regulatory Flexibility Analysis
IOY	Initial Optimal Yield
IVR	Interactive Voice Response
IWP	Internal Waters Processing
JVP	Joint Venture Processing
M	Natural Mortality Rate
MA DMF	Massachusetts Division of Marine Fisheries

MAFMC	Mid-Atlantic Fishery Management Council
ME DMR	Maine Department of Marine Resources
MMPA	Marine Mammal Protection Act
MRFSS	Marine Recreational Fisheries Statistical Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum Sustainable Yield
mt	Metric Tons
NB	New Brunswick
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NSGs	National Standard Guidelines
OFL	Overfishing Limit
OY	Optimum Yield
PDT	Plan Development Team
PS/FG	Purse Seine/Fixed Gear
RFA	Regulatory Flexibility Act
RFFA	Reasonably Foreseeable Future Action
RIR	Regulatory Impact Review
RSA	Research Set-Aside
SARC	Stock Assessment Review Committee
SAW	Stock Assessment Workshop
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
SFA	Sustainable Fisheries Act
TAC	Total Allowable Catch
TC	Technical Committee
TRAC	Transboundary Resource Assessment Committee
TRT	Take Reduction Team
USAP	U.S. At-Sea Processing
VMS	Vessel Monitoring System
VTR	Vessel Trip Report

1.0 INTRODUCTION

This document contains the New England Fishery Management Council's recommended specifications for the 2013-2015 Atlantic herring (*Clupea harengus*) fishery as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Herring Fishery Management Plan (FMP) approved by the National Marine Fisheries Service (NMFS) on October 27, 1999. The proposed specifications are consistent with the provisions contained in the Magnuson-Stevens Act and the Atlantic Herring FMP. This document also contains information and supporting analyses required under other applicable law, namely the National Environmental Policy Act (NEPA), Regulatory Flexibility Act (RFA), and Executive Order 12866.

The Atlantic herring fishery specifications are annual amounts (for the 2013-2015 fishing years) including:

- Overfishing Limit (OFL);
- Acceptable Biological Catch (ABC);
- A Stock-wide Annual Catch Limit (ACL) = U.S. Optimum Yield (OY);
- Domestic Annual Harvest (DAH);
- Domestic Annual Processing (DAP);
- U.S. At-Sea Processing (USAP);
- Border Transfer (BT, U.S.-caught herring transferred to Canadian vessels for export);
- Management Area sub-ACLs;
- Research Set-Asides (RSA); and a
- Fixed Gear Set-Aside (FGSA).

Related definitions and formulas are provided in the following sub-section.

1.1 BACKGROUND

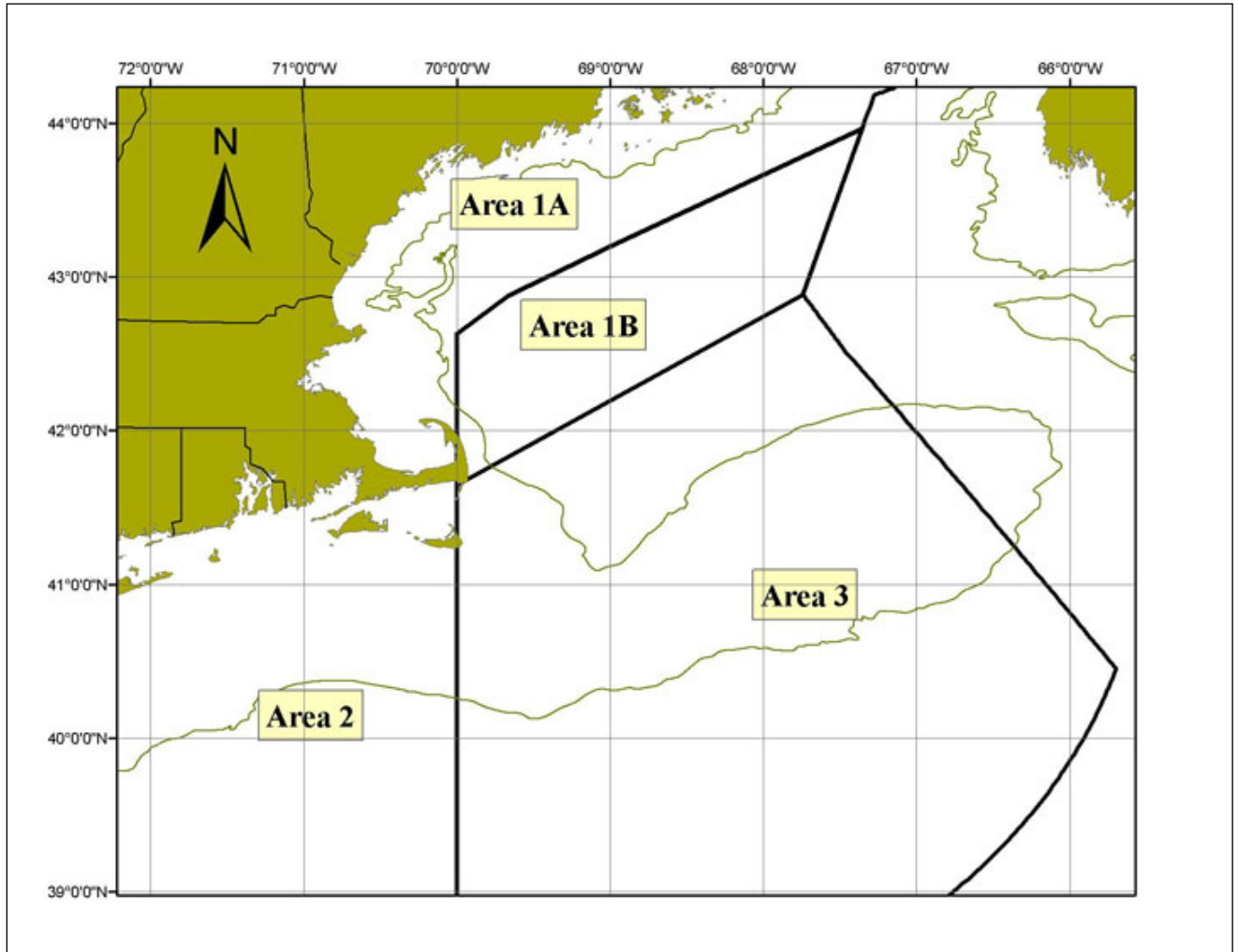
The assessments/specifications required by the Herring FMP are made every three years as part of the Atlantic herring fishery specification process. The Herring FMP mandates that the TACs, currently known as sub-annual catch limits (sub-ACLs) per Amendment 4, be distributed to four herring management areas on an annual basis. The Council uses the best available information to estimate the proportion of each spawning component of the Atlantic herring stock complex in each area/season and distributes the sub-ACLs such that the risk of overfishing an individual spawning component is set at an acceptably low level.

In Amendment 4, the Council updated the specifications process to ensure consistency with the newly-implemented provisions of the MSA. The Council opted to retain the general provisions for establishing specifications for the Atlantic herring fishery but modified the specifications and eliminated the need to annually specify Joint Venture Processing (JVP), Internal Waters Processing (IWP), Total Allowable Level of Foreign Fishing (TALFF), and a sub-ACL reserve. While TALFF will not have to be considered by the Council during the specifications process, countries interested in foreign fishing for herring may still request TALFF allocations from NMFS, and these requests will be addressed as they arise.

The Atlantic herring (*Clupea harengus*) fishery is managed as one stock complex, but this stock is comprised of inshore and offshore components that segregate during spawning. In recognition of the spatial structure of the herring resource, sub-ACLs are 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 located in the coastal waters between MA and NC and,; Area 3 is on Georges Bank (GB) (Figure 1). Requirements of the Atlantic herring fishery are regulated by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Atlantic Herring Fishery Management Plan (FMP) approved by the National Marine Fisheries Service (NMFS) on October 27, 1999.

In addition, Amendment 5 to the FMP for Atlantic Herring, which is under final review through NMFS/NOAA, is referenced throughout the 2013-2015 Atlantic Herring specifications. The proposed action focuses on establishing a comprehensive catch monitoring program for the limited access herring fishery, addressing river herring bycatch in the herring fishery, establishing criteria for midwater trawl vessel access to groundfish closed areas, and adjusting other aspects of the fishery management program to keep the Herring FMP in compliance with the MSA.

Figure 1 Atlantic Herring Management Areas



1.2 DEFINITIONS AND FORMULAS

The following definitions and formulas are provided in the Atlantic Herring FMP and relate to the development of the Atlantic herring fishery specifications. These formulas form the basis of the specifications proposed for the 2013-2015 fishing years.

Overfishing Level (OFL). The catch that results from applying the maximum fishing mortality threshold to a current or projected estimate of stock size. When the stock is not overfished and overfishing is not occurring, this is usually F_{MSY} or its proxy.

$$OFL \geq ABC \geq ACL$$

Acceptable Biological Catch (ABC). The MSA interpretation of ABC includes consideration of biological uncertainty (stock structure, stock mixing, other biological/ecological issues), and recommendations for ABC should come from the Council's SSC. The maximum catch that is recommended for harvest, consistent with meeting the biological objectives of the management plan. ABC can equal but never exceed the OFL.

$$OFL - \text{Scientific Uncertainty} = ABC \text{ (Determined by SSC)}$$

ABC Control Rule. The specified approach to setting the ABC for a stock or stock complex as a function of scientific uncertainty in the estimate of OFL and any other scientific uncertainty. The ABC control rule will consider uncertainty in factors such as stock assessment issues, retrospective patterns, predator-prey issues, and projection results.

The ABC control rule will be specified and may be modified based on guidance from the SSC during the specifications process. Modifications to the ABC control rule can be implemented through the specifications package or framework adjustments to the Herring FMP (in addition to future amendments), as appropriate.

Annual Catch Limit (ACL). The catch level selected such that the risk of exceeding the ABC is consistent with the management program. ACL can be equal to but can never exceed the ABC. ACL should be set lower than the ABC as necessary due to uncertainty over the effectiveness of management measures. The ACL equates to optimum yield (OY) and serves as the level of catch that determines whether accountability measures (AMs) become effective.

A stock-wide ACL will be established that accounts for both scientific uncertainty (through the specification of ABC) and management uncertainty (through the specification of the stock-wide ACL and buffer between ABC and the ACL).

$$ABC - \text{Management Uncertainty (determined by Council)} = \text{Stock-wide ACL} = OY$$

Sub-ACLs. Once known as area-based total allowable catch (TAC) levels. The objective to prevent overfishing on a sub-component of the stock, to the extent possible, is achieved by defining sub-ACLs for each of four management areas. If the Council chooses, accountability measures (AMs) can be specified for the sub-ACLs within the specifications process, providing further incentives to avoid overfishing a sub-component of the herring stock complex.

Accountability Measure(s) (AMs). Management measures established to ensure that (1) the ACL is not exceeded during the fishing year; and (2) any ACL overages, if they occur, are mitigated and corrected.

Domestic Annual Harvest (DAH). DAH is established based on the expected catch from U.S. fishing vessels during the upcoming fishing year(s). The Herring FMP specifies that OY is equal to DAH plus a reserve.

$$\text{OY} = \text{DAH} + \text{Reserve (if one is assigned)}$$

The Herring FMP also specifies that domestic annual harvest (DAH) will be composed of domestic annual processing (DAP), the total amount allocated to processing by foreign ships (JVpt), and the amount of herring that can be taken in U.S. waters and transferred to Canadian herring carriers for transshipment to Canada (BT). Amendment 4 eliminated the need to annually specify JVP allocations.

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

Domestic Annual Processing (DAP). 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). The Herring FMP specifies that DAP is a subset of DAH and is composed of estimates of production from U.S. shoreside and at-sea processors. The Herring FMP authorizes the allocation of a portion of DAP for at-sea processing by domestic processing vessels that exceed the current size limits (U.S. at-sea processing, USAP).

U.S. At-Sea Processing (USAP). Domestic at-sea processing capacity by U.S. vessels that exceed current size limits. When determining the USAP allocation, the Council should consider the availability of other processing capacity, development of the fishery, status of the resource, and opportunities for vessels to enter the herring fishery.

Border Transfer (BT). The amount of herring that can be taken in U.S. waters and transferred to Canadian herring carriers for transshipment to Canada, (4,000 mt for the 2010-2012 specifications).

Research Set-Aside (RSA). RSAs are allowed in any or all of the herring management areas and can be specified as 0-3% of any management area sub-ACL.

Fixed Gear Set-Aside (FGSA). This can be specified up to 500 mt in Area 1A and will be returned to the 1A sub-ACL if not utilized by November 1.

Table 1 provides an overview of the above definitions.

Table 1 Overview of Definitions

Acronym	Definition	Formula	Considerations
OFL	Overfishing Limit	Catch at $F_{\text{Threshold}} * B$	Current stock size
ABC	Acceptable Biological Catch	Catch at F_{MSY} or F_{rebuild} $\leq \text{OFL}$ or $\text{OFL} - \text{Scientific Uncertainty} = \text{ABC}$ (Determined by SSC)	Biological uncertainty over current stock size, estimate of F, or other parameters (stock mixing ratios, recruitment, etc.)
ACL	Annual Catch Limit	$\leq \text{ABC}$ or $\text{ABC} - \text{Management Uncertainty} = \text{Stock-wide ACL} = \text{OY}$	Uncertainty from other sources, evaluation of risk to achieving management goals if ABC is exceeded
Sub -ACLs	Sub Annual Catch Limit	Closure at 95% of the ACL in any FMA	To prevent overfishing on a sub-component level
AM	Accountability Measures	None	(1) minimizing risk of exceeding ACL during the fishing year; (2) addressing ACL overages, if they occur

1.3 PURPOSE AND NEED

The purpose of this action is to establish specifications for the Atlantic herring fishery during the 2013-2015 fishing years. The Atlantic Herring FMP requires that the NMFS Regional Administrator, after consultation with the Council, determine the specifications for the herring fishery. Amendment 1 to the Herring FMP established a process whereby the Council can set specifications for up to three fishing years. Amendment 4 to the Herring FMP modified the specifications process and implemented provisions for annual catch limits (ACLs) and accountability measures (AMs). Amendment 5 to the Herring FMP, currently under review by NMFS, proposes measures to establish a comprehensive catch monitoring program for the herring fishery, river herring bycatch measures, criteria for midwater trawl access to groundfish closed areas, and measures to address interactions with the Atlantic mackerel fishery.

The Herring FMP requires the Council and the Regional Administrator to review the best available information regarding the status of the resource and fishery and develop appropriate fishery specifications. The FMP also provides the Regional Administrator the authority to adjust the specifications in mid-season as necessary. Provisions in the plan require that the total herring ACL be distributed among the management areas shown in Figure 1 on an annual basis. The Council uses the best available information to estimate the proportion of each spawning component of the Atlantic herring stock complex in each area/season and distributes the sub-ACLs such that the risk of overfishing and individual spawning component is minimized.

The Atlantic herring fishery specifications are intended to meet the goal and many of the objectives of the Atlantic Herring FMP, as modified in Amendment 1, specifically:

Goal

- Manage the Atlantic herring fishery at long-term sustainable levels consistent with the National Standards of the Magnuson-Stevens Fishery Conservation and Management Act.

Objectives

- Harvest the Atlantic herring resource consistent with the definition of overfishing contained in the Herring FMP and prevent overfishing
- Prevent the overfishing of discrete spawning components of Atlantic herring
- Avoid patterns of fishing mortality by age which adversely affect the age structure of the stock
- Provide for long-term, efficient, and full utilization of the optimum yield from the herring fishery while minimizing waste from discards in the fishery. Optimum yield is the amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, taking into account the protection of marine ecosystems, including maintenance of a biomass that supports the ocean ecosystem, predator consumption of herring, and biologically sustainable human harvest. This includes recognition of the importance of Atlantic herring as one of many forage species of fish, marine mammals, and birds in the Northeast Region.

- Minimize, to the extent practicable, the race to fish for Atlantic herring in all management areas
- Provide, to the extent practicable, controlled opportunities for fishermen and vessels in other mid-Atlantic and New England fisheries
- Promote and support research, including cooperative research, to improve the collection of information in order to better understand herring population dynamics, biology and ecology, and to improve assessment procedures
- Promote compatible US and Canadian management of the shared stocks of herring
- Continue to implement management measures in close coordination with other Federal and State FMPs and the ASMFC management plan for Atlantic herring, and promote real-time management of the fishery

2.0 MANAGEMENT ALTERNATIVES UNDER CONSIDERATION

This section describes the Council’s alternatives under consideration for the 2013-2015 herring fishery specifications, including the proposed specifications and alternatives for accountability measures (AMs).

2.1 ALTERNATIVES FOR SPECIFYING OFL AND ABC/ ABC CONTROL RULE

During the development of the 2013-2015 herring fishery specifications, **XXX** alternatives are being considered by the Council for specifying OFL/ABC, based on recommendations from the SSC and advice/analyses provided by the Herring PDT. **The Council’s Preferred Alternative for OFL/ABC/ABC Control Rule for 2013-2015 is Alternative 2, which is based on a constant catch approach.** The following subsections describe all alternatives under consideration.

2.1.1 Alternative 1 – No Action

The no action alternative would maintain the OFL and ABC specifications from 2012 for the 2013-2015 fishing years (Table 2).

Table 2 Alternative 1 (No Action) – Proposed OFL and ABC Specifications (mt) for 2013-2015

YEAR	2013	2014	2015
OFL (mt)	127,000	127,000	127,000
ABC (mt)	106,000	106,000	106,000

**OFL and ABC values are based on the 2012 herring fishery specifications.*

2.1.2 Alternative 2 – Constant Catch Approach (Preferred Alternative)

Alternative 2 is the Council’s *Preferred Alternative* for specifying ABC and the control rule for the 2013-2015 herring fishery specifications. It was developed by the Herring PDT based on a constant catch approach and supported by the SSC at the October 2012 meeting (Appendix XXX). Under this alternative, the ABC Control Rule specifies ABC annually as the catch that is projected to produce a probability of exceeding F_{MSY} in 2015 that is less than or equal to 50%. This value is 114,000 mt. OFL would be specified under this alternative as 169,000 mt in 2013, 136,000 mt in 2014, and 114,000 mt in 2015 (Table 3). This alternative accounts for scientific uncertainty by establishing a larger buffer between OFL and ABC during 2013 and 2014.

Table 3 Alternative 2 (Preferred Alternative) – Proposed OFL and ABC Specifications (mt) for 2013-2015

YEAR	2013	2014	2015
OFL (mt)	169,000	136,000	114,000
ABC (mt)	114,000	114,000	114,000

**OFL values are derived from a unique projection that applies F_{MSY} in every year but assumes that catch in prior years is 114,000 mt.*

2.1.3 Alternative 3 – 75% F_{MSY} Approach (Non-Preferred)

Alternative 3 was developed by the Herring PDT and also supported by the SSC at the October 2012 meeting (Appendix XXX). Under this alternative, the ABC Control Rule specifies ABC annually as the projected catch associated with fishing at 75% F_{MSY} . This value is 130,000 mt in 2013, 102,000 mt in 2014, and 104,000 mt in 2015 (Table 4). Under this alternative, the buffer for scientific uncertainty is distributed among the three years.

Table 4 Alternative 3 (Non-Preferred) – Proposed OFL and ABC Specifications (mt) for 2013-2015

YEAR	2013	2014	2015
OFL (mt)	169,000	127,000	104,000
ABC (mt)	130,000	102,000	88,000

**OFL values are derived from a unique projection that assumes catch associated with F_{MSY} is taken in every year (see SAW 54 Assessment Summary Report in Appendix 1).*

2.2 SPECIFICATION OF MANAGEMENT UNCERTAINTY AND OPTIONS FOR SUB-ACLS

2.2.1 Management Uncertainty

An additional element of a buffer established between the OFL, ABC, and the stock-wide ACL is defined as **management uncertainty**. Amendment 4 states that management uncertainty should be addressed prior to establishing ACLs, and deductions should be made from ABC, if necessary, to account for management uncertainty. Once scientific uncertainty and management uncertainty are deducted, the stock-wide ACL specification represents the U.S. Optimum Yield (OY).

$$\text{ABC} - \text{Management Uncertainty (determined by Council)} = \text{Stock-wide ACL} = \text{OY}$$

For the 2013-2015 specifications, the Council is proposing to deduct **6,200 mt** from the ABC to account for potential catch of Atlantic herring in the Canadian (New Brunswick (NB)) weir fishery. Consistent with the approach outlined in Amendment 4 to the Herring FMP as well as the 2010-2012 specifications), the Council considered three possible sources of management uncertainty for the 2013-2015 specifications:

1. Canadian Catch (NB weir fishery, see Section 3.5.2);
2. State Waters Catch (see Section 3.5.1.4); and
3. Herring Discards (see Section 3.5.1.1).

Based on the information/data considered by the Council (see sections referenced above) and the Herring PDT recommendations, the Council has determined that catch in the NB weir fishery is the only source of management uncertainty for which there should be a deduction between ABC and the stock-wide ACL. The Council's proposed deduction of 6,200 mt for management uncertainty is based on the most recent three years' average catch in the NB weir fishery, as this best reflects expected catch in this fishery over the next three years. Information to support this specification is provided in Section 3.5.2 of this document.

This means that, based on the *Preferred Alternative* for specifying OFL/ABC (Alternative 2 – 114,000 mt, see Section 2.1.2), the total stock-wide ACL/U.S. OY specification for the 2013-2015 fishing years will be **107,800 mt** (see Table 5 in the following section).

2.2.2 Options for Sub-ACLs

The sub-ACL options described below are based on the *Preferred Alternative* for specifying OFL/ABC (Alternative 2, see Section 2.1.2), with a deduction to account for management uncertainty. The Council recommendation for Atlantic Herring ACL and U.S. OY for 2013-2015 is **107,800 mt** (see Table 5 below).

Table 5 Proposed Stockwide ACL/OY Specification for 2013-2015

<i>Preferred Alternative</i>	2013	2014	2015
OFL (mt)	169,000	136,000	114,000
ABC (mt)	114,000	114,000	114,000
Management Uncertainty	6,200	6,200	6,200
ACL/OY (mt)	107,800	107,800	107,800

**Based on Council's Preferred Alternative for OFL/ABC/ABC Control Rule, Section 2.1.2)*

The Herring FMP requires that the total ACL be divided into four sub-ACLs (formerly known as TACs) and annually distributed among the herring management areas. The options under consideration for the 2013-2015 sub-ACLs are based on dividing a total ACL of **107,800 mt** among the herring management areas.

Research Set-Asides (RSA)

The options for specifying sub-ACLs also include consideration of a RSA up to 3% in any management area. The research set-aside was established in Amendment 1 (0-3% for any management area) and includes a corresponding requirement that adjusts the accountability measure to require that when the catch in a management area is projected to reach 92% of its specified sub-ACL (or whatever the appropriate percentage is, based on the RSA), the Regional Administrator will close the area to directed herring fishing. If there is no RSA specified for a management area, then the Regional Administrator will close the area to directed herring fishing when catch is projected to reach 95% of the specified sub-ACL. The Council will specify RSAs when selecting the final 2013-2015 fishery specifications.

Fixed Gear Set-Aside (FGSA)

Amendment 1 allows for up to 500 metric tons of Atlantic herring to be set-aside in Area 1A for fixed gear fishermen West of Cutler until November 1. Unutilized set-aside is returned to the 1A fishery following November 1. ME DMR requires the ME state commercial fixed gear fishermen to be compliant with the federal IVR weekly reporting requirements and regulations as well as reporting monthly to ME DMR. The FGSA for Area 1A was set to 295 mt for the 2010-2012 specifications. The Council will specify any FGSA when selecting final 2013-2015 fishery specifications.

The sub-ACL options under consideration for the 2013-2015 fishing years are described in the following sub-sections.

2.2.3 Option 1 – No Action

This option represents the status quo and maintains the 2012 herring fishery specifications through the 2013-2015 fishing years. No changes are proposed in the sub-ACLs under this option.

Table 6 Option 1 – No Action (2012 Specifications)

	2010-2012	2013-2015
OFL (mt)	145,000/134,000/127,000	127,000
ABC (mt)	106,000	106,000
ACL (mt)	91,200	91,200
Sub-ACL Area 1A	26,546	26,546
Sub-ACL Area 1B	4,362	4,362
Sub-ACL Area 2	22,146	22,146
Sub-ACL Area 3	38,146	38,146
No Research Set-Asides (RSAs) Area 1A Fixed Gear Set-Aside – 295 mt		91,200

Note: Consideration of the no action option is required under NEPA.

2.2.4 Option 2

This option was developed by allocating catch among the four management areas based on the proportional distribution of the total ACL in 2012. Under this option, the Area 1A sub-ACL continues to represent 29% of the total ACL, the Area 1B sub-ACL continues to represent 5% of the total ACL, and the Area 2 and 3 sub-ACLs continue to represent 24% and 42% of the total ACL, respectively.

Table 7 Option 2 – Proposed Sub-ACLs (mt) for 2013-2015

	2010-2012	2013-2015			
OFL (mt)	145,000/134,000/127,000	169,000/136,000/114,000			
ABC (mt)	106,000	114,000			
ACL (mt)	91,200	107,800	1% RSA	2% RSA	3% RSA
Sub-ACL Area 1A	26,546 (29%)	31,200	312	624	936
Sub-ACL Area 1B	4,362 (5%)	5,400	54	108	162
Sub-ACL Area 2	22,146 (24%)	25,900	259	518	777
Sub-ACL Area 3	38,146 (42%)	45,300	453	906	1,359
Area 1A Fixed Gear Set-Aside – TBD		107,800	N/A	N/A	N/A

Note: This option was recommended by the Herring Committee for consideration at its September 20, 2012 meeting.

2.2.5 Option 3

Option 3 was developed by allocating additional available yield for 2013-2015 (16,600 mt) equally among Areas 1A, 1B, and 2, the areas with sub-ACLs that are more often fully utilized. The sub-ACLs in Areas 1A, 1B, and Area 2 would increase about 5,500 mt, and the Area 3 sub-ACL remains similar to 2012 under this option.

Table 8 Option 3 – Proposed Sub-ACLs (mt) for 2013-2015

	2010-2012	2013-2015			
OFL (mt)	145,000/134,000/127,000	169,000/136,000/114,000			
ABC (mt)	106,000	114,000			
ACL (mt)	91,200	107,800	1% RSA	2% RSA	3% RSA
Sub-ACL Area 1A	26,546	32,100	312	624	936
Sub-ACL Area 1B	4,362	9,900	99	198	297
Sub-ACL Area 2	22,146	27,800	278	556	834
Sub-ACL Area 3	38,146	38,000	380	760	1,140
Area 1A Fixed Gear Set-Aside – TBD		107,800	N/A	N/A	N/A

Note: Options 3 and 4 are proposed based on Herring Committee guidance at the September 20, 2012 meeting. The Committee should consider moving forward with one of these two options, or one similar option that addresses the same objective(s).

2.2.6 Option 4

This option is based on allocating additional available yield for 2013-2015 (16,600 mt) primarily based on concerns and needs expressed by the industry fishing for both herring and mackerel in Area 2. Under this option, the sub-ACLs for Areas 1A, 1B, and 2 would all increase from 2012 levels; the Area 2 sub-ACL would increase about 10,000 mt, and the remaining yield would be distributed among Areas 1A and 1B.

Table 9 Option 4 – Proposed Sub-ACLs (mt) for 2013-2015

	2010-2012	2013-2015			
OFL (mt)	145,000/134,000/127,000	169,000/136,000/114,000			
ABC (mt)	106,000	114,000			
ACL (mt)	91,200	107,800	1% RSA	2% RSA	3% RSA
Sub-ACL Area 1A	26,546	32,000	320	640	960
Sub-ACL Area 1B	4,362	5,800	58	116	174
Sub-ACL Area 2	22,146	32,000	320	640	960
Sub-ACL Area 3	38,146	38,000	380	760	1,140
Area 1A Fixed Gear Set-Aside – TBD		107,800	N/A	N/A	N/A

2.2.7 Option 5

This option would prohibit directed fishing for herring in Area 1B and redistribute available yield proportionately to Areas 1A, 2, and 3. A sub-ACL of 600 mt is proposed in Area 1B to account for incidental catch. All vessels fishing in Area 1B would be restricted to a 2,000 pound incidental catch limit for herring for the entire fishing year.

Table 10 Option 5 – Proposed Sub-ACLs (mt) for 2013-2015

	2010-2012	2013-2015			
OFL (mt)	145,000/134,000/127,000	169,000/136,000/114,000			
ABC (mt)	106,000	114,000	1% RSA	2% RSA	3% RSA
ACL (mt)	91,200	107,800			
Sub-ACL Area 1A	26,546	33,200	332	664	996
Sub-ACL Area 1B	4,362	600	6	12	18
Sub-ACL Area 2	22,146	29,000	290	580	870
Sub-ACL Area 3	38,146	45,000	450	900	1,350
Area 1A Fixed Gear Set-Aside – TBD		107,800	N/A	N/A	N/A

Note: Options 5 and 6 are proposed to address concerns about recent overages due to low sub-ACLs in Area 1B. If the Committee supports further consideration of an option that eliminates directed fishing in Area 1B, it should select one of these two options, or develop one similar option that addresses the same objective(s).

2.2.8 Option 6

This option would prohibit directed fishing for herring in Area 1B and redistribute available yield primarily to Areas 1A and 2. All vessels fishing in Area 1B would be restricted to a 2,000 pound incidental catch limit for herring for the entire fishing year. Under this option, the sub-ACLs for Areas 1A and 2 would increase by about 10,000 mt, a sub-ACL of 600 mt in Area 1B is proposed to account for incidental catch, and the sub-ACL for Area 3 would remain virtually unchanged.

Table 11 Option 6 – Proposed Sub-ACLs (mt) for 2013-2015

	2010-2012	2013-2015			
OFL (mt)	145,000/134,000/127,000	169,000/136,000/114,000			
ABC (mt)	106,000	114,000	1% RSA	2% RSA	3% RSA
ACL (mt)	91,200	107,800			
Sub-ACL Area 1A	26,546	36,600	366	732	1,098
Sub-ACL Area 1B	4,362	600	6	12	18
Sub-ACL Area 2	22,146	32,600	326	652	978
Sub-ACL Area 3	38,146	38,000	380	760	1,140
Area 1A Fixed Gear Set-Aside – TBD		107,800	N/A	N/A	N/A

2.2.9 Option 7

This option was developed based on a Herring Committee recommendation to consider shifting some yield from Area 3 to Area 2 to address the needs of the mackerel/herring fishery in Area 2. Under this option, about 8,000 mt of the Area 3 sub-ACL is re-allocated to Area 2, and the majority of the additional yield available in 2013-2015 is allocated to Areas 1A and 1B.

Table 12 Option 7 – Proposed Sub-ACLs (mt) for 2013-2015

	2010-2012	2013-2015			
OFL (mt)	145,000/134,000/127,000	169,000/136,000/114,000			
ABC (mt)	106,000	114,000	1%	2%	3%
ACL (mt)	91,200	107,800	RSA	RSA	RSA
Sub-ACL Area 1A	26,546	40,000	400	800	1,200
Sub-ACL Area 1B	4,362	5,800	58	116	174
Sub-ACL Area 2	22,146	32,000	320	640	960
Sub-ACL Area 3	38,146	30,000	300	600	900
Area 1A Fixed Gear Set-Aside – TBD		107,800	N/A	N/A	N/A

Note: Option 7 is proposed based on Herring Committee guidance at the September 20, 2012 meeting to consider an option that re-allocates catch from Area 3 to Area 2.

2.3 OTHER 2013-2015 FISHERY SPECIFICATIONS

This section identifies the Council's recommendations for the remaining specifications for the 2013-2015 fishing years. Information to support these specifications is provided below, and additional information/discussion can be found in Sections 3.0 and 4.0 of this document.

2.3.1 Domestic Annual Harvest (DAH)

For 2013-2015, DAH is proposed to be set to equal OY for the U.S. Atlantic herring fishery (**107,800 mt**). Domestic annual harvest (DAH) is established based on the expected catch from U.S. fishing vessels during the upcoming fishing year.

$$\text{OY} = \text{DAH}$$

Discussion: When specifying DAH for the herring fishery, important considerations relate to the actual and potential capacity of the U.S. harvesting fleet. Recent fishery performance (catch) is an important factor, as well as the potential for the fishery to expand in the short-term.

The Herring FMP became effective during the 2001 fishing year, and since 2001, total landings in the U.S. fishery have decreased, averaging 93,792 mt over the time series (Table 13). Herring landings from the most recent five-year period (2007-2011) averaged 86,373 mt.

The 2007-2009 specifications document provided into to indicate that the U.S. fleet was capable of harvesting all of the available yield from the herring resource (DAH was specified at 145,000 mt for 2007-2009). Thus, the Council determined that both TALFF and JVP should be set at 0 mt for 2007-2009 primarily due to the potential for DAH and DAP to be realized by the domestic fishery and maximized benefits to the U.S. harvesting and shoreside processing sectors. From this time period through 2011, there has been no JVP activity for herring in recent years, so TALFF allocations to support these operations have not been necessary.

The average herring catch of 86,373 mt from 2007 to 2011 has been lower than the proposed DAH specification for 2013-2015. Possible reasons for lower harvest relate to sub-ACL reductions during 2010-2012, which included a large buffer for scientific uncertainty due to a strong retrospective pattern in the assessment (the ACL was lower than previous years), as well as the impacts of the Amendment 1 measures implemented in 2006/2007, including a limited access program and a seasonal purse seine/fixed gear only area in the inshore GOM. The size and capacity of the herring fleet has not changed substantially since 2007, and the capability of the fleet to catch the available DAH exists; in 2009, the vessels caught 103,943 mt, close to the proposed DAH specification for 2013-2015. These data indicate that the proposed DAH specification is consistent with the harvesting capacity of the domestic fleet.

Table 13 Total U.S. Atlantic Herring Catch, 2001-2011

YEAR	TOTAL U.S. Herring Catch (MT)
2001	120,025
2002	93,183
2003	101,607
2004	93,205
2005	96,116
2006	95,714
2007	85,819
2008	83,240
2009	103,943
2010	72,829
2011	86,034

Source: NMFS

*Note: The 2011 total catch estimate is preliminary and pending rulemaking; 2001 and 2002 totals are reported VTR landings; 2003-2011 data are provided by NMFS (year-end catch totals).

2.3.2 Domestic Annual Processing (DAP)

DAP is proposed to be set equal DAH minus 4,000 mt for BT during the 2013-2015 fishing years (**103,800 mt**).

Discussion: 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). The Herring FMP specifies that DAP is a subset of DAH and is composed of estimates of production from U.S. shoreside and at-sea processors.

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.

While it is difficult to predict whether or not the U.S. processing sector will utilize all of the available DAP in 2013-2015, it is certainly possible given the capacity of the domestic processing sector.

XXX

2.3.3 Border Transfer (BT)

BT represents U.S.-caught herring transferred to Canadian vessels for export and is proposed to be set at **4,000 mt** for the 2013-2015 fishing years.

Discussion: Specification of BT has remained at 4,000 mt since the implementation of the Herring FMP, and there was no change for the 2010-2012 fishing years. Table 14 indicates a decrease in BT from 1994-2011, with zero utilization of the border transfer from 2008 to 2010 and in 2011 utilizing 946 mt (24% of 4,000 border transfer mt).

Table 14 Utilization of Border Transfer (mt)

YEAR	MT Utilized in BT
1994	2,456
1995	2,117
1996	3,690
1997	1,280
1998	1,093
1999	839
2000	1,546
2001	445
2002	688
2003	1,311
2004	184
2005	169
2006	653
2007	53
2008	0
2009	0
2010	0
2011	946

**Source: NMFS*

2.3.4 U.S. At-Sea Processing (USAP)

Specification of USAP for the 2013-2015 fishing years is proposed to be set at **zero**.

Discussion: The Herring FMP states that “part of DAP may be allocated for at-sea processing by domestic vessels that exceed the vessel size limits (see section 3.6.6 of the Herring FMP). 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 and is not a specific allocation to this processing sector.

USAP can provide an additional outlet for U.S. harvesters, particularly those who operate vessels that do not have refrigerated saltwater (RSW) systems to maintain catch quality for delivery to shoreside processors. Such vessels could offload product to USAP vessels near the fishing areas, increasing the benefits to the U.S. industry. This is consistent with one of the objectives of the Atlantic Herring FMP: to provide, to the extent practicable, controlled opportunities for fishermen and vessels in other mid-Atlantic and New England fisheries.

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 (formerly TACs) 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 fishing years. The Council has not received any information that would suggest changing this specification for the 2013-2015 fishing years.

2.4 ALTERNATIVES FOR ACCOUNTABILITY MEASURES

In August 2012, a court order addressing remedial action pertaining to deficiencies identified in Amendment 4 to the Atlantic herring Fishery Management Plan was issued. One of the issues ordered to be addressed within the 2013-2015 Atlantic herring specifications is reconsideration of existing Atlantic herring AMs. Consistent with the court order, the Council is considering the following range of alternatives to modify existing accountability measures in the 2013-2015 specifications package. If a new AM is recommended by the Council, it may require implementation through a future action (framework adjustment or amendment to the Herring FMP).

The current AM associated with the haddock catch cap is described in the No Action Alternative (Alternative 1, see following subsection) and will remain effective under any other alternatives for AMs under consideration in the 2013-2015 herring specifications package.

Discussion

NMFS' Guidelines state that accountability measures (AMs) are management measures implemented for stocks such that exceeding the ACL is prevented, where possible, and corrected or mitigated if it occurs. The Guidelines suggest three kinds of AMs that could be considered: (1) those that can be applied in-season, designed to prevent the ACL from being reached; and (2) those that are applied after the fishing year, designed to address the operational issue that caused the ACL overage and ensure that it does not happen in subsequent fishing years, and, as necessary, address any biological harm to the stock; and (3) those that are based on multi-year average data which are reviewed and applied annually. AMs should address and minimize the frequency and magnitude of overages and should be designed so that if an ACL is exceeded, specific adjustments are effective in the next fishing year or as soon as possible. The Guidelines also suggest that multi-year specifications (like those for the Atlantic herring fishery) should include AMs that provide for automatic adjustments in the subsequent year's harvest if an ACL is exceeded in one year.

2.4.1 Alternative 1 – No Action

This alternative would maintain status quo conditions regarding the current AMs in the herring fishery. The AMs that would remain effective under the no action alternative are described below.

AM – Management Area Closure (Directed Fishing)

Currently, the directed fishery for herring in a management area is closed when 95% of the sub-ACL is projected to be reached; 5% is provided after the closure to account for incidental catch fishing under a 2,000 pound trip limit (and up to an additional 3% for research set-aside, which would result in a directed fishery closure when 92% of catch is projected). Closing the directed fishery at a 95% projected catch level helps to minimize the risk of exceeding 100% of the sub-ACL during the fishing year. Once the directed fishery is closed, all vessels are limited to 2,000

pounds of Atlantic herring, which is accounted for through the 5% “buffer” that remains available.

Discussion: This accountability measure was implemented in the Council’s Atlantic Herring FMP (1999) and has helped to keep catch at or near management area sub-ACLs since that time. While some overages have been experienced, the frequency and degree of overage has not been significant enough to compromise the health of the resource or stock complex. The rationale provided in the Herring FMP for this provision states:

Closing the fishery when the TAC is reached will protect the resource and ensure long term sustainable catches are achieved. This provision also sends a signal to the industry that harvests should be controlled or the fishery may close. The set-aside for incidental catches in other fisheries reduces the likelihood that the overall TAC will be exceeded. This level can be reduced by the Regional Administrator, or can be increased through a framework adjustment measure, if it appears to misstate the incidental catch.

AM – Sub-ACL Overage Deduction

The AM establishes a process to address **sub-ACL** overages in the Atlantic herring fishery. Once the final total catch for a fishing year is determined during the subsequent fishing year using the best available information (including VTR reports to account for incidental catch in other fisheries), any sub-ACL overage results in a reduction of the corresponding sub-ACL for the fishing year after the final total catch will be tallied. The sub-ACL deduction equals the amount that was exceeded. NMFS makes these determinations and publish any changes to the sub-ACLs in the *Federal Register* prior to the start of the fishing year during which the deduction would occur.

Discussion: This accountability measure was implemented in Amendment 4, consistent with the NMFS Guidelines that suggest consideration of AMs that are applied after the fishing year, designed to address the operational issue that caused the sub-ACL overage and ensure that it does not happen in subsequent fishing years, and, as necessary, address any biological harm to the stock. An example of how this AM is applied is provided below.

Example (Using Area 1A): In Year 1, the directed herring fishery in Area 1A closes when 95% of the sub-ACL is projected to be reached, and *all* vessels fishing in Area 1A are subject to a 2,000 pound trip limit for herring. This includes vessels with limited access herring permits and vessels participating in other fisheries and catching herring incidentally (some with limited access permits for herring, and some with open access permits for herring). During Year 2, VTR reports from all fisheries are compiled to generate a final tally of all herring catch during Year 1 (likely around April of Year 2 given the VTR lag time). If the final tally indicates that there was a sub-ACL overage during Year 1, the overage would be deducted from the Year 3 sub-ACL for Area 1A. NMFS publishes the Year 3 sub-ACLs with appropriate deductions prior to the start of the Year 3 fishing year.

AM – Haddock Catch Cap

The Herring FMP includes an AM for the current haddock catch cap, consistent with the establishment of the catch cap as a sub-ACL in the groundfish fishery (Amendment 16) and consistent with current regulations regarding the catch cap. When the Regional Administrator has determined that the haddock catch cap (§648.85(d)) has been caught, all vessels issued an Atlantic herring permit or fishing in the Federal portion of the GOM/GB Herring Exemption Area, will be prohibited from fishing for, possessing, or landing herring in excess of 2,000 lb per trip in or from the GOM/GB Herring Exemption Area unless the vessel has a multispecies permit and is fishing on a declared groundfish trip.

2.4.2 Alternative 2 – Adjust Provisions for Closure of Directed Fishery in a Management Area

The following alternatives are being considered to modify the existing AM for closing the directed herring fishery in a management area when 95% of the sub-ACL is projected to be reached.

2.4.2.1 Alternative 2A

This alternative would adjust the existing AM to require the directed herring fishery in a given management area to close when catch is projected to reach 92% (not including RSAs) of a sub-ACL (versus 95%) under the following conditions:

- The stock is overfished or overfishing is occurring; **and**
- The sub-ACL for the management area has been exceeded in at least one of the preceding two years.

Discussion: This alternative was developed by the Herring Committee in October 2012 as part of the court mandate to consider a wider range of alternatives for AMs in the 2013-2015 fishery specifications.

2.4.2.2 Alternative 2B

This alternative would adjust the existing AM to require the directed herring fishery in a given management area to close when catch is projected to reach **92%** (not including RSAs) of a sub-ACL (versus 95%). The remaining 8% is provided after the closure to account for incidental catch fishing under a 2,000 pound trip limit for all vessels with herring permits.

Options:

- Other thresholds (90%, for example) could be considered; and different thresholds could be applied to different management areas (for example, 92% in Area 1A, 90% in Area 1B, and 95% in Areas 2 and 3).

Discussion: This alternative was considered but rejected in Amendment 4. It is being reconsidered by the Council at this time, consistent with the court mandate to consider a range of alternatives to existing AMs in the 2013-2015 fishery specifications.

The thresholds that are selected for closing the directed fishery should be based on consideration of the size of the sub-ACL, patterns of effort in the fishery, and the ability to monitor the sub-ACL on a real-time basis.

2.4.2.3 Alternative 2C

This alternative would automatically reduce the percentage trigger for closing the directed fishery in any management area where a sub-ACL overage occurs. For example, under the current 95% closure AM (for the directed fishery), if NMFS sub-ACL monitoring data indicate the sub-ACL in a management area was exceeded by 3% during the fishing year, then the area would close at 92% of the sub-ACL in the following year (instead of 95%). NMFS would evaluate all available data and publish the change to the trigger for closure in the *Federal Register* as soon as possible during the following fishing year. The directed fishery for herring in the area would close earlier to avoid exceeding the sub-ACL in the following year.

Discussion: This alternative was considered but rejected in Amendment 4. It is being reconsidered by the Council at this time, consistent with the court mandate to consider a range of alternatives to existing AMs in the 2013-2015 fishery specifications.

2.4.3 Alternative 3 – Prohibit Possession of Herring When 100% of the Sub-ACL is Projected to be Reached

This alternative would allow NMFS to prohibit all catch of herring in a management area if 100% of the sub-ACL is projected to be reached.

Options:

- This provision could apply to the total ACL for Atlantic herring. Under this option, possession of herring would be prohibited in all management areas when 100% of the stock-wide ACL is projected to be reached.

Discussion: This alternative was considered but rejected in Amendment 4. It is being reconsidered by the Council at this time, consistent with the court mandate to consider a range of alternatives to existing AMs in the 2013-2015 fishery specifications. This measure was rejected in Amendment 4 because of the potential to create regulatory discards. ACLs are intended represent total catch (landings and discards). However, prohibiting landings of herring in non-directed fisheries (after the directed fishery is closed when 95% of the sub-ACL is reached) would not likely restrict further herring catch, but would rather convert incidental catch landings to discards.

2.4.4 Alternative 4 – Establish a Trigger for an In-Season Review and Possible Adjustment of the Sub-ACL

Under this alternative, a catch threshold (ex., % of sub-ACL for a given management area) would be established and would trigger a review by the NMFS Regional Administrator (RA) to determine if in-season adjustments are necessary to ensure that the sub-ACL is not exceeded during the fishing year.

If this alternative is selected, the language should clearly indicate what the trigger would be (ex., 75% of sub-ACL) and what in-season actions/adjustments the RA may consider during the review (ex., lower trigger for closure of directed fishery, seasonal split of sub-ACL, etc.).

Discussion: This alternative was considered but rejected in Amendment 4. It is being reconsidered by the Council at this time, consistent with the court mandate to consider a range of alternatives to existing AMs in the 2013-2015 fishery specifications.

2.4.5 Alternative 5 – Adjust the Sub-ACL Overage Payback Provisions

The following alternatives are being considered to modify the existing provisions for sub-ACL overage paybacks.

2.4.5.1 Alternative 5A

Under this alternative, when overfishing is not occurring and the stock is rebuilt (i.e., above the target biomass), the pound-for-pound payback of a sub-ACL overage in a given management area would only be required if the sub-ACL is exceeded by 5% or more.

Discussion: This alternative was developed by the Herring Committee in October 2012 as part of the court mandate to consider a range of alternatives to existing AMs in the 2013-2015 fishery specifications.

2.4.5.2 Alternative 5B

This alternative would require a direct deduction of a sub-ACL overage **in the following fishing year** (versus the current one-year lag). The process for determining sub-ACL overages would be based on NMFS sub-ACL monitoring (daily VMS catch reports supplemented with state and federal dealer data), consistent with management measures implemented as part of the Amendment 5 catch monitoring program.

Under this alternative, once the final catch for a fishing year is determined by NMFS for sub-ACL monitoring purposes, any sub-ACL overage would result in a reduction of the corresponding sub-ACL for the following fishing year equal to the amount that was exceeded. NMFS would make these determinations and publish any changes to the ACLs in the *Federal Register* as early in the subsequent fishing year as possible.

Options:

- This provision could apply to the total ACL for Atlantic herring. Under this option, once the final catch for a fishing year is determined by NMFS for ACL/sub-ACL monitoring purposes, any stock-wide ACL overage would result in a reduction of the total ACL for the following fishing year, equal to the amount that was exceeded.

Discussion: This alternative was considered but rejected in Amendment 4. It is being reconsidered by the Council at this time, consistent with the court mandate to consider a range of alternatives to existing AMs in the 2013-2015 fishery specifications.

2.4.5.3 Alternative 5C

This alternative would address sub-ACL overages in the herring fishery following a review of the impacts of the overage. Once the final catch for a fishing year was determined using the best available information, any sub-ACL overage would trigger a review by the Herring PDT to determine if a negative biological impact occurred from the overage, and if so, to what extent. The Herring PDT would then recommend ACL/sub-ACL adjustments to account for the overage based on this review. As part of its review, the Herring PDT would consider all potential biological impacts resulting from the overage, including impacts on individual stock components, spawning, productivity, and ecosystem impacts. The Herring PDT may also recommend no adjustments if it determines that the overage did not result in a negative biological impact.

Discussion: This alternative was considered but rejected in Amendment 4. It is being reconsidered by the Council at this time, consistent with the court mandate to consider a range of alternatives to existing AMs in the 2013-2015 fishery specifications.

Similar to current payback provisions, this alternative would also require a one-year lag time to conduct the review and determine the appropriate adjustments. For example, if an overage occurs in Year 1, the PDT would review the impacts of the overage in Year 2 and recommend adjustments to the ACLs/sub-ACLs for Year 3. Changes to the ACLs/AMs for Year 3 would not have required a Council action, but would be made by NMFS through publication in the *Federal Register*, following a recommendation by the Council after reviewing the Herring PDT's analysis.

Noting the time concerns and the possibility that the requirements for the Herring PDT may not be feasible, this alternative was eliminated from consideration in Amendment 4. The Council also noted that this alternative would be inconsistent with the objectives of the catch monitoring program (developed in Amendment 5); if an overage is large enough to indicate a measurable impact on the stock, then the problem would likely have originated from the failure of the catch monitoring program to prevent such an overage from occurring.

3.0 AFFECTED ENVIRONMENT

The Affected Environment is described in this document based on valued ecosystem components (VECs). The VECs for consideration include: Atlantic Herring; Non-Target Species and Other Fisheries; Physical Environment and Essential Fish Habitat (EFH); Protected Resources; and Fishery-Related Businesses and Communities. VECs represent the resources, areas, and human communities that may be affected by the management measures under consideration in this amendment. VECs are the focus since they are the “place” where the impacts of management actions are exhibited.

3.1 ATLANTIC HERRING

The NEFMC manages herring under the Atlantic Herring FMP. The stock is not overfished at this time and overfishing is not occurring (the stock is considered rebuilt). A complete description of the Atlantic herring resource can be found in Section 7.1 of the FSEIS for Amendment 1 to the Herring FMP. Updated information to supplement that presented in Amendment 1 can be found in Section 6.1 of the EA for Amendment 4 to the Herring FMP. The following subsections update information through 2011 where possible and summarize the stock status and recent biological information for Atlantic herring. Further information is presented in Amendment 5 to the Herring FMP.

3.1.1 Background Information

The Atlantic herring (*Clupea harengus*), is widely distributed in continental shelf waters of the Northeast Atlantic, from Labrador to Cape Hatteras. Herring can be found in every major estuary from the northern Gulf of Maine to the Chesapeake Bay. They are most abundant north of Cape Cod and become increasingly scarce south of New Jersey (Kelly and Moring 1986) with the largest and oldest fish found in the southern most portion of the range (Munro 2002). 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, Gulf of Maine herring migrate from summer feeding grounds along the Maine coast and on Georges Bank to southern New England and Mid-Atlantic areas during winter, with larger individuals tending to migrate farther distances. Presently, herring from the Gulf of Maine and Georges Bank components are combined for assessment purposes into a single coastal stock complex.

Additionally, Amendment 5 to the Herring FMP describes a tagging project executed by Maine DMR between 2003 and 2006 to provide evidence of intermixing of Gulf of Maine, George’s Bank, and Scotian Shelf herring. The tag recoveries showed a clear pattern of short-term residency during the summer feeding and spawning period, which was then followed by a long distance migration through time. German bank spawning ground turnover rates were also studied in 2009, and the results showed a trend towards staying on the spawning grounds, with most fish being recaptured by the third week after release on the spawning grounds, and some fish remaining on the grounds for up to five weeks. A number of inshore trawl surveys were performed by NMFS and MA DMF from 1990-2011 and 1978 to 2010 respectively to examine trends in the distribution of Atlantic herring as an inshore component. Similarly, NMFS has

performed Acoustic surveys since 1999 in an effort to study Atlantic herring population and distribution. Catch sampling of Atlantic herring has been collected since 1970 by ME DMR and there are between 175 and 250 samples processed each year, further in depth analysis can be seen in Amendment 5 to the Herring FMP.

Atlantic Herring as a Forage Species

To date, the Council, based on recommendations from its Herring PDT, has determined that the importance of herring as a forage species and the role of herring in the ecosystem is adequately addressed through analyses conducted as part of the SAW 54 and the benchmark stock assessment for Atlantic herring as well as through the specification-setting process and the SSC's determination of Acceptable Biological Catch, which includes a buffer for scientific uncertainty. Specifically, the role of herring as a keystone species in the ecosystem and the availability of herring as prey are two of several important considerations in the Council's ACL-setting process for the Atlantic herring fishery. It is well known that Atlantic herring are consumed by demersal and pelagic fish, marine mammals, and seabirds in addition to human exploitation. Overholtz and Link (2007) estimated the total annual removal of herring from the ecosystem by predator species for the period 1977-2002, using different modeling approaches, assumptions, and data inputs, depending on the information available. Overall, the authors estimated that predators often consumed more herring than the amount harvested by the fishery between 1959 and 2002, and that predation was likely important to the herring dynamics in the Gulf of Maine/Georges Bank area. Further information regarding the role of fishes, mammals, and seabirds can be found in Section XXX.

3.1.2 Updated Stock Information (SAW/SARC 54)

The Stock Assessment Review Committee (SARC) of the 54th Northeast Regional Stock Assessment Workshop (SAW 54) met in June 2012 to review the Northeast regional benchmark stock assessment of Atlantic herring in Woods Hole, MA. A statistical catch-at-age model (Age Structured Assessment Program, ASAP; Legault and Restrepo 1999) was proposed as the best scientific information for determining Atlantic herring stock status. The SARC 54 Panel recognized natural mortality (M), the 2008 year class, and Biological Reference Points (BRPs) as scientific uncertainties. The spawning stock biomass (SSB) was estimated at 517,930 mt in 2011 and fishing mortality rate at age 5 (F) was estimated to be 0.14. Age 5 was used because it is fully selected in the mobile gear fleet, which accounted for much of the catch in recent years.

The SAW/SARC 54 assessment did not have the same problems with retrospective patterns or inconsistent biological reference points as in the TRAC 2009 assessment. Rather after largely resolving the retrospective pattern, the three main sources of scientific uncertainty regarding Atlantic herring from this assessment included: the estimate of the 2008 year class, natural mortality, and the Biological Reference Points (BRPs). These sources of uncertainty were evaluated by the Herring PDT and the SSC during the development of the proposed ABC/ABC control rule specification (see Appendix XXX for the complete SSC Report).

This assessment included significant changes from previous assessments, with almost all data inputs and model settings being reconsidered. For example, catches from all sources were combined in previous assessments, but catch-at-age was partitioned into mobile and fixed gear

fleets in the new formulation of the ASAP model. Furthermore, age - and time-varying natural mortality rates were developed and herring consumption by various predators justified a 50% increase in natural mortality beginning in 1996, whereas natural mortality equaled 0.2 for all ages and years in previous assessments. Selectivity in the SAW/SARC 54 assessment was also estimated for any data source with age composition, but was fixed in previous assessments. Lastly, maturity-at-age varied among years in this assessment, but held constant in previous assessments.

Biological Reference Points (BRPs)

The BRPs from SAW/SARC 54 were based on the fit of a Beverton-Holt stock-recruitment curve (estimated internally to ASAP model) and other inputs from the terminal year of the assessment (i.e., 2011) (Table 8). The BRPs were affected by the 50% increase in natural mortality beginning in 1996, and so are considered uncertain (see below). The 2009 reference points are from the previous TRAC 2009 assessment and were based on the fit of a Fox surplus production model.

The BRPs seen in Table 15 differ due to (1) differences in natural mortality assumptions between assessments (i.e., SAW/SARC 54 used age-and time-varying M with a 50% increase beginning in 1996 and TRAC 2009 used 0.2 for all ages and years), and (2) the methods used to estimate the BRPs (Fox model was used in TRAC 2009 and the Beverton-Holt (BH) stock-recruitment curve estimated within ASAP for SAW/SARC 54).

Table 15 Atlantic Herring Biological Reference Points

Reference Points	TRAC 2009	SAW/SARC 54 (June 2012)
F_{MSY}	0.27	0.27
B_{MSY}	670,000 mt (1/2 SSB _{MSY} = 335,300)	157,000 mt (1/2 SSB _{MSY} = 78,500)
MSY	178,000 mt	53,000 mt

Uncertainty in the MSY BRPs is principally driven by two factors: 1) uncertainty in the estimate of the steepness parameter of the stock-recruitment relationship, and 2) the 50% increase in natural mortality during 1996-2011. For example, over approximately 95% confidence intervals for steepness (0.35-0.85), MSY ranged from 40,000 to 78,000 mt, SSB_{MSY} ranged from 73,000 to 277,000 mt, and F_{MSY} ranged from 0.12 to 0.7. Stock status in 2011, however, was robust to this uncertainty, with a broad range of comparisons resulting in the conclusion that overfishing is not occurring and the stock is not overfished (SSB > 1/2 SSB_{MSY} and F < F_{MSY}). Also, as noted above, the 50% increase in natural mortality during 1996-2011 implies a decrease in sustainable yield (e.g., lower MSY than if the increase were not present).

3.1.2.1 Spawning Stock Biomass (SSB)

The herring total and spawning stock biomass increased after 2009, mostly due to the large 2008 year class. The estimated 2011 January 1 total biomass of Atlantic herring was 1,322,446 mt. Based on the ASAP model, SSB was 517,930 mt in 2011. SSB declined during 1997-2010, and ranged from 180,527 mt in 1982 to a max of 1,936,769 mt in 2009. Total biomass and SSB showed similar trends over time, but 1-2 year lags caused by total biomass being reflected immature recruits rather than SSB.

3.1.2.2 Fishing Mortality (F)

Fishing mortality (F) rates in 2010 and 2011 were relatively low due to the presence of the strong 2008 year class, which increased the stock biomass. Fishing mortality in 2011 equaled 0.14, but is not representative of fishing mortality rates in recent years which averaged 0.23 during 2000-2009.

3.1.2.3 Natural Mortality (M)

Natural mortality assumptions in SAW 54 were based on a combination of the Hoenig and Lorenzen methods, with the Hoenig method providing the scale of natural mortality and the Lorenzen method defining how natural mortality declined with age (Hoenig 1983; Lorenzen 1996). Natural mortality rates during 1996-2011 were increased by 50% to resolve a retrospective pattern and to ensure that the implied levels of consumption were consistent with observed increases in estimated consumption of herring. Consumption estimates were based on food habits data primarily for groundfish, but also informed by consumption estimates from marine mammals, highly migratory species, and seabirds. The 50% increase in natural mortality implies a decrease in sustainable yield (i.e. lower MSY absent the increase), such that monitoring for changes in predator consumption rates remains of particular importance.

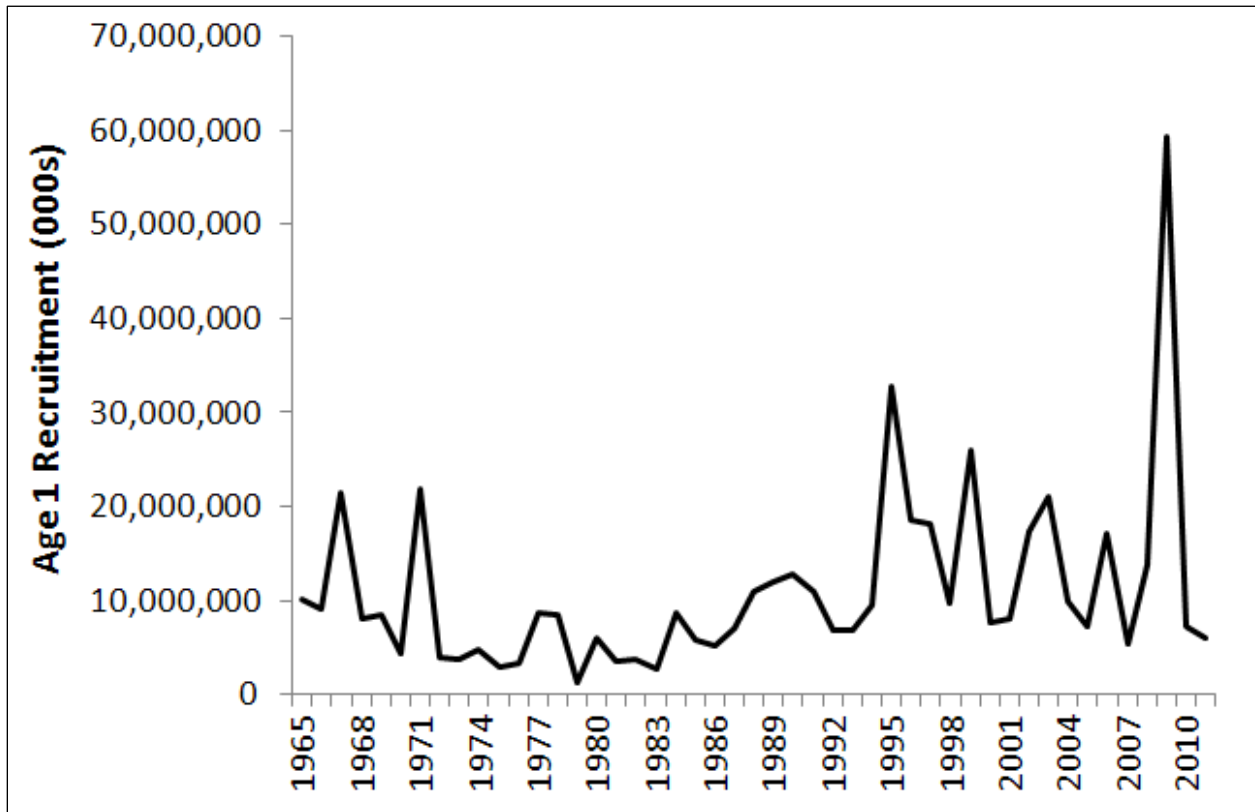
The Herring PDT reviewed the SAW 54 Assessment and discussed assumptions about natural mortality (M) and changes made in the assessment model. The PDT agrees that natural mortality and consumption of herring by predators has been addressed in this assessment to the extent possible. Addressing M in this manner seems appropriate given herring's importance as a forage species and appears to be consistent with other sources of information regarding food consumption and predation. Natural mortality and consumption have been evaluated in this assessment more thoroughly than assessments for other species in the Northeast Region. The SSC generally supported the Herring PDT's conclusions and recommendations (see SSC Report in Appendix XXX for more information).

3.1.2.4 2008 Atlantic Herring Year Class

The SAW/SARC 54 assessment estimated the 2008 year class as the largest recruitment on record, totaling 59.4 billion age-1 fish in 2009 (Figure 2). The signal for this cohort was consistently seen in all sources of data that contain age composition. The average age-1 recruitment has been below the 1996-2011 average of 15.8 billion fish except for the 2008 year class, which is likely to be a significant component of projected yield in the near future. The spawning stock and total biomass increased after 2009, most likely due to the strong 2008 year class.

The sensitivity of the stock status to the 2008 year class was tested on projections through 2015 at F_{MSY} . A projection of the 2008 year class was cut in half to approximately equal previous high recruitments and the probability of the stock being overfished or overfishing to occur still remained at zero. A Beverton-Holt relationship was also used to conduct a sensitivity run with variation of the annual recruitments (CV in base = 1, CV in sensitivity = 0.67), and with these additional restrictions on recruitment variation, the 2008 year class would still be the largest on record.

Figure 2 Atlantic Herring Age-1 Recruitment (000s), Estimated from the ASAP Model Base Run (SAW 54)



Source: NEFSC

3.1.2.5 Stock Status – Overfishing Definition

The current overfishing definition (Atlantic Herring FMP, 1999) for Atlantic herring is provided below.

If stock biomass is equal or greater than B_{MSY} , overfishing occurs when fishing mortality exceeds F_{MSY} . If stock biomass is below B_{MSY} , overfishing occurs when fishing mortality exceeds the level that has a 50 percent probability to rebuild stock biomass to B_{MSY} in 5 years ($F_{Threshold}$). The stock is in an overfished condition when stock biomass is below $\frac{1}{2} B_{MSY}$ and overfishing occurs when fishing mortality exceeds $F_{Threshold}$. These reference points are thresholds and form the basis for the control rule.

The control rule also specifies risk-averse fishing mortality targets, accounting for the uncertainty in the estimate of F_{MSY} . If stock biomass is equal to or greater than $\frac{1}{2} B_{MSY}$, the target fishing mortality will be the lower level of the 80 percent confidence interval about F_{MSY} . When biomass is below B_{MSY} , the target fishing mortality will be reduced consistent with the five-year rebuilding schedule used to determine $F_{Threshold}$.

*The Herring PDT notes there may be an error or inconsistency in the language related to the rebuilding schedule and recommends that this overfishing definition be reviewed at the next appropriate discussion.

The 2012 SAW 54 benchmark assessment results estimated that Atlantic herring SSB in 2011 was 517,930 mt, which is well above B_{MSY} (157,000 mt). Estimated fishing mortality in 2011 was 0.14, which is below F_{MSY} (0.27). Therefore, the stock is not overfished and overfishing is not occurring. In fact, the stock is considered to be completely rebuilt.

3.2 NON-TARGET SPECIES AND OTHER FISHERIES

3.2.1 Non-Target Species (Overview from Amendment 5 FEIS)

“Non-target species” refers to species other than herring which are caught/landed by federally permitted vessels while fishing for herring. These non-target species may be caught by the same gear while fishing for herring, and may be sold assuming the vessel has proper authorization or permit(s).

Standardized Bycatch Reporting Methodology (SBRM)

On September 15, 2011, upon the order of the U.S. Court of Appeals for the District of Columbia Circuit, the U.S. District Court for the District of Columbia, in the case of *Oceana, Inc. v. Locke* (Civil Action No. 08-318), vacated the Northeast Region Standardized Bycatch Reporting Methodology (SBRM) Omnibus Amendment and remanded the case to NMFS for further proceedings consistent with the D.C. Circuit Court’s decision.

To comply with the ruling, NMFS announced on December 29, 2011 (76 FR 81844) that the Northeast Region SBRM Omnibus Amendment is vacated and all regulations implemented by the SBRM Omnibus Amendment final rule (73 FR 4736, January 28, 2008) are removed. This action removed the SBRM section at § 648.18 and removes SBRM-related items from the lists of measures that can be changed through the FMP framework adjustment and/or annual specification process for the Atlantic mackerel, squid, and butterfish; Atlantic surfclam and ocean quahog; Northeast multispecies, monkfish; summer flounder; scup; black sea bass; bluefish; Atlantic herring; spiny dogfish; deep-sea red crab; and tilefish fisheries. This action also makes changes to the regulations regarding observer service provider approval and responsibilities and observer certification. The SBRM Omnibus Amendment had authorized the development of an industry-funded observer program in any fishery, and the final rule modified regulatory language in these sections to apply broadly to any such program. This action revises that regulatory language to refer specifically to the industry-funded observer program in the scallop fishery, which existed prior to the adoption of the SBRM Omnibus Amendment.

NMFS and the New England and Mid-Atlantic Fishery Management Councils are developing a new omnibus amendment to bring Northeast fishery management plans into compliance with Magnuson-Stevens Act requirements for a standardized bycatch reporting methodology. A SBRM Fishery Management Action Team has been constituted and has begun development of the new amendment.

XXX

Non-Target Species: Information from Observer Data

Table 16 summarizes coverage rates from the Northeast Fisheries Observer Program (NEFOP) for the 2009-2011 calendar years (also the herring fishing years) by gear type for all trips that landed greater than 2,000 pounds of Atlantic herring. During the 2011 fishing year, NEFOP covered trips for about 55% of all midwater trawl, 45% of pair trawl, 25% of purse seine, and 13% of bottom-trawl Atlantic herring landings. Observer coverage of mackerel catch has generally been less in recent years, partially because the observer program used to select away from trips that target mackerel but still notified for herring (this was due to coverage needs for herring related to groundfish).

Table 16 Observer Program Coverage Rates for Trips Landing Greater than 2,000 pounds of Herring, 2009-2011

Year	Gear Type	Total Trips	Total Days	Total Herring Landed (lbs.)	Obs Trips	Obs Days	Obs Herring Kept (lbs.)	% trips obs	% days obs	% herring obs
2009	OTF	180	306	9,647,215	11	15	554,579	6%	5%	6%
2009	OTM	50	242	13,875,075	16	69	3,747,316	32%	29%	27%
2009	PTM	356	1321	153,345,903	98	350	49,596,367	28%	26%	32%
2009	PUR	223	596	49,706,514	42	130	9,943,521	19%	22%	20%
2010	OTF	185	343	8,452,546	9	22	298,691	5%	6%	4%
2010	OTM	58	230	19,851,018	32	122	10,190,452	55%	53%	51%
2010	PTM	290	1129	98,165,321	128	545	47,528,352	44%	48%	48%
2010	PUR	222	506	18,799,340	24	58	1,850,818	11%	11%	10%
2011	OTF	175	368	9,449,163	24	59	1,208,293	14%	16%	13%
2011	OTM	61	165	17,647,500	27	91	9,758,411	44%	55%	55%
2011	PTM	295	1071	115,321,409	123	452	51,562,629	42%	42%	45%
2011	PUR	271	603	37,908,770	79	172	9,506,794	29%	29%	25%

OTF – small mesh bottom trawl; OTM – single midwater trawl; PTM – paired midwater trawl; PUR – purse seine

Herring is Atl Herring or Unk Herring;

Day defined as (date land - date sail) + 1;

Landings data from Vessel Trip Reports

Source: NEFSC Observer Program

The tables provided in Atlantic Herring Amendment 5 FEIS (Table 11 – Table 24) summarize information on non-target species in Federal waters, state waters (portside sampling in Maine and Massachusetts) as well as a discussion regarding the river herring bycatch program. The tables summarize the number of NEFOP observed herring trips from 2009 and 2010 along with the catch and discard of all species on observed trips, which are broken down by half year time period of January through June and July through December, and species observed are recorded as either discarded or kept in pounds.

Overall, the indicate that the four species/species groups that comprise the majority of the observed catch (either discarded or kept) in total pounds for the paired and single midwater trawl vessels, category A and B are Atlantic herring, Fish NK (primarily fish that are pumped to a paired vessel without an observer onboard (kept), and some unobserved fish that are discarded/released), Atlantic mackerel, and dogfish. Observed non-target species catch on limited access purse seine vessels was similar in terms of primary species composition. Other non-target species catch was more variable on midwater trawl vessels (versus purse seine), but in general, bycatch represents a very small fraction of total catch by limited access herring midwater trawl and purse seine vessels.

The composition of observed catch of non-target species on bottom trawl vessels is more variable (see Tables 14 – Table 20 in the Amendment 5 FEIS). Squid is the most common species caught by herring vessels fishing with bottom trawls. The majority of the species are haddock, skate, Atlantic cod, and flounders on large-mesh bottom trawl vessels when fishing for herring. However, observed catch from the small mesh vessels with herring permits appears to differ. The Category A and B bottom trawl vessels fishing small mesh catch primarily squid, Atlantic mackerel, Atlantic herring, and butterfish; Category C bottom trawl vessels fishing with small mesh are observed to catch primarily silver hake, other fish, scup, and squid. The five species that comprise the majority of catch on Category D bottom trawl vessels are skate, silver hake, dogfish, other fish, and squid.

3.2.2 Other Fisheries (Overview from Amendment 5 FEIS)

For the purposes of this document, the term “other fisheries” refers to those fisheries which are directly affected or related to the operation of the Atlantic herring fishery; namely river herring, the Atlantic mackerel fishery, and the Northeast groundfish fishery. In the Atlantic herring fishery, river herring are bycatch species that are not landed when caught. Mackerel is a primary alternate species caught by herring vessels and is commonly landed. The Northeast groundfish fishery is a primary alternate fishery for some herring vessels, and the areas of operation of both fisheries overlap (see the FEIS for Amendment 5 for more detail).

3.2.2.1 Shad and River Herring

As a non-target species in the Atlantic herring fishery, river herring are caught occasionally as a bycatch species but are not always discarded due to the high volume nature of the fishery; for example, discarding might take place in processing plants rather than at sea.

Based on 2009-2010 NEFOP observed trips only, river herring do not represent the majority of the bycatch composition on herring vessels (all permit categories), and seem to be most prevalent in Quarters 1 and 4 for paired midwater trawls, Quarters 1 and 2 for single midwater trawls, and are rarely caught by purse seine vessels (see XXX or Amendment 5 for more detail). Of the bottom trawl vessels the majority of river herring bycatch occurred on Category D vessels in Quarters 1, 2 and 3 and Category B and C in Quarters 1 and 4. Paired midwater trawls caught more river herring than bottom trawl vessels, however.

Life History

Shad and river herring are anadromous fish that spend the majority of their adult lives at sea, only returning to freshwater in the spring to spawn. Historically, shad and river herring spawned in virtually every river and tributary along the Atlantic coast.

American Shad

American shad stocks are river-specific; that is, each major tributary along the Atlantic coast appears to have a discrete spawning stock. The percentage of shad that survive to spawn more than once decreases from north to south. Shad that spawn in more northerly rivers may survive to spawn again (referred to as iteroparity), while shad native to the rivers south of Cape Fear, North Carolina die after spawning (referred to as semelparity). Mature females (ages five and older) produce a large quantity of eggs that are released into the water column and are fertilized by mature males (ages four and older). American shad adults that are iteroparous return to the sea soon after spawning and migrate northward to summer feeding grounds in the Gulf of Maine, while the fertilized eggs are carried by river currents, and develop into larvae which begin to feed four to seven days after hatching. Larvae drift downstream into tidal freshwater reaches of the spawning rivers, and gradually mature into juveniles. In early to late summer, juvenile shad migrate out of their nursery areas to the sea. Immature American shad will remain in the ocean for three to five years.

Alewife/Blueback Herring

Alewife and blueback herring are known as “river herring” and managed collectively by ASMFC. Alewife spawn in rivers, lakes, and tributaries from northeastern Newfoundland to South Carolina, but are most abundant in the Mid-Atlantic and the New England states. Blueback herring prefer to spawn in swift flowing rivers and tributaries from Nova Scotia to northern Florida, but are most numerous in waters from the Chesapeake Bay south. Mature alewife (ages three to eight) and blueback herring (ages three to six) migrate rapidly downstream after spawning. Larvae begin to feed three to five days after hatching, and transform gradually into the juvenile stage. Juveniles remain in tidal freshwater nursery areas in spring and early summer, but may also move upstream with the encroachment of saline water. As water temperatures decline in the fall, juveniles move downstream to more saline waters. Little information is available on the life history of juvenile and adult alewife and blueback herring after they emigrate to the sea as young-of-the-year or yearlings, and before they mature and return to freshwater to spawn.

Population Management

The ASMFC Interstate Fishery Management Plan for Shad & River Herring, approved in 1985, was one of the very first FMPs developed by the ASMFC. Amendment 1 was adopted in 1998 and focuses on American shad regulations as well as monitoring programs to improve data collection and stock assessment capabilities.

Additionally, Amendment 2 to the ASMFC FMP for Shad and River Herring was approved in 2009 and implemented a precautionary approach to river herring management. Amendment 2 requires states or jurisdictions to close all state fisheries by January 1, 2012, with exceptions for systems with a sustainable fishery. A sustainable fishery is defined as one that demonstrates that

the river herring stock can support a commercial and/or recreational fishery without diminishing future stock reproduction and recruitment. Under Amendment 2, river herring from any state waters fishery may not be landed without an approved plan. State fishery proposals must contain 'sustainability targets' that are subject to Shad and River Herring Technical Committee (TC) review and Shad & River Herring Management Board (Board) approval.

Then, in 2010, the Board approved Amendment 3, which revised American shad regulatory and monitoring programs in place under Amendment 1. The Amendment was developed in response to the 2007 American shad stock assessment, which found that most American shad stocks were at all-time lows and did not appear to be recovering. Amendment 3 is similar to the management program required for river herring. The Amendment prohibits state waters commercial and recreational fisheries beginning January 1, 2013, unless a state or jurisdiction has a sustainable management plan reviewed by the TC and approved by the Board.

Fishery Performance

Since the early 1800s, the American shad supported major commercial fisheries along the Atlantic coast and was one of the most valuable food fish of the U.S. Atlantic coast before World War II. The estimated U.S. Atlantic coast catch in 1896 was 50 million pounds, and today the total coastwide harvest has averaged approximately 540,000 pounds annually since 2005 (Table 17). Each state is required to annually document that American shad ocean bycatch did not exceed 5% of the total landings (in pounds) on a per trip basis. Shad bycatch landings from ocean waters in 2010 comprised 8,546 pounds, or about 1.53% of the coastwide total.

River herring formerly supported significant commercial and recreational fisheries throughout their range. Fisheries were traditionally executed in rivers, estuaries, and coastal waters using weirs, traps, dip nets and gill nets. Commercial landings of river herring declined 95% from over 13 million pounds in 1985 to about 700 thousand pounds in 2005 (Table 18). The majority of the landings (64%) were reported by the state of Maine, followed by South Carolina (24%) and Virginia (9%). Although recreational harvest data are scarce, most harvest is believed to come from the commercial industry.

Table 17 Commercial Shad Landings (lbs.) by State from Maine to New Jersey, 1970-2010

YEAR	ME	NH	MA	RI	CT	NY	NJ
1970					78,518	118,208	26,127
1971					109,182	86,320	18,144
1972					113,037	148,645	24,494
1973					116,847	122,517	20,231
1974					112,130	110,860	24,358
1975					75,071	114,942	38,556
1976					177,811	100,064	31,933
1977					150,777	94,712	60,873
1978	11,118		363		138,938	207,114	59,512
1979			544		93,804	236,507	40,280
1980	12,682	3,130	3,810	907	140,843	647,106	54,296
1981	41,096	2,540	7,575	14,243	147,284	307,768	59,286
1982	11,741	1,225	13,336	35,970	128,369	205,254	127,416
1983	17,554	1,542	6,124	10,660	193,234	223,353	90,811
1984	15,157	2,313	13,472	16,602	180,966	333,396	98,159
1985	7,258	3,311	10,115	41,187	182,347	385,498	108,093
1986	10,438	7,666	27,261	23,769	146,490	395,389	79,244
1987	11,975	18,734	18,507	47,129	151,457	315,607	92,852
1988	14,461	20,837	22,967	55,339	85,957	362,169	113,763
1989	21,091	13,882	6,178	19,038	82,680	230,656	188,698
1990	5,354	17,330	2,540	10,337	119,068	212,701	222,110
1991	903	8,584	289	12,617	68,167	161,325	184,817
1992	658	4,492	140	6,029	65,616	130,060	148,497
1993	0	2,971	181	18,394	43,955	66,202	154,063
1994	477	12,803	130	8,137	48,023	92,794	102,484
1995	173	13,862	206	12,683	27,958	119,437	132,328
1996	485	16,118	61	6,452	30,281	95,148	95,774
1997	88	11,538	341	16,674	41,279	84,900	106,474
1998	192	6,881	801	15,236	40,526	146,907	105,712
1999	77	1,667	101	20,076	20,219	97,631	121,009
2000	132	2,695	122	7,854	48,724	81,159	116,624
2001	216	368	477	30,777	26,869	60,170	122,543
2002	8		192	39,553	49,034	86,876	125,341
2003	2	1	503	17,548	50,407	61,098	107,036
2004	4	49	12	6,652	30,086	39,868	98,760
2005	88	3,877		191,312	69,333	90,932	25
2006				2,292	38,547	9,271	62,920
2007				783	51,572	50,040	58,981
2008					7,344	22,720	6,761
2009				176	40,998	10,204	2,660
2010	7,140				24,187	11,375	14,363

Source: ASMFC

Recreational numbers included where available

Table 18 Commercial River Herring Landings (lbs.) by State from Maine to New Jersey, 1960-2010

Year	ME	NH	MA	CT	RI	NY	NJ
1960	966,235	95,000	17,651,100		20,000	38,200	3,000
1961	1,278,895	100,000	20,838,200		6,000	33,800	16,500
1962	1,137,420	125,000	8,275,700		19,000	38,200	20,300
1963	898,100	150,000	11,735,100	129,300	3,400	32,300	3,400
1964	903,677	75,000	5,528,800	140,000	14,800	37,000	14,200
1965	1,615,460	125,000	6,935,300	210,000	24,100	23,600	21,500
1966	1,153,180	75,000	6,633,200	192,500	6,600	4,188,000	12,400
1967	1,255,897	65,000	5,431,900	185,500	23,400	4,400	9,000
1968	1,498,447	40,600	116,700	190,000	32,800	7,000	8,400
1969	1,404,055	37,500	100,000	214,900	10,600	9,200	5,100
1970	1,066,975	31,000	1,156,300	122,300	143,600	11,000	7,500
1971	1,406,720	25,000	222,300	25,000	52,600	68	9,500
1972	1,445,200	24,000	1,907,400	22,800	34,000	400	14,700
1973	1,680,954	21,500	695,400	14,300	15,100	21,600	7,000
1974	2,232,790		228,500	17,000	36,100	16,900	10,600
1975	1,626,670		1,716,900	25,200	41,500	15,300	9,300
1976	1,894,860		44,900	67,100	34,000	1,500	11,300
1977	2,091,850	210,000	131,800	61,300	35,300	6,000	10,600
1978	1,704,075	165,000	701,300	39,800	26,200	700	2,400
1979	1,329,615		52,300	62,700	11,700	1,000	6,600
1980	1,449,405		144,000	55,100	7,400	900	18,600
1981	1,408,720		84,000	52,700		64,900	13,800
1982	576,677	114,500	53,500	41,800	4,800	229,200	13,600
1983	370,868	115,216	93,100	37,500	6,100	24,700	2,200
1984	499,555	90,000	194,100	32,400	900	4,200	3,100
1985	723,310	61,300	46,600	38,900	400	150	4,800
1986	937,720	26,990	32,400	40,100		2,900	4,200
1987	539,143	19,550	32,500	21,400	2,600	2,765	5,200
1988	625,975	12,087	42,580	2,100		100	700
1989	625,765	11,200	255,700	1,600		500	800
1990	436,625		20,700	1,150			42,494
1991	361,480		20,300	1,200			9,994
1992	438,042	9,802	18,700	3,200			3,069
1993	165,375	2,676	18,900	2,440			2,659
1994	83,318			2,000			328
1995	2,940			14,044	403	209	795
1996	136,395			252	750	741	4,449
1997	281,977		180			6,317	4,515
1998	386,365	25,994				12,234	7,371
1999	312,375					6,051	1,377
2000	246,680			77,985	574	98,845	2,246
2001	646,660			20		39,293	3,915
2002	819,554				12	40,716	4,669
2003	613,385					40,076	3,667
2004	543,172		89			36,685	7,131
2005	341,311					26,984	4,326
2006	1,178,758					23,505	3,414
2007	740,915					28,571	223
2008	1,170,469	8,137					631
2009	1,383,130	9,443				83	
2010	1,334,515	7,392	31	36,232		17,142	1,517

Source: ASMFC; Recreational numbers included where available

NAFO River Herring Catches, 1960-2009

The Northwest Atlantic Fisheries Organization (NAFO) is an intergovernmental fisheries science and management body founded in 1979, preceded by the International Commission of the Northwest Atlantic Fisheries (ICNAF), 1949-1978. Under the NAFO Convention, countries fishing within the (NAFO) Regulatory Area (RA) for certain NAFO managed species are required to report catches. The Foreign countries catching river herring included Bulgaria, Germany, Spain, Poland, Romania, and Russia. Reported NAFO foreign river herring catch began in 1967 and ceased in 1990, peaking in 1973 at 36,154 mt with the majority of catch by Russia (former USSR). By comparison, the total catch for US and foreign vessels combined in 1973 was 37,192 mt. US river herring catch peaked in 1961 at 10,205 mt and again in 1973 at 10,797 mt. Prior to and following the establishment of the EEZ, river herring catches fell for both US and foreign countries. No river herring catches were reported from 1994-2001 and 2003-2006 (see Amendment 5 to the FMP for Atlantic Herring for more detail).

Status of Stocks (American Shad & River Herring)

A stock assessment for American shad was completed in 1997 and submitted for peer review in early 1998 based on new information and the Board recommended terms of reference. The 1998 assessment estimated fishing mortality rates for nine shad stocks and general trends in abundance for 13 shad stocks. A coastwide American shad stock assessment was completed and accepted in 2007 and found that American shad stocks are currently at all-time lows and do not appear to be recovering. The 2007 report identified primary causes for stock decline as a combination of overfishing, pollution, and habitat loss due to dam construction. In recent years, coastwide harvests have been on the order of 500-900 mt, nearly two orders of magnitude lower than in the late 19th century. The peer review panel suggested that current and new restoration actions, including a reduction in fishing mortality, enhancement of dam passage, mitigation of dam-related fish mortality, stocking, and habitat restoration be addressed.

The ASMFC completed the river herring benchmark stock assessment and peer review in 2012, examining 52 stocks of alewife and blueback herring with available data in US waters. The status of 23 stocks were determined to be *depleted* relative to historic levels, and one stock was increasing. Statuses of the remaining 28 stocks could not be determined, citing times-series of available data as being too short. “*Depleted*” was used, rather than “*overfished* and “*overfishing*,” due to many factors (i.e., directed fishing, incidental fishing/bycatch, habitat loss, predation, and climate change) contributing to the decline of river herring populations. Furthermore, the stock assessment did not determine estimates of river herring abundance and fishing mortality due to lack of adequate data. For many of these reasons, the stock assessment team suggested reducing the full range of impacts on river herring populations.

On August 5, 2011, the National Marine Fisheries Service (NMFS) received a petition from the Natural Resources Defense Council (NRDC), requesting that alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) be listed each as threatened throughout all or a significant portion of their range under the Endangered Species Act (ESA). In the alternative, NRDC requested that NMFS designate distinct population segments of alewife and blueback herring as specified in the petition (Central New England, Long Island Sound, Chesapeake Bay, and Carolina for alewives, and Central New England, Long Island Sound, and Chesapeake Bay for blueback herring). NMFS reviewed the petition and published a positive 90-day finding on

November 2, 2011, determining that the information in the petition, coupled with information otherwise available to the agency, indicated that the petitioned action may be warranted. As a result of the positive finding, the agency is required to review the status of the species to determine if listing under the ESA is warranted. NMFS recognized the ASMFC's extensive effort to compile the most current information on the status of these stocks throughout their range in the United States and, in order to not duplicate this effort, has been working cooperatively with ASMFC. The peer review reports and additional climate change analysis and extinction risk modeling results will be available in September/October, 2012. NMFS will use these reports and the modeling results along with the ASMFC river herring stock assessment and all other best available information to develop a listing determination which will be published in the *Federal Register* as soon as possible.

3.2.2.2 Atlantic Mackerel Fishery

A more detailed description of the Atlantic mackerel fishery can be found in the Final EIS for Amendment 5 to the Herring FMP, and the EIS for Amendment 11 to the Atlantic Mackerel, Squid, and Butterfish (MSB) FMP: http://www.mafmc.org/fmp/msb_files/msbAm11.htm. The overlap between the Atlantic herring and mackerel fisheries is important, as many of the same vessels and processing plants participate in both of these fisheries, and many of the participants are primarily or entirely economically dependent on these two fisheries. Many pair trawl vessels and midwater trawl vessels are dependent on herring and mackerel although pair trawl vessels are generally less dependent on herring than mackerel. Most bottom trawl vessels are not significantly dependent on either herring or mackerel, while purse seine vessels were almost entirely reliant on herring and menhaden.

Population Management

The MAFMC manages the Atlantic mackerel fishery. For the 2012 fishing year, the MAFMC adopted an ABC of 80,000 mt per the recommendation of its Scientific and Statistical Committee (http://www.mafmc.org/fmp/msb_files/2012_Specs/SSC_Report_25-26_May_2011.pdf). After accounting for Canadian catch, the Council also specified recreational-commercial allocations and buffers for management uncertainty such that the effective proposed U.S. commercial quota for 2012 is 33,821 mt. This is much higher than 2011 landings (less than 1,000 mt) but also substantially lower than quotas as recently as 2010 (115,000 mt). 2012 landings will likely be around 6,000 mt according to preliminary data. The fishery is currently open access, but a new limited access program, detailed below, became effective for Atlantic mackerel on March 1, 2012. A proposed rule is pending to maintain the 2012 specifications for 2013-2015.

Amendment 11 –Limited Access Program

Amendment 11 to the MSB FMP (76 FR 68642, November 7, 2011) implemented a limited access system consisting of tiered limited access and open access components. NMFS will be accepting applications for the limited access program until February 28, 2013, but switched over to the new permit system on March 1, 2012. The qualifying criteria for the limited access component are a valid Federal Fisheries Permit for mackerel as of March 21, 2007 and a certain level of mackerel landings during a specified time period as detailed below:

- Tier 1: At least 400,000 pounds landed in any one year 1997-2005
- Tier 2: At least 100,000 pounds landed in any one year 3/1/1994-2005
- Tier 3: At least 1,000 pounds in any one year 3/1/1994-2005.
 - Tier 3 would be capped for a maximum catch up to 7% of the commercial quota, set annually during the specifications process (no other allocations).
- Open Access: All other vessels.

The number of vessels that are expected to qualify for each tier and associated trip limits are summarized below (Table 19). The resulting capacity estimate for the vessels expected to qualify for Atlantic mackerel permits is 107,578 mt. The estimates for vessels in each Tier are based on analysis of unpublished NMFS dealer weighout data at the time, and all numbers did change as the program was implemented.

Table 19 Summary of Mackerel Limited Access Program and Predicted Number of Qualifiers

Access Category	Years Used for Qualification	Threshold of Poundage Needed to Qualify	Vessels Predicted to Qualify	Initial Trip Limits (adjustable via Specifications)
Tier 1	1997-2005	400,000	29	None
Tier 2	1994-2005	100,000	45	135,000
Tier 3	1994-2005	1,000	329	100,000
Open Access	N/A	N/A	N/A	20,000

Source: MAFMC, unpublished NMFS dealer weighout data

Amendment 11 sets initial trip limits for each tier, with all trip limits adjustable via specifications:

- Tier 1: No trip limit
- Tier 2: 135,000 lb per trip or calendar day
- Tier 3: 100,000 lb per trip or calendar day
- Open access: 20,000 lb per trip or calendar day

All permit categories are subject to a 20,000 lb trip limit during a closure of the mackerel fishery.

Stock Status

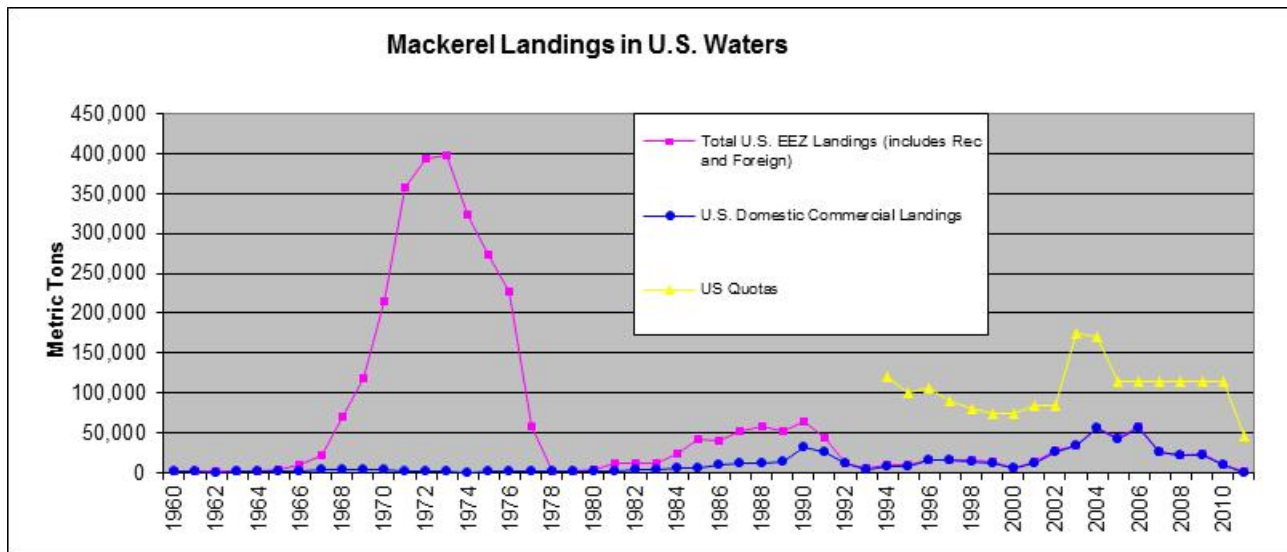
The status of mackerel is currently “unknown” with respect to both fishing mortality rates and stock size. The mackerel stock was last assessed in 2010 (utilizing data through 2008) via a joint U.S. – Canadian Transboundary Resource Assessment Committee (TRAC). The TRAC was unable to resolve uncertainties in the analyses to an acceptable degree so there are no accepted reference points. Various bureaucratic issues have left the official NMFS listing for mackerel as "not overfished" and "no overfishing" but these are not reflective of reality (the Mid-Atlantic Fishery Management Council is working with NMFS to have the designation updated).

Given current indications of reduced productivity and lack of older fish in the survey and catch, the TRAC recommended that annual total catches not exceed the average total landings over the most recent three years of data available at that time (2006-2008; 80,000 mt) until new information suggests a different amount is more appropriate. Results of the current TRAC assessment differ substantially from those in the 2005 NEFSC assessment, which indicated an increasing trend in SSB. If the 2005 assessment results had been adjusted for severe retrospective patterns, the adjusted results would have been similar to the current assessment results. Also, the current TRAC assessment results are consistent with the decreasing trend in SSB estimates in the Gulf of St. Lawrence during the past decade as derived from the egg surveys reported in the 2008 Canadian mackerel assessment. A recent Canadian assessment suggests continued low productivity (http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2012/2012_031-eng.html), at least in Canadian waters.

Mackerel Fishery Performance

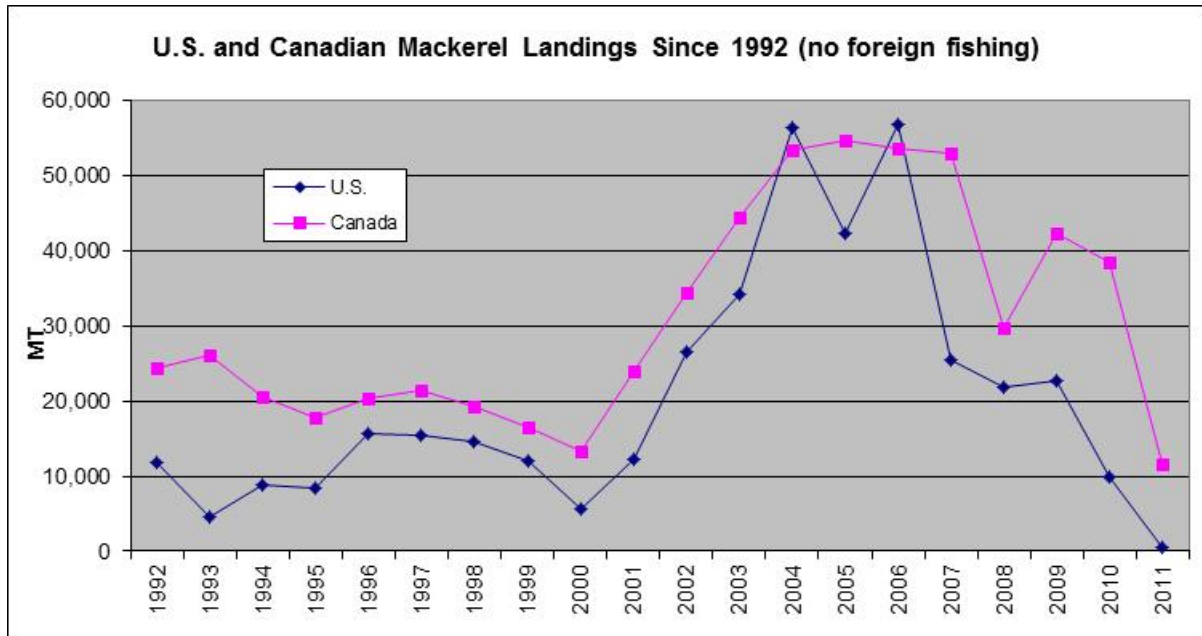
As Figure 3 and Figure 4 illustrate, catch in the fishery has varied substantially in the past 50 years. In the 1970s, foreign vessels came close to landing 400,000 mt of mackerel. In the early 1980s very little mackerel was caught, but by 1990 domestic boats were catching over 25,000 mt. Landings were relatively stable during the 1990's around 10,000 mt for domestic vessels, but the early 2000's saw landings rise to around 50,000 mt before dropping off in recent years. 2011 was a particularly low year with less than 1,000 mt of mackerel landed. Canadian landings since 1992 are included in Figure 4.

Figure 3 Atlantic Mackerel Landings Within 200 Miles of the US Coast (2011 Preliminary)



Source: TRAC 2010, unpublished NEFSC dealer reports

Figure 4 US and Canadian Atlantic Mackerel Landings (2011 Preliminary)



Source: Unpublished NEFSC Dealer Reports

The basic management approach for the Atlantic mackerel fishery is to use hard quotas with in-season closures. The principle measure used to manage mackerel catch is monitoring via dealer weighout data that is submitted weekly. The dealer data triggers in-season management actions that institute relatively low trip limits when 90% of the DAH is landed. Mandatory reporting for mackerel was fully instituted in 1997 so specification performance since 1997 is most relevant.

Table 20 lists the performance of the mackerel fishery (commercial and recreational together) compared to its DAH. There have been no quota overages. The gears used to catch mackerel have shifted from primarily bottom trawl before 2001 to primarily midwater trawl since 2001 (Table 21). See the MAFMC’s Omnibus Amendment or 2012 mackerel specifications for details: <http://www.mafmc.org/fmp/omnibus.htm>; and http://www.mafmc.org/fmp/msb_files/msbSpecs2012.htm respectively.

Table 20 Mackerel Quota Performance

Year	Harvest (mt) (Commercial and Recreational)	Quota (mt)	Percent of Quota Landed
1997	17,139	90,000	19%
1998	15,214	80,000	19%
1999	13,367	75,000	18%
2000	7,097	75,000	9%
2001	13,879	85,000	16%
2002	27,824	85,000	33%
2003	35,068	175,000	20%
2004	56,912	170,000	33%
2005	43,302	115,000	38%
2006	58,371	115,000	51%
2007	26,130	115,000	23%
2008	22,517	115,000	20%
2009	23,238	115,000	20%
2010	10,649	115,000	9%
2011	1,463	47,395	3%

Source: Unpublished NMFS Dealer Reports

Table 21 Atlantic Mackerel Landings (%) by Gear

Year	Bottom Otter Trawl	Midwater Trawl	Pair Trawl	Other
1982	71%	0%	1%	28%
1983	34%	0%	16%	51%
1984	44%	0%	14%	37%
1985	56%	0%	9%	34%
1986	87%	0%	0%	13%
1987	85%	0%	0%	15%
1988	91%	0%	0%	9%
1989	93%	0%	0%	7%
1990	90%	0%	0%	10%
1991	94%	3%	1%	2%
1992	96%	0%	0%	4%
1993	81%	10%	0%	9%
1994	94%	0%	0%	6%
1995	94%	1%	0%	6%
1996	85%	8%	0%	7%
1997	90%	4%	0%	6%
1998	83%	4%	9%	3%
1999	93%	1%	0%	6%
2000	81%	13%	0%	6%
2001	5%	92%	0%	3%
2002	15%	44%	39%	1%
2003	15%	50%	34%	1%
2004	13%	41%	36%	10%
2005	13%	20	62%	5%
2006	18%	43%	34%	4%
2007	8%	58%	32%	3%
2008	13%	42%	42%	2%
2009	30%	41	41%	4%
2010	28%	42%	42%	10%
2011	61%	13%	14%	12%

Source: Unpublished NMFS Dealer Reports

3.2.2.3 Northeast Multispecies (Groundfish) Fishery

The overlap between the Northeast multispecies fisheries and the herring fishery is diverse; herring vessel operation overlaps in similar areas and times as multispecies vessel operation. As such, herring vessels encounter and some may land various groundfish species.

With respect to bycatch, haddock in particular are occasionally caught higher in the water column and encountered more frequently by herring vessels than other groundfish species. Framework (46) modified the bycatch regulations for the herring fishery and adjusted the cap on the amount of haddock that could be caught by midwater trawl herring vessels. When the cap is reached, catches of herring from a large part of the GOM and GB areas are limited to 2,000 pounds per trip for all herring vessels.

General Fishery

The Northeast Multispecies Fishery Management Plan (FMP) specifies the management measures for thirteen groundfish species (cod, haddock, yellowtail flounder, pollock, plaice, witch flounder, white hake, windowpane flounder, Atlantic halibut, winter flounder, redfish, Atlantic wolffish, and ocean pout) off the New England and Mid-Atlantic coasts. The N FMP has been updated through a series of frameworks and amendments, the most recent being Framework 47 (modified the Ruhl trawl definition and clarifies the regulations for charter/party vessels fishing in groundfish closed areas) and Amendment 17 (defines and facilitates the effective operation of state-operated permit banks by recognizing state-operated permit banks under provisions of the Multispecies FMP). These documents should be referenced for more detailed descriptions of the fishery and the current management measures.

Haddock Stock Status/Landings

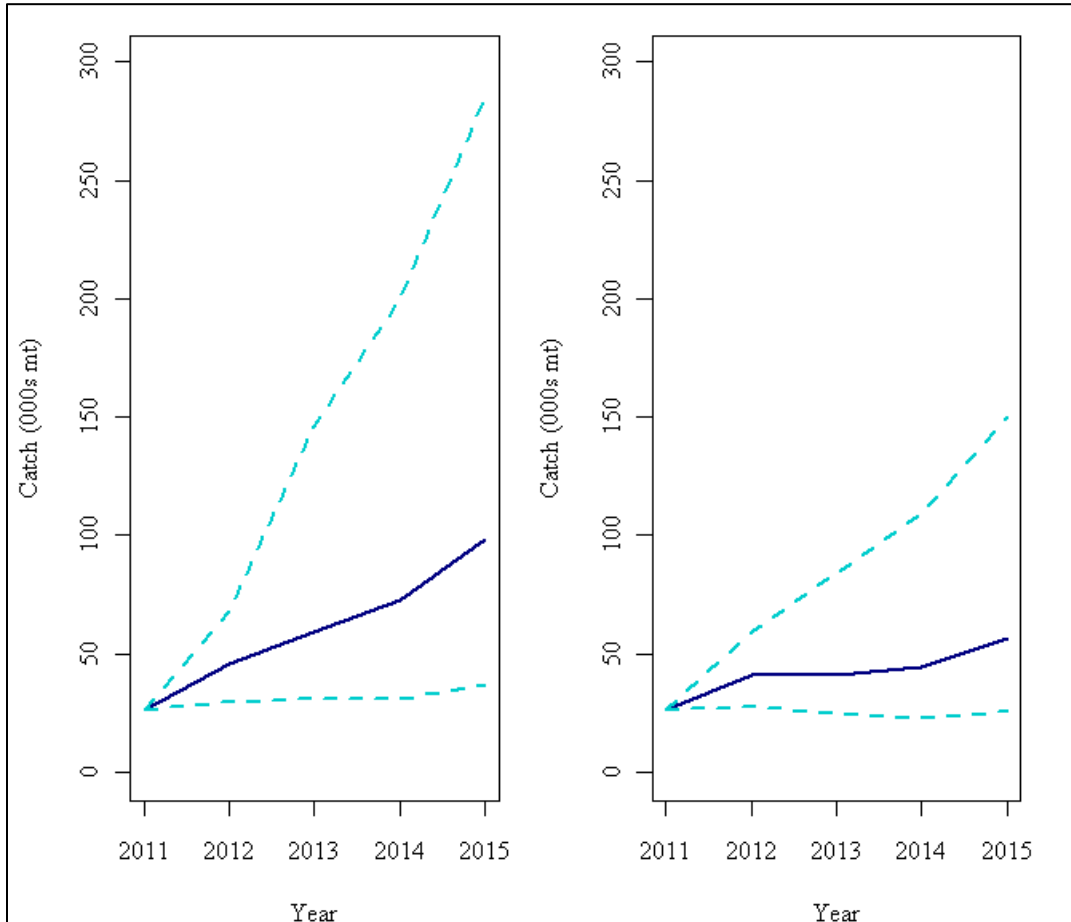
The GOM and GB haddock, *Melanogrammus aeglefinus*, is a commercially-exploited groundfish found in the northwest and northeast Atlantic Ocean. This demersal gadoid species is distributed from Cape May, New Jersey to the Strait of Belle Isle, Newfoundland in the northwest Atlantic, where a total of six distinct haddock stocks have been identified. Two of these haddock stocks are found in U.S. waters associated with Georges Bank and Gulf of Maine.

Median age and size of maturity differ slightly between the GB and GOM haddock stocks. GARM III found that the Gulf of Maine fishery does not target haddock and is directed mostly at flatfish for which the fleet uses large square (6.5 in) mesh gear, which leads to reduced selectivity on haddock. The Gulf of Maine haddock have lower weights at age than the Georges Bank stock and the age at 50 percent maturity was also lower for Gulf of Maine as compared to Georges Bank haddock.

In the most recent groundfish assessment updates (2012), the Georges Bank haddock stock is still considered rebuilt, thus no rebuilding projections were made. However, a projection was made to estimate catch and stock levels from 2011-2015. In this projection, catch in 2011 was assumed to be at the same level as catch in 2010 (25,903 mt), and fishing mortality was assumed to be F_{MSY} in 2012-2015 ($F=0.39$) seen in Figure 5. Under this mixed harvest scenario, the realized F in 2011 is projected to be 0.20, and catch in years 2012-2015 is projected to increase

from 45,600 mt to 98,200 mt. SSB from 2011 to 2015 is projected to range from 313,300 mt to 466,300 mt (Figure 6).

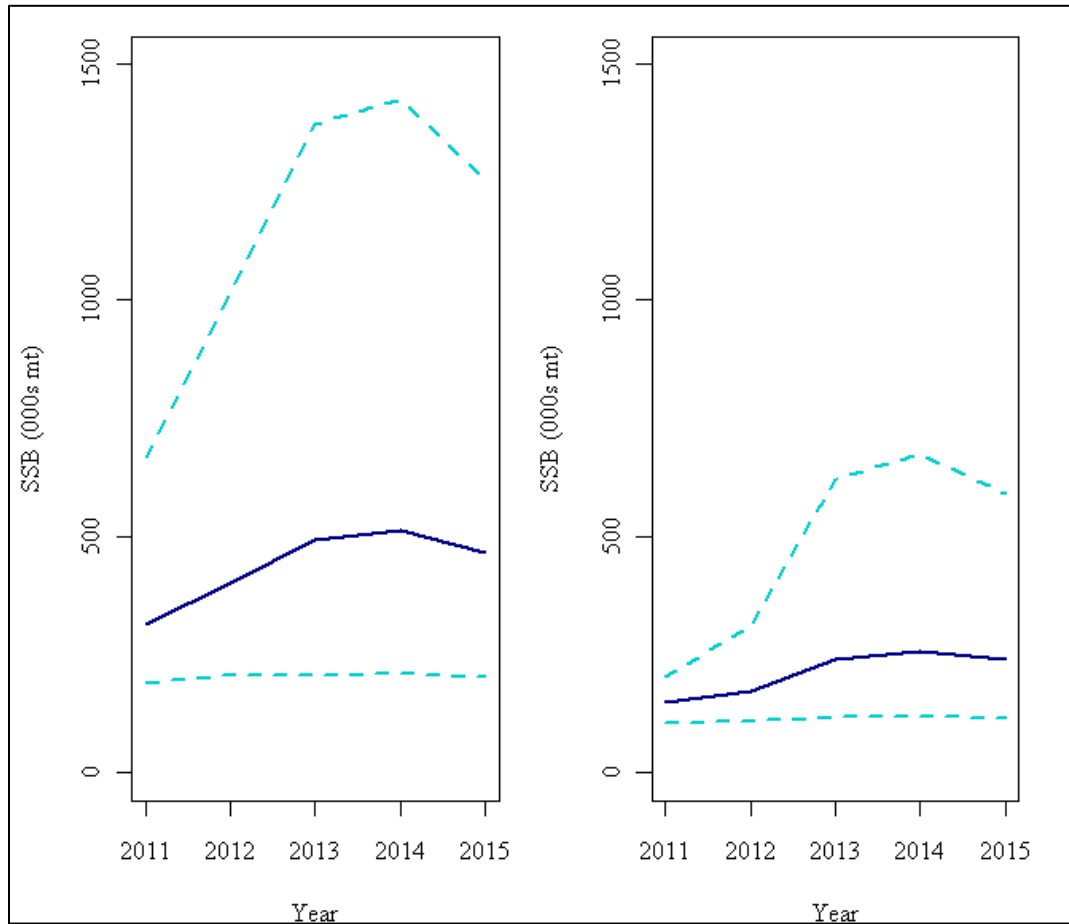
Figure 5 George’s Bank Haddock Catch Projections, 2011



Source: NEFSC

Projections assuming a catch in 2011 of 25,903 mt, and fishing at $F=0.39$ in years 2012-2015. On the left, no adjustment is made to the uncertain 2010 year class. On the right, that year class is decreased by 50% before making the projections.

Figure 6 George’s Bank Haddock SSB Projections, 2011



Source: NEFSC

Projected spawning stock biomass, assuming a catch in 2011 of 25,903 mt, and fishing at $F=0.39$ in years 2012-2015. On the left, no adjustment is made to the uncertain 2010 year class. On the right, that year class is decreased by 50% before making the projections.

The estimate of haddock SSB for 2010 is 167,278 mt, which is greater than the median estimate of SSB_{MSY} (124,900 mt). Therefore, the Georges Bank haddock stock is not overfished.

The estimate of F on fully selected fish in 2010 is 0.24, which is less than the F_{MSY} proxy (0.39), therefore overfishing is not occurring. Applying Mohn’s Rho for 7 years did not cause the stocks status to differ from the calculated confidence interval, thus the retrospective pattern was not considered for additional sensitivity configurations

(<http://nefsc.noaa.gov/publications/crd/crd1206/gbhaddock.pdf>).

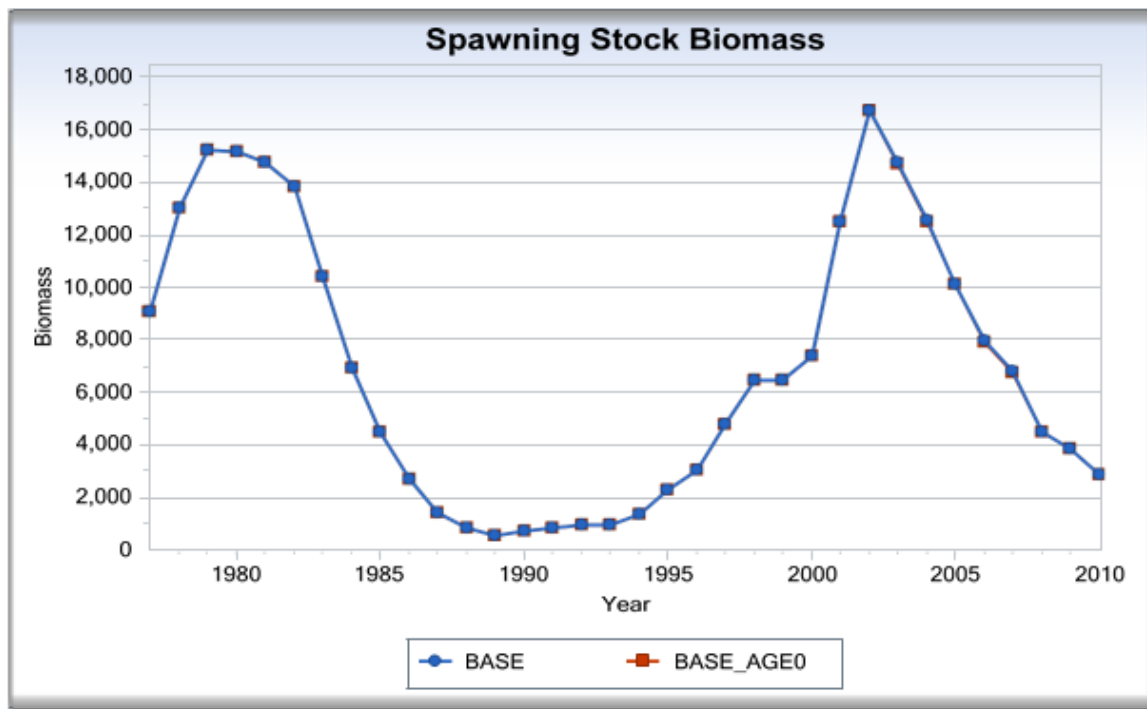
The GB haddock stock is a transboundary resource, which is co-managed with Canada. Substantial declines have recently occurred in the weights at age due to slower than average growth, particularly of the 2003 year-class. This is affecting productivity in the short-term. The growth of subsequent year-classes is returning to the earlier rates. Based on these results, the Georges Bank haddock stock is not overfished and overfishing is not occurring. The stock is above the biomass target.

For the 2012 assessment update of the Gulf of Maine haddock all model configuration details were kept identical to the configuration used in GARM III with the exception of the age 1-9+, due to an inconsistency in the GARM III VPA formulation (ages 0-9+) and biological reference point/projections (ages 1-9+).

Based on the updated 2012 assessment and revised reference points, the stock is not currently overfished, but overfishing is occurring (Figure 7). Accounting for the observed retrospective bias does change stock status with respect to the overfishing definition. However, the revised stock status point does not fall outside the confidence intervals of the un-adjusted point (Figure 7). The GARM III precedence was to not adjust stock status or projection inputs when the F and SSB estimates revised for retrospective bias do not fall outside the confidence intervals of the model.

The current biological reference points seen in Figure 7 are SSB_{MSY} of 4,904 mt, F_{MSY} of 0.46, and MSY of 1,177 mt. Based on these results, the Gulf of Maine haddock stock is not overfished, but overfishing is occurring. The stock is also below the biomass target. This represents a change from GARM III status.

Figure 7 Gulf of Maine Haddock Spawning Stock Biomass, 2012



Source: NEFSC

Framework 46

In September 2011, NMFS implemented Framework 46 to the Multispecies (Groundfish) FMP, which modified the haddock catch cap provisions for the herring fishery, originally adopted in Framework 43. The haddock catch cap provisions apply only to midwater trawl vessels with a herring permit because these vessels catch nearly all of the haddock caught by the herring fishery. Catches of haddock by midwater trawl vessels fishing in Management Areas 1A, 1B, and 3 that are documented by at-sea observers are extrapolated to an estimate of the total catch of haddock. Individual estimates are developed for each haddock stock (GOM and GB haddock). The cap is applied based on the multispecies fishing year (May 1 through April 30). The catch cap is set at one percent of the Acceptable Biological Catch (ABC) of each of the haddock stocks (Gulf of Maine and Georges Bank). If the haddock catch estimate extrapolated from observer reports exceeds a stock-specific cap, midwater trawl vessels will be limited to catching 2,000 pounds of Atlantic herring in a relevant area. If there is an overage of the cap, the cap for the following year will be reduced by the amount of the overage.

In order to monitor the cap, Framework 46 implemented some changes to the reporting requirements for midwater trawl vessels. In addition to the existing requirement to report herring catches by herring management area, midwater trawl vessels fishing in Management Areas 1A, 1B, and 3 are now required to report total kept catch by haddock stock area and gear used. This information is needed to extrapolate observer information to an estimate of total haddock catch.

Other Groundfish Stock Status/Landings

Of the twenty multispecies stocks, seven were reassessed during 2010-2012. These seven stocks, which were peer reviewed in the SAW/SARC process, include pollock in 2010, three stocks of winter flounder in 2011 (SNE/MA, GBK, and GOM), yellowtail flounder (SNE/MA and GB) and Gulf of Maine cod in 2012. This section summarizes the stock status in terms of biomass (B) or spawning stock biomass (SSB) and fishing mortality (F) through 2012 as reported in NEFSC (2012). Projected SSB and F were estimated in 2008 and 2009 for most of the age-based GARM assessments. The Georges Bank yellowtail assessment is updated each year through the TRAC and pollock was assessed in 2010 during SARC 50.

Comparisons between estimated stock sizes for 2007 from GARM III with the revised estimate for 2007 from the current updated results revealed decreases of 46% for Georges Bank cod, 20% for Georges Bank haddock, 57% for Gulf of Maine/Cape Cod yellowtail flounder, and 21% for witch flounder. Revised biomass estimates for GOM haddock, American plaice, and redfish biomasses exceeded those estimated in 2007 at GARM III. The changes in abundance between assessments for the same calendar year estimate are the result of incorporation of more information into the estimate and reduced uncertainty in the stock biomass. Subsequent to GARM III, pollock was assessed in SAW 50 (2010). The stock was determined to be not overfished and not subject to overfishing and remains the most current.

Atlantic wolffish was added to the multispecies groundfish stock complex and was assessed in 2008 in the Data Poor Working Group (DPWG 2008) and updated in 2010. Atlantic wolffish stock is presently overfished with current SSB being at 29% of SSB_{MSY} and overfishing is not occurring (F for fishing year 2010 was only 21% of F_{MSY}). As in the previous assessment a

range of knife edge maturity and selectivity assumptions were used to characterize stock status due to a general lack of biological data on this stock.

Measures of stock biomass and fishing mortality were computed for 12 of 13 stocks. A composite snapshot of the overall stock status of these stocks reveals seven stocks that are overfished and of these, four experience overfishing. Of the five stocks that exceed half of the B_{MSY} proxy, one stock (GOM haddock) is experiencing overfishing. There were no changes in overfished status between the current results and GARM III. Of the 12 assessed stocks two (Acadian redfish and SNE/MAB windowpane flounder) have exceeded their B_{MSY} proxy targets and are therefore newly rebuilt since GARM III (Table 22). Model-based estimates were not derived for white hake because the stock is currently scheduled for a benchmark assessment in December 2012. Stock biomasses increased for eight of the 12 stocks between 2007 and 2010. Declines in stock biomass for Georges Bank and Gulf of Maine haddock stocks were expected owing to the reduced influence of the strong 2003 year class to the population. Decreases in biomass for American plaice and ocean pout were 12% and 13% respectively.

All of the fishing mortality reference points are based on F_{MSY} proxy values. Changes in the reference points between GARM III and this update were considered negligible. Determinations of overfishing were consistent between 2008 and 2012 with two exceptions. Overfishing of GOM haddock was not occurring in 2007 (GARM III) but is occurring in 2010. Conversely, overfishing of SNE/MAB windowpane is no longer occurring in 2010. Overfishing was occurring for five of the 12 assessed groundfish stocks in 2010. For most stocks the trend in fishing mortality is downward but GOM haddock constitutes a notable exception. Eight of the 12 stocks demonstrated reduced fishing mortality rates between 2007 and 2010.

Projections of catches for 2012 by stock at various fishing mortality rates (status quo, $F_{rebuild}$, F_{MSY} and 75% of F_{MSY}) were typically lower than the ABCs and ACLs currently specified in Framework 47. The increased biomass of redfish resulted in projected catches higher than ACLs for that stock listed in Framework 47 (NEFMC Groundfish FMP). A similar result occurred for the rebuilt stock of SNE-MAB windowpane flounder. Projected catches of GB cod, GOM haddock, GOM/CC yellowtail flounder, plaice and witch flounder consistent with the current control rule of 75% F_{MSY} were all lower than the Annual Catch limits now set for 2012.

Table 22 and Table 23 summarize 13 groundfish stocks based on GARM III results. Table 22 provides the estimates regarding biomass projections and Table 23 provides the estimates regarding fishing mortality.

Table 22 Stock Status Summary (Biomass), February, 2012 (13 Groundfish Stocks)

Stock	Biomass (mt or kg/tow if noted)					Status	
	2012 Update			GARM III		Overfished?	
	B _{MSY} Proxy	B2010	B2007	B _{MSY} Proxy	B2007	GARM III	2012 Update
GB Cod	140,424	11,289	9,494	148,084	17,672	YES	YES
GB Haddock	124,900	167,279	252,065	158,873	315,975	NO	NO
GOM Haddock	4,904	2,868	6,796	5,900	5,850	NO	NO
CC GOM YT Flounder	7,080	1,680	824	7,790	1,922	YES	YES
American Plaice	18,398	10,805	12,271	21,940	11,106	NO	NO
Witch Flounder	10,051	4,099	2,710	11,447	3,434	YES	YES
Acadian Redfish	238,000	314,780	241,090	271,000	172,342	NO	NO
White Hake	--	--	--	56,254	19,800	YES	--
GOM GB Windowpane	1.60 kg/tow	0.46 kg/tow	0.242 kg/tow	1.40 kg/tow	0.24 kg/tow	YES	YES
SNE MAB Windowpane	0.24 kg/tow	0.35 kg/tow	0.19 kg/tow	0.34 kg/tow	0.19 kg/tow	NO	NO
Ocean Pout	4.94 kg/tow	0.41 kg/tow	0.47 kg/tow	4.94 kg/tow	0.48 kg/tow	YES	YES
Atlantic Wolffish	1,756	505	490	2184 - 2202	562 - 998	YES	YES
Atlantic Halibut	49,000	1,700	1,320	49,000	1,300	YES	YES

Source: NEFSC

Note the biomass and comparisons between GARM III and groundfish updates, which were provided during peer-review.

Table 23 Stock Status Summary (Fishing Mortality) February, 2012 (13 Groundfish Stocks)

Stock	Fishing mortality (instantaneous rates or 000 mt landings per survey kg/tow)					Status	
	2012 Update			GARM III		Overfishing?	
	F _{MSY} Proxy	F2010	F2007	F _{MSY} Proxy	F2007	GARM III	2012
GB Cod	0.23	0.45	0.88	0.25	0.3	YES	YES
GB Haddock	0.39	0.18	0.19	0.35	0.23	NO	NO
GOM Haddock	0.46	0.82	0.23	0.43	0.35	NO	YES
CC GOM YT Flounder	0.26	0.36	1.02	0.24	0.414	YES	YES
American Plaice	0.18	0.13	0.08	0.19	0.09	NO	NO
Witch Flounder	0.27	0.47	0.52	0.2	0.29	YES	YES
Acadian Redfish	0.04	0.006	0.0049	0.04	0.007	NO	NO
White Hake	--	--	--	0.13	0.15	YES	--
GOM GB Windowpane	0.44	0.51	2.082	0.5	1.96	YES	YES
SNE MAB Windowpane	2.09	1.4	1.82	1.47	1.85	YES	NO
Ocean Pout	0.76	0.31	0.35	0.76	0.38	NO	NO
Atlantic Wolffish	0.33	0.07	0.33	0.13 - 0.32	0.158	UNK	NO
Atlantic Halibut	0.073	0.032	0.062	0.07	0.065	NO	NO

Source: NEFSC

Note the fishing mortality and comparisons between GARM III and groundfish updates, which were provided during peer-review.

3.3 PHYSICAL ENVIRONMENT AND ESSENTIAL FISH HABITAT

3.3.1 Physical Environment

3.3.2 Essential Fish Habitat (EFH)

3.3.3 General Statement About Impacts on Physical Environment and EFH (Background)

3.4 PROTECTED RESOURCES

3.4.1 Species Present in the Area

3.4.2 Species Potentially Affected

3.4.3 Interactions Between Gear and Protected Resources

3.4.4 Actions to Minimize Interactions with Protected Species

3.5 FISHERY-RELATED BUSINESSES AND COMMUNITIES

3.5.1 Fishery-Related Businesses

3.5.1.1 Background Information

The U.S. Atlantic Herring fishery occurs over the Mid-Atlantic shelf region from Cape Hatteras to Maine, including an active fishery in the inshore Gulf of Maine and seasonally on Georges Bank. The Atlantic herring winter fishery is generally prosecuted south of New England in management Area 2 during the winter (January-April), and oftentimes as part of the directed mackerel fishery. There is significant overlap between 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) is generally prosecuted throughout the Gulf of Maine in Areas 1A, 1B and in Area 3 (Georges Bank) as fish are available. Restrictions in Area 1A (including ASMFC days out measures implemented in response to quota reductions) have pushed the fishery in the inshore Gulf of Maine to later months (late summer). Fall fishing (September-December) tends to be more variable and dependent on fish availability; the Area 1A quota is always fully utilized, and the inshore Gulf of Maine fishery usually closes sometime 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.

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3.5.1.2 Atlantic Herring Catch Monitoring – Recent Landings and Discards

The herring ACL and management area sub-ACLs are tracked based on total catch–landings and discards. Herring harvesters are required to report discards in addition to landed catch through independent methods. The harvester fills out a hard copy report for each catch by trip (vessel trip report, VTR) and is required to send in these reports monthly (NMFS Gloucester). Harvesters are also required to report the amount of herring caught (landed and discarded) from each management area weekly via telephone (IVR; NMFS Gloucester).

Table 24 summarizes the Atlantic herring catch estimates by year and management area that were utilized by NMFS for quota/sub-ACL monitoring from 2003-2011. The following describes how catch and/or landings were determined from 2003 to 2011.

- 2003-2006 catch estimates are under quota management implemented through the Atlantic Herring FMP and are based on interactive voice reporting (IVR) data from the call-in system used to monitor TACs.
- 2007-2009 catches are based on IVR data supplemented with dealer data. During 2008 and 2009, TACs for Areas 1A and 1B were reduced for a research set-aside. The RSA for Area 1A was 1,350 mt, and the RSA for Area 1B was 300 mt.
- Catch estimates for the 2010 and 2011 (preliminary) fishing years are based on a comprehensive methodology developed by NMFS for quota monitoring in response to Amendment 4 provisions and the need to better monitor sub-ACLs. In general, estimates are based on landings data obtained from dealer reports supplemented with VTRs and discard data from extrapolated observer data (see detailed methodology on the following pages). *The 2011 catch totals are provided by NMFS but are still pending final rule-making.

How Herring Catch is Tracked – Landings

A change to year-end tallying started during the 2010-2012 specifications cycle due to overages in 2010, which resulted in the need for a more timely catch reporting system to better monitor catch against sub-ACLs. NMFS revised vessels reporting requirements (76 FR 54385) on September 2011; limited access herring vessels are now required to report herring catch daily via vessel monitoring systems (VMS), open access herring vessels are required to report catch weekly via the interactive voice response (IVR) system, and all herring-permitted vessels are required to submit vessel trip reports (VTRs) weekly.

NMFS determined final 2010 herring landings based on dealer reports (Federal and state) containing herring purchases, supplemented with VTRs (Federal and State of Maine) containing herring landings. NMFS compared dealer reports to VTRs for all trips that landed herring in 2010. Because VTRs are generally a hail weight or estimate of landings, with an assumed 10% margin of error, dealer reports are assumed to be more accurate source of landings data. However, if the amount of herring reported via VTR exceeded the amount of herring reported by the dealer by 10% or more, it was assumed that the dealer report for that trip was in error. In those instances, the amount of herring reported via VTR was used to determine the amount of herring landed on that trip. Herring landings in the VTR database were checked for accuracy

against the scanned image of the paper VTRs submitted by the owner/operator of the vessel. VTR landings were also verified by comparing reported landings to harvesting potential and applicable possession limits for each vessel. Federal dealer reports for 2010 were finalized in June 2011 and state dealer reports for 2010 were finalized in September 2011.

Herring landings reported on VTRs were assigned to herring management areas using latitude and longitude coordinates. VTRs with missing or invalid latitude/longitude coordinates were manually corrected using the statistical area reported on the VTR. If no statistical area was reported on the VTR, then a combination of recent fishing activity and a review of the scanned images of the original VTR were used to assign landings to herring management area. Dealer reports without corresponding VTRs were prorated to herring management area using the proportion of total herring landings stratified by week, gear type, and management area.

As NMFS was reviewing the 2010 herring data, and comparing individual VTRs with individual dealer reports, it resolved data errors resulting from misreporting. Common dealer reporting issues were: missing dealer reports, incorrect or missing VTR serial numbers, incorrect or missing vessel permit numbers, and incorrect dates. VTRs had similar errors. Common VTR reporting issues were: missing VTRs, missing or incorrect dealer information, incorrect amounts of landed herring, incorrect dates, and missing or incorrect statistical area.

The same methodology was utilized by NMFS to determine the 2011 year-end totals (provided in this document as preliminary totals, pending final rulemaking).

How Herring Catch is Tracked – Discards

Initially, NMFS calculated the total herring catch for 2010 and 2011 by adding the amount of herring landings to the amount of herring discarded. The methodology used by NMFS to calculate the amount of landed herring and the amount of discarded herring was reviewed by the Council's Herring Plan Development Team (PDT) in 2011. The Herring PDT recommended that prorated dealer reports should account for fishing effort and seasonality in its calculations. Based on the Herring PDT's recommendations, NMFS revised its methodologies to include stratification by week, gear type, and area for dealer reports that were prorated to management area. Additionally, the Herring PDT recommended that the extrapolation of discards be stratified by gear type and area. NMFS revised its discard methodology accordingly.

Table 25 provides the 2010 and 2011 (preliminary) year-end catch totals determined by NMFS, using landings data (dealer reports supplemented with VTRs) and estimated discards (extrapolated using Northeast Fisheries Observer Program, NEFOP, data). Discards were stratified and calculated by herring fishery management area and gear type, then total discards were combined by herring fishery management area. The amount of observed herring discards ("Atlantic herring" and "herring unidentified") was divided by the amount of observed fish landed. This discard ratio was then multiplied by the amount of all fish landed for each trip to calculate total amount of herring discards.

Overages

Since the implementation of Amendment 1, quota overages (shaded rows in Table 24) have been relatively infrequent and minor in scale. Overages have only occurred in Areas 1A and 1B. In terms of magnitude, the largest overage under quota management occurred in Area 1B during the 2006 fishing year, where 3,000 mt additional herring were caught (about 6.6 million pounds). Some of this overage may have been attributable to mis-reporting of management area fished and may have been addressed through the area boundary changes implemented in Amendment 1. Due to the of the high volume and seasonal nature of the fishery and restrictions on fishing times (e.g. days out, spawning restrictions), recent quota overages have tended to occur primarily in the most active areas of the fishery and in years when substantial reductions in quota have been implemented.

Effective February 24, 2012, NMFS reduced the 2012 sub-ACLs in Areas 1A and 1B to account for overages in those areas in 2010. Therefore, the sub-ACL for Area 1A is 24,668 mt (reduced from 26,546 mt) and the sub-ACL for Area 1B is 2,723 mt (reduced from 4,362 mt) for the 2012 fishing year (see Table 26). It appears from preliminary catch totals that there may have been an overage in Area 1A during the 2011 fishing year (Table 25). Once NMFS finalizes the 2011 totals, any overages and subsequent deductions for 2013 will be published in the *Federal Register*.

Table 24 Atlantic Herring Catch by Year and Management Area, 2003-2011

YEAR	AREA NAME	CATCH (MT)	QUOTA (MT)	QUOTA CAUGHT
2003	1A	61,516	60,000	103%
2003	1B	5,271	10,000	53%
2003	2	13,835	50,000	28%
2003	3	20,985	60,000	35%
2004	1A	60,095	60,000	100%
2004	1B	9,044	10,000	90%
2004	2	12,992	50,000	26%
2004	3	11,074	60,000	18%
2005	1A	61,102	60,000	102%
2005	1B	7,873	10,000	79%
2005	2	14,203	30,000	47%
2005	3	12,938	50,000	26%
2006	1A	59,989	60,000	100%
2006	1B	13,010	10,000	130%
2006	2	21,270	30,000	71%
2006	3	4,445	50,000	9%
2007	1A	49,992	50,000	100%
2007	1B	7,323	10,000	73%
2007	2	17,268	30,000	58%
2007	3	11,236	55,000	20%
2008	1A	42,257	43,650	97%
2008	1B	8,671	9,700	89%
2008	2	20,881	30,000	70%
2008	3	11,431	60,000	19%
2009	1A	44,088	43,650	101%
2009	1B	1,799	9,700	19%
2009	2	28,032	30,000	93%
2009	3	30,024	60,000	50%
2010	1A	28,424	26,546	107%
2010	1B	6,001	4,362	138%
2010	2	20,831	22,146	94%
2010	3	17,573	38,146	46%
2011* ¹	1A	30,621	29,251	105%
2011*	1B	3,528	4,362	81%
2011*	2	14,919	22,146	68%
2011*	3	36,966	38,146	97%

Source: NMFS.

*Note the 2011 catch totals are preliminary and pending rulemaking, while the 2003-2010 data is from NMFS year-end catch totals.

Note the shaded rows indicate overages.

¹This quota included the additional 284 mt allocated to Area 1A on November 1, 2011 due to under harvest in the fixed gear fisheries west of Cutler, ME. As of the November 18, 2011 summary report, the New Brunswick weir fishery landed 3,711 mt. This quota included the additional 3,000 mt allocated to Area 1A on November 1, 2011 due to under harvest in the New Brunswick weir fishery.

Table 25 Total Catch of Atlantic Herring in 2010-2011

Year	Area	Sub-ACL (mt)	Landed-Herring (mt)	Discarded Herring (mt)	Total Herring Catch (mt)	Herring Catch as % of Sub-ACL
2010	1A	26,546	28,364	60	28,424	107
2010	1B	4,362	5,997	3	6,001	138
2010	2	22,146	20,781	50	20,831	94
2010	3	38,146	17,573	23	17,596	46
2011	1A	29,251	30,621	55	30,676	105
2011	1B	4,362	3,528	2	3,530	81
2011	2	22,146	14,919	81	15,001	68
2011	3	38,146	36,966	71	37,038	97

Source: NMFS year-end totals.

*The 2011 catch totals are preliminary and pending rulemaking.

Note the shaded rows indicate overages. The rows for 2011 are not shaded due to the totals being preliminary.

Table 26 Atlantic Herring Catch – 2010 and 2011 Overages and Resulting 2012 and 2013 Sub-ACLs

YEAR	AREA NAME	CATCH (MT)	QUOTA (MT)	QUOTA CAUGHT	2012 Quota (MT)
2010	1A	28,424	26,546	107%	24,668
2010	1B	6,001	4,362	138%	2,723
2010	2	20,831	22,146	94%	No change
2010	3	17,573	38,146	46%	No change
YEAR	AREA NAME	CATCH (MT)	QUOTA (MT)	QUOTA CAUGHT	2013 Quota (MT)
2011*	1A	30,621	29,251	105%	TBD
2011*	1B	3,528	4,362	81%	TBD
2011*	2	14,919	22,146	68%	TBD
2011*	3	36,966	38,146	97%	TBD

Source: NMFS.

*The 2011 catch totals are preliminary and pending rulemaking.

Note the shaded rows indicate overages.

3.5.1.3 2012 Herring Catch (Year to Date)

Table 27 provides the updated Atlantic Herring landings report from NMFS/NERO for each of the four management areas, which includes projections supplemented with dealer data. The quota along with the percent of quota is provided for each management area/sub-ACL. Due to the harvest of less than 9,000 mt of herring by the New Brunswick weir fishery through October 15, 2012, NOAA adjusted the 2012 fishing year in Area 1A sub-ACL and added 3,000 mt to Area 1A after November 1, 2012, making the 2012 sub-ACL for Area 1A 27,343 mt. The New Brunswick weir fishery landed 409 mt herring as of October 15, 2012. The fixed gear catch from vessels west of Cutler in Area 1A is unavailable at the time of this writing.

Table 27 Atlantic Herring Weekly Landings Report (October 25, 2012)

Area	2012 Sub-ACL	Supplemented with Dealer Data		
		Cumulative Catch (mt)	Percent of Sub-ACL (%)	Date of Closed Area
1A	27,343	20,662	76% ¹	None at this time
1B	2,723	4,121	151%	February 24, 2012 – December 31, 2012
2	22,146	21,073	95%	February 20, 2012 – December 31, 2012
3	38,146	39,103	103%	October 7, 2012 – December 31, 2012
Total	90,358	84,958	94%	

Herring catch reported for the week ended October 20, 2012.

Area 1A quota excludes 295 mt set-aside for fixed gear fisheries west of Cutler, ME until November 1, 2012.

¹ Includes current Maine state-only vessel herring landings.

Source: NERO Weekly Quota and Landing Reports

3.5.1.4 Herring Vessels – Updated Information

This section provides updated information regarding the vessels participating in the herring fishery from 2008-2011. In all of the following tables, nominal revenues for “herring trips” are presented. A herring trip is defined liberally in these summary tables and includes any trip in which at least one pound of Atlantic herring is retained.

Landing Ports

Data regarding “port of landing” for vessels catching herring during 2008-2011 were examined, and a general overview is provided at this time. A summary table will be in the next draft of this document. The data suggest that:

- The majority of Atlantic herring caught by vessels fishing in Area 1A is landed in Maine (Portland, Rockland, Stonington) and Massachusetts (Gloucester, New Bedford);
- The majority of herring caught in Area 1B is landed in Maine (Portland, Rockland, Stonington, Vinalhaven) and Massachusetts (Gloucester);
- The majority of herring caught in Area 3 (Georges Bank) is landed in Maine (Portland, Rockland, Vinalhaven) and Massachusetts (Gloucester, New Bedford); and
- The majority of herring caught in Area 2 (southern New England/Mid-Atlantic) is landed in Massachusetts (New Bedford, Gloucester) and Rhode Island (Kingstown, Point Judith).

General Overview

Table 28 provides a general overview of revenues generated by month and management area for all trips landing herring from 2008-2011 (revenues from all species landed are included in the table). Areas 1A, 1B, and Area 3 generally represent “summer” fisheries, while Area 2 represents a winter fishery that overlaps with the Atlantic mackerel fishery in southern New England and the Mid-Atlantic. Midwater trawl vessels are prohibited from fishing in Area 1A June through September, and ASMFC imposes “days out” restrictions that usually prohibit landing fish from Area 1A January through May. Area 1B and 3 are considered offshore fisheries, primarily pursued using single midwater trawls and pair trawls. Vessels fishing in Area 2 derive a substantial amount of revenues from Atlantic mackerel and other species.

Table 28 Total Revenues by Month and Area (2008-2011) for All Trips Landing Herring

	Area 1A	Area 1B	Area 2	Area 3
January		\$91,824	\$12,851,152	
February			\$9,749,132	\$247,319
March			\$5,566,787	\$326,842
April		\$229,495	\$2,582,450	\$1,125,664
May	\$131,552	\$2,171,546	\$509,784	\$1,630,013
June	\$2,958,329	\$589,678	\$664,027	\$2,622,790
July	\$6,229,295	\$321,225	\$261,510	\$3,663,856
August	\$8,095,975	\$334,749	\$372,640	\$4,127,641
September	\$3,065,341	\$1,335,388	\$450,380	\$7,556,671
October	\$9,213,555	\$209,280	\$832,894	\$4,042,709
November	\$7,831,413		\$1,253,465	
December	\$414,552	\$480,466	\$3,352,185	\$129,495
Grand Total	\$37,956,292	\$5,821,301	\$38,446,407	\$25,757,269

Table 2 provides more perspective on the revenues in Table 28 by summarizing total revenues by permit category from 2008-2011 and reflecting the percentage of those revenues derived from Atlantic herring. Fishing activity in Area 1B may be of particular interest for the 2013-2015 specifications; Table 30 provides revenue information regarding the midwater trawl and purse seine vessels that caught herring in Area 1B from 2008 through 2011.

The information below shows that Category A vessels catching Atlantic herring in Areas 1A, 1B, and 3 are catching herring almost exclusively. However, when these vessels catch herring in Area 2, a substantial portion of revenues on these trips (nearly 40%) are attributable to other species. Category C and D vessels derived relatively small amounts of revenue from herring trips from 2008-2011 (\$2.96M and \$3.6M, respectively). Furthermore, only a small proportion of total revenues for these vessels (Category C and D) are from herring (30% and 11%, respectively). The remainder of the revenues for these vessels are derived from other species (Table 31).

The data in Table 30 suggest that Area 1B is not heavily relied upon for herring revenues, but is utilized by midwater trawlers (single and paired) most during the months of May and September. ASMFC days out restrictions usually preclude fishing in Area 1A during May, and midwater trawl vessels are prohibited from Area 1A during June-September. Very little purse seine activity occurs in Area 1B.

Table 29 Total Revenues (and Percent of Total) by Permit Category for Trips Landing Herring (2008-2011)

Total Revenues				
	Category A	Category B/C	Category C	Category D
Area 1A	\$35,474,735		\$1,459,209	\$1,022,347
Area 1B	\$5,768,737		c	c
Area 2	\$33,381,919	\$1,178,413	\$1,377,175	\$2,508,900
Area 3	\$25,613,460		c	\$56,237
Grand Total	\$100,275,684	\$1,178,413	\$2,960,287	\$3,603,718
Percentage of Revenues from Herring				
	Category A	Category B/C	Category C	Category D
Area 1A	99.9%		55.1%	32.8%
Area 1B	99.7%			
Area 2	61.6%	94.8%	6.7%	2.5%
Area 3	96.8%			1.2%
Grand Total	86.4%	94.8%	30.3%	11.2%

Table 30 Total Revenues by Month and Gear Type (2008-2011) for Herring Vessels Fishing in Area 1B

	Midwater Trawl (Single and Paired)	Purse Seine
January	c	c
February	0	0
March	0	0
April	\$229,495	c
May	\$2,017,541	\$154,005
June	\$324,789	\$264,889
July	\$179,468	\$141,757
August	\$176,281	\$158,468
September	\$1,105,545	\$202,464
October	c	c
November	c	c
December	\$471,513	c
Grand Total	\$4,704,208	\$1,068,322

Note: "c" indicates that data cannot be reported due to confidentiality restrictions.

Table 31 summarizes revenues from the top ten species caught by vessels landing herring in Area 2 from 2008 through 2011. The data indicate that herring vessels fishing in Area 2 catch a wider variety of species than those fishing in the Gulf of Maine (Area 1) or on Georges Bank (Area 3). Vessels catching herring in Area 2 land other small pelagic species such as mackerel, squid (Loligo), and silver hake (whiting), in addition to herring. Area 2 is the primary area for the Atlantic mackerel fishery, and the data in Table 31 illustrate the overlap between the herring and mackerel fisheries.

Table 31 Revenues from Primary Species Caught by Vessels Landing Herring in Area 2 (2008-2011)

	Grand Total
ATLANTIC HERRING	\$21,839,660
ATLANTIC MACKEREL	\$11,487,434
LOLIGO SQUID	\$1,349,696
SILVER HAKE	\$1,088,886
SCUP	\$620,362
FLUKE	\$545,487
BUTTERFISH	\$282,623
ILLEX SQUID	\$232,109
RED HAKE	\$175,931
BLACK SEA BASS	\$150,229

3.5.1.5 Herring Catch by State Waters Vessels

The vast majority of the Atlantic herring resource is harvested in Federal waters. Catch by Federal permit holders that occurs in State waters is reported and counted against the sub-ACLs. Catch by state-only permit holders is monitored by the ASMFC and is not large enough to substantially affect management of the Federal fishery and the ability to remain under the sub-ACLs. The majority of Atlantic herring landings from State waters occurred in the State of Maine. Connecticut (14 mt herring) and Maine are the only two states that reported landings of herring from state waters fisheries during 2006. According to ME DMR, 252 mt of Atlantic herring were landed by weirs and stop seines in Maine during the months of June – September 2007, with the majority of landings occurring during June. An additional 25 mt was landed by other gear types in the state of Maine (gillnets, hooks, pound nets) during 2006.

The Council determined to close the directed herring fishery when 95% of the sub-ACL was harvested (or 92% in areas with a research set-aside), establishing a buffer between OFL and ABC, managing a 500 mt set aside for West of Cutler fixed gear fishermen, and the ASMFC’s requirement that fixed gear fishermen must report through IVR (and therefore have catch counted against the sub-ACL) reduced any management uncertainty associated with State waters landings to an insignificant amount.

The non-federally permitted commercial landings in Area 1A are primarily from Maine fixed gear fishermen and a small number of seiners. Amendment 1 sets aside 500 mt of Atlantic Herring until November for fixed gear fishermen West of Cutler. The Commission's Amendment 2 to the Interstate FMP for Atlantic Herring requires fishermen East of Cutler to report *weekly* through the federal IVR system. ME DMR require the ME state commercial fixed gear fishermen to be compliant with the federal IVR weekly reporting requirements and regulations as well as reporting monthly to ME DMR. Non-federally permitted landings in Maine were only 178 mt in 2008.

During 2010 and 2011 (2012 is unavailable) Atlantic herring landings from state waters only occurred in the State of Maine. According to ME DMR, 757 mt of Atlantic herring were landed by weirs and stop seines in Maine during the months of June – July 2010, with the majority of landings occurring during June. An additional 176 mt was landed by other gear types in the state of Maine (gillnets, hooks, pound nets) during 2010. There was 23.67 mt of Atlantic herring that were landed by weirs and stop seines in Maine during the months of June and September 2011, with the majority of landings occurring during June. An additional 8 mt was landed by other gear types in the state of Maine (gillnets, hooks, pound nets) during 2011 (Table 32). Note the substantial decrease in herring landings from 2010 to 2011.

Table 32 2010-2011 Atlantic Herring Landings by Non-Federally-Permitted Vessels

Year	State	Live Pounds	Metric Tons
2010	ME	2,057,901	933.46
2011	ME	70,792	32.11

Source: Provided by ME DMR for non-federally-permitted vessel (mostly purse seine vessels). Maine had the only state landings.

The Herring PDT reviewed state waters catch and agree that no additional deduction for management uncertainty related to state waters catch is necessary at this time.

3.5.1.6 Atlantic Herring Discards – Additional Information

SAW 54 regarded herring discards incorporated from the VTR data provided to them by NMFS. Discard estimates have only been available since 1996 and are generally less than 1% of the landings and do not represent a significant source of mortality. However, this is not considered problematic to the 2013-2015 assessment according to SAW 54.

The Herring PDT agrees that uncertainty related to estimating Atlantic herring discards is not likely to be a significant source of management uncertainty to address for the 2013-2015 fishery specifications. This is because increased observer coverage, combined with improved observer sampling in the herring fishery, has improved bycatch accounting and reduced uncertainty associated with estimating herring discards in recent years (see additional information presented below). Moreover, management measures implemented through Amendment 5 will likely improve catch monitoring and the accuracy of herring discard estimates in future years.

3.5.1.6.1 Discard Estimates from NMFS/NERO Year-End Totals

Discards of Atlantic herring by area were determined by NMFS using NEFOP observer data and applying the following formula, where NK = herring unknown (refer to section 6.3.6):

$$(Observed Atlantic Herring NK/Observed Kept All Species) \times (Vessel Kept All Species)$$

Only discard and kept all data from observed hauls were used in calculating the discard ratio. Discard ratios were determined for each area and gear type, and then multiplied by vessel kept all by area and gear type. Where vessel kept all area and gear type were missing on VTR's, observer ratios were multiplied by the weighted average of the discard ratios for all observed gear types by corresponding area. Estimated discards for all gear types were then summed by area resulting in a fleet-wide estimate of discards for Atlantic herring (provided by NMFS). Table 33 shows that the "Discards as % of Total Catch" were minimal in 2010 and 2011.

Table 33 Atlantic Herring Discard Estimates in 2010 and 2011

Year	Management Area	Total herring catch (mt)	Discarded herring (mt)	Discards as % of Total Catch
2010	1A	28,424	60	0.21
2010	1B	6,001	3	0.05
2010	2	20,831	50	0.24
2010	3	17,596	23	0.13
Total		72,852	136	0.19
2011	1A	30,676	55	0.18
2011	1B	3,530	2	0.06
2011	2	15,001	81	0.54
2011	3	37,038	71	0.19
Total		86,245	209	0.24

Source: NMFS year-end totals. Discards based on NEFOP observer data.

*The 2011 catch totals are preliminary and pending rulemaking.

3.5.1.6.2 2010 Herring PDT Discard Estimate from Amendment 5 Draft EIS

As part of the analyses required to develop alternatives for allocating observer coverage, the Herring PDT used 2010 observer data for limited access herring vessels to generate fleet-wide estimates of herring discards. These data were analyzed with formulae similar to those specified by the SBRM amendment to calculate variance and to estimate the number of trips necessary to achieve certain levels of precision over a range of desired CVs. This analysis helped to better illustrate the trade-offs associated with the choices that would need to be made in Amendment 5, based on goals and priorities for observer coverage as well as available resources.

Overall, the Herring PDT concluded that discards of Atlantic herring are low; approximately 360,000 lbs. in 2010, estimated in the PDT analysis, or 0.25% of the Atlantic herring catch (Table 34). In addition, there was a low amount of variability; CVs fishery-wide were 20%.

Table 34 Estimated Removals, Proportion of Total Removals, and CV by Strata for Atlantic Herring (2010)

Estimate (lbs.)	Area	BT	PS	MWT	Total
	CC/GB		0		67,591
	GOM		0	46,625	91,189
	SNE	47,150		0	114,638
	Total	47,150	46,625	0	273,419
Proportion of total removal	Area	BT	PS	MWT	Total
	CC/GB				0.18
	GOM		0.00	0.13	0.25
	SNE		0.13		0.31
	Total	0.13	0.13	0.74	1.00
CV	Area	BT	PS	MWT	
	CC/GB				0.24
	GOM			0.33	0.38
	SNE		0.82		0.40

Source: Herring PDT Analysis of Alternatives to Allocate Observer Coverage on Limited Access Herring Vessels, Amendment 5 DEIS.

3.5.2 Communities

In this document, for the purposes of gaining 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. In terms of National Standard 8, some of the communities identified in this section may not fit the strict interpretation of the criteria for substantial dependence on fishing. The fishing communities that meet the legal definition (as promulgated through National Standard 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. A description concerning NS 8 is seen below.

In the 1996 amendments to the M-S Act, Congress added provisions directly related to social and economic factors for consideration by Councils and NMFS. National Standard 8 of the M-S Act states that:

Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

National Standard 8 requires the consideration of impacts on fishing communities. Section 316 of M-S Act defines a fishing community as:

“A community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community.”

Because herring is widely used as bait for the lobster fishery, especially in Maine, it is not practical to identify every community with substantial involvement in the lobster fishery (and consequently some level of dependence on the herring fishery) for assessment in this document. Instead, some of the communities of interest were selected, in part, because of their involvement in or dependence on the lobster fishery; assessment of the impacts of the Amendment 1 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.

National Standard 8 requires the Council to consider the importance of fishery resources to affected communities and provide those communities with continuing access to fishery resources, but it does not allow the Council to compromise the conservation objectives of the management measures. “Sustained participation” is interpreted as continued access to the fishery within the constraints of the condition of the resource.

Communities of Interest in Amendment 5

The herring fishery is a smaller more discrete fishery in the Northeast region, unlike some other fisheries such as multispecies. *Communities of Interest* for Amendment 1 to the Herring FMP were selected because they meet at least one (and more than one in most cases) of the following five criteria:

1. Atlantic herring landings averaging at least 10,000,000 pounds (4,536 mt) per year from 1997-2008, or anticipated landings above this level based on interviews and documented fishery-related developments.

A transportation network is essential for distributing herring throughout the region from herring vessels to processing facilities, bait facilities, and lobster vessels, all of which are engaged in and dependent on the herring fishery to varying degrees. In some cases, processing facilities and other infrastructure dependent on herring are located in communities with few or no landings of herring, but these facilities employ many individuals and are important social and economic components of the fishery. As a result, it is necessary to consider criteria other than landings to identify the *communities of interest* in this specification document.

2. Infrastructure dependent in part or whole on Atlantic herring.

Infrastructure for the Atlantic herring fishery includes:

- Shoreside processing facilities for food production (whole frozen);
- Shoreside processing facilities for bait production (salting, etc.);
- At-sea processing facilities (freezer vessels); and
- Trucking and other essential services for distributing fish.

Infrastructure and the opportunity to capitalize on available markets for herring are important elements of the fishery. For the most part, infrastructure in this fishery, whether shoreside or at-sea, is dedicated solely to serving the small pelagic fisheries (herring and mackerel, primarily). Very few elements of the infrastructure are engaged in other fisheries such as multispecies, monkfish, or scallops. The investments that have been made in the infrastructure for the Atlantic herring fishery reflect a long-term commitment to this fishery.

3. Dependence on herring as lobster and/or tuna bait.

Atlantic herring is important bait for the lobster and tuna fisheries, as well as for other primarily recreational fisheries (striped bass, for example). In fact, herring is the bait of choice in the State of Maine, particularly for their critical lobster fishery. Consequently, consideration of a community's dependence on herring for bait purposes is essential, as any changes to the supply of herring bait in some areas could produce negative impacts across other fisheries such as the lobster and tuna fisheries as well as throughout numerous coastal communities that depend largely on herring bait.

While it is not feasible to identify every community that depends on herring for bait as a *community of interest*, several communities were identified based on an exceptionally high degree of dependence on herring for bait. Assessment of the impacts on any community that depends on herring for bait is further discussed in Section **XXX**.

Atlantic Herring as Forage Fish

Another consideration related to dependence on herring bait is the importance of herring as a forage fish for many species and the overall role of herring in the ecosystem. Individuals from communities that are dependent on herring for bait have expressed concern about the supply of herring for forage purposes and the need to maintain an adequate amount of herring in the ocean as prey for other valuable (commercial and recreational) species. Including dependence on herring as bait as a criterion for identifying communities of interest provides an opportunity to consider the importance of herring as forage as well as any social and community impacts related to this issue (see Section **XXX**).

4. Geographic isolation in combination with some level of dependence on the Atlantic herring fishery.

Geographic isolation is an important consideration for communities that exhibit dependence on the Atlantic herring fishery. In general, dependence on fishing and opportunities to seek alternatives to fishing decrease as the geographic isolation of a community increases. The isolation of some coastal communities (those in Downeast Maine, for example) has clearly contributed to the dependence of these communities on the marine environment. Communities that are more geographically isolated and dependent on herring in some way may proportionately be more affected by management measures that decrease the supply of herring or opportunities in the fishery. Since transportation is such an important element of the herring fishery, the lack of major thoroughfare in geographically isolated communities may exacerbate problems associated with changes in supply and opportunities in the fishery.

5. Utilization of Atlantic herring for value-added production.

Since the closing of the sardine cannery in Prospect Harbor in 2010 and the sale of Engelhard Corporation in Eastport that had processed herring scales for pearl essence, there is currently no value-added production associated with herring. In the future, processing herring for pickling or other products for specialty markets is feasible. As the FEIS for Amendment 1 noted, value-added production suggests that a facility may have invested in niche or specialty markets for the fishery, which may be more sensitive to changes in supply. Reports on the closing of the cannery in Prospect Harbor suggest that this is the case (Seelye, 2010).

Based on the five criteria described above, the following eleven *communities of interest* are identified below and are further evaluated in Amendment 5 to the FMP for Atlantic Herring specifically section 4.5.3:

- 1. Portland, Maine**
- 2. Rockland, Maine**
- 3. Stonington/Deer Isle, Maine**
- 4. Vinalhaven, Maine**
- 5. Lubec/Eastport, Maine**
- 6. Sebasco Estates, Maine**
- 7. NH Seacoast – Newington, Portsmouth, Hampton/Seabrook**
- 8. Gloucester, Massachusetts**
- 9. New Bedford, Massachusetts**
- 10. Southern Rhode Island – Point Judith, Newport, North Kingstown**
- 11. Cape May, New Jersey**

Profiles of these communities, including important demographic and social information, are provided in “Community Profiles for the Northeast US Fisheries”, by Clay et al., and can be accessed at www.nefsc.noaa.gov/read/socialsci/community_profiles. In some cases, the groups of communities identified above have been disaggregated so that information specific to certain communities can be provided and so that important details about individual communities are not lost.

3.5.3 Canadian Herring Fisheries

The Canadian catch (New Brunswick weir fishery) is quite variable and is the only deduction that the Herring PDT believes is necessary to address management uncertainty at this time. Selection of the buffer to account for uncertainty surrounding the catch in the NB weir fishery is at the discretion of the Council and should be based on recent performance in the fishery and the expected level of effort in the next three years.

Catch of the Gulf of Maine/Georges Bank Atlantic herring stock complex in Canadian waters consists primarily of fish caught in the New Brunswick (NB) weir fishery (the SARC 54 Panel noted that the Atlantic herring stock on the Scotian Shelf region is unknown). Currently, the Herring FMP assumes that 20,000 mt of fish from the inshore component of the Atlantic herring resource will be taken annually in the NB weir fishery for the 2010-2012 specifications. This assumed catch is subtracted from the available yield from the inshore component of the resource before sub-ACLs are determined for management areas in the U.S. EEZ. While the NB weir catch has been quite variable over time, the 20,000 mt assumption has been determined in previous years to be appropriate. The language in Amendment 1 provides flexibility to reconsider this assumption and adjust according to trends in the fishery in future years as part of the fishery specification process.

The Council deducted 14,800 mt from the ABC to account for potential catch of Atlantic herring in the NB weir fishery for the 2010-2012 specifications. NMFS monitored NB weir fishery landings, which are made available by Canada’s Department of Fisheries and Oceans (DFO) on a close to real-time basis (within two weeks). If, by considering landings through October 15 of each year, NMFS determines that less than 9,000 mt has been taken in the NB weir fishery, NMFS will allocate an additional 3,000 mt to Area 1A to be made available to the directed herring fishery during November and through the remainder of the fishing year (until it is harvested). This specification provides additional opportunity for fishing in Area 1A if catch in the NB weir fishery is substantially less than the deducted amount (14,800 mt), while still minimizing the likelihood that ABC would be exceeded.

- The NB weir fishery catch is quite variable and dropped to just under 6,500 mt in 2008. The NB weir fishery landings totaled about 30,944 mt in 2007 and 6,448 mt in 2008.
- The most recent five-year average of NB weir landings (2007–2011) is 11,218 mt, and the most recent ten-year average (2002-2011) is 12,358 mt.
- Extremely low landings during the 2008 fishing year decreased these moving averages, especially the ten-year average.

- The 2010 fishing year had NB weir landings of 10,958 mt and decreased in 2011 to 3,711 mt (Table 35).

Table 36 provides the number of active weirs in the fishery and catch per weir from 1978-2011. The data indicate a decreased effort overall, with 2009 and 2011 having only 38 and 37 active weirs respectively, down from a high of 210 weirs in 1979. Although, standardized effort (catch per weir) has been highly variable year to year.

Table 37 provides the monthly weir landings for NB from 1978 to 2010 (2011 data not yet available). These data illustrate that the NB weir fishery is primarily a late summer/fall fishery with very little activity occurring during the winter and later part of the year. There were no weir landings in November and December in 2009, and only 46 mt landed during those months in 2010. Note that the most current monthly weir landings showing reduced catch in Table 37 (2008-2010) also coincide with the reduced level of effort seen in Table 37.

Table 35 Total Atlantic Herring Catch During, 1964 – 2011

YEAR	US Fixed Gear Catch (mt)	Mobile Gear (mt)	New Brunswick Weir (mt)	US Fixed + NB Weir (mt)
1964	31484	142156	29432	60916
1965	36440	58161	31682	68122
1966	23178	162022	35602	58780
1967	17458	258306	29928	47386
1968	24565	421091	32111	56676
1969	9007	362148	25643	34650
1970	4316	302107	15070	19386
1971	5712	327980	12136	17848
1972	22800	225726	31893	54693
1973	7475	247025	19053	26528
1974	7040	203462	19020	26060
1975	11954	190689	30816	42770
1976	35606	79732	29207	64813
1977	26947	56665	19973	46920
1978	20309	52423	38842	59151
1979	47292	33756	37828	85120
1980	42325	57120	13526	55851
1981	58739	26883	19080	77819
1982	15113	29334	25963	41076
1983	3861	29369	11383	15244
1984	471	46189	8698	9169
1985	6036	27316	27864	33900
1986	2120	38100	27885	30005
1987	1986	47971	27320	29306
1988	2598	51019	33421	36019
1989	1761	54082	44112	45873
1990	670	54737	38778	39448
1991	2133	78032	24574	26707
1992	3839	88910	31968	35807
1993	2288	74593	31572	33860
1994	539	63161	22242	22781
1995	6	106179	18248	18254
1996	631	116788	15913	16544
1997	275	123824	20551	20826
1998	4889	103734	20092	24981
1999	653	110700	18644	19798
2000	54	109087	16830	16884
2001	27	120548	20210	20237
2002	46	93176	11874	11920
2003	152	102320	9008	9160
2004	96	94628	20685	20781
2005	68	93670	13055	13123
2006	1007	102994	12863	13870
2007	403	81116	30944	31347
2008	31	84650	6448	6479
2009	98	103458	4031	4129
2010	1263	67191	10958	12221
2011	422	80682	3711	4132

Source: NEFSC (SAW 54 Assessment Report)

Table 36 Number of Active Weirs and the Catch per Weir in the New Brunswick, Canada Fishery from 1978-2011

Year	Number of Active Weirs	Catch per Weir (mt)
1978	208	162
1979	210	155
1980	120	92
1981	147	102
1982	159	140
1983	143	88
1984	116	72
1985	156	171
1986	105	262
1987	123	216
1988	191	200
1989	171	255
1990	154	258
1991	143	166
1992	151	212
1993	145	216
1994	129	160
1995	106	172
1996	101	156
1997	102	200
1998	108	181
1999	100	191
2000	77	213
2001	101	199
2002	83	142
2003	78	115
2004	84	245
2005	76	166
2006	89	131
2007	97	311
2008	76	79
2009	38	95
2010	77	139
2011	37	71

Source: NEFSC (SAW 54 Assessment Report)

Table 37 Monthly Weir Landings (mt) for Weirs Located in New Brunswick, 1978-2010

YEAR	MONTH												Year Total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
1978	3				512	802	5,499	10,275	10,877	4,972	528	132	33,599
1979	535	96			25	1,120	7,321	9,846	4,939	5,985	2,638	74	32,579
1980					36	119	1,755	5,572	2,352	1,016	216		11,066
1981					70	199	4,431	3,911	2,044	2,435	1,686	192	14,968
1982		17			132	30	2,871	7,311	7,681	3,204	849	87	22,181
1983					65	29	299	2,474	5,382	3,945	375		12,568
1984					6	3	230	2,344	2,581	3,045	145		8,353
1985					22	89	4,217	8,450	6,910	4,814	2,078	138	26,718
1986	43				17		2,480	10,114	5,997	6,233	2,564	67	27,516
1987	39	21	6	12	10	168	2,575	10,893	6,711	5,362	703	122	26,621
1988		12	1	90	657	287	5,993	11,975	8,375	8,457	2,343	43	38,235
1989		24		95	37	385	8,315	15,093	10,156	7,258	2,158		43,520
1990					93	20	4,915	14,664	12,207	7,741	168		39,808
1991					57	180	4,649	10,319	6,392	2,028	93		23,717
1992				15	50	774	5,477	10,989	9,597	4,395	684		31,981
1993					14	168	5,561	14,085	8,614	2,406	470	10	31,328
1994				18		55	4,529	10,592	3,805	1,589	30		20,618
1995					15	244	4,517	8,590	3,956	896	10		18,228
1996					19	676	4,819	7,767	1,917	518	65		15,781
1997				8	153	1,017	6,506	7,396	5,316				20,396
1998					560	713	3,832	8,295	5,604	525			19,529
1999					690	805	5,155	9,895	2,469	48			19,063
2000					10	7	2,104	7,533	4,940	1,713	69		16,376
2001					35	478	3,931	8,627	5,514	1,479			20,064
2002					84	20	1,099	6,446	2,878	1,260	20		11,807
2003					257	250	1,423	3,554	3,166	344	10		9,003
2004					21	336	2,694	8,354	8,298	913	3		20,620
2005						213	802	7,145	3,729	740	11		12,639
2006					8	43	1,112	3,731	3,832	2,328	125	462	11,641
2007	182		20	30	84	633	3,241	11,363	7,637	6,567	314	73	30,145
2008						82	1,502	2,479	1,507	389	49	32	6,041
2009					5	239	699	1,111	1,219	330			3,603
2010				6	64	1,912	2,560	3,903	1,933	247	46		10,671
NB Average Catch (t)	160	34	9	34	127	378	3,549	8,033	5,410	2,912	659	119	20,939
NB Minimum Catch (t)	3	12	1	6	5	3	230	1,111	1,219	48	3	10	3,603
NB Maximum Catch (t)	535	96	20	95	690	1,912	8,315	15,093	12,207	8,457	2,638	462	43,520

Source: NEFSC (SAW 54 Assessment Report)

Recent Average Catch

The Herring PDT is providing a 3-year, 5-year, and 10-year average catch total from the New Brunswick weir fishery (Table 38). The variable averages may be due to a decrease in effort in the NB weir fishery seen in Table 36.

Table 38 New Brunswick Weir Fishery – Recent Catch Averages

Years – Average	NB Weir Fishery Catch (mt)
3-year average (2009-2011)	6,233
5-year average (2007-2011)	11,218
10-year average (2002-2011)	12,358

Source: NEFSC (SAW 54 Assessment Report)

4.0 ENVIRONMENTAL IMPACTS

The impacts of the management measures proposed by the Council in the 2013-2015 Atlantic Herring Specifications are assessed and discussed relative to each of the valued ecosystem components (VECs) described in the Affected Environment (see Section 3.0).

Much of the detailed analysis to support the development of the alternatives considered by the Council in the 2013-2015 Atlantic Herring Specifications was provided by the Herring PDT and SSC to form the basis for determining the potential impacts of the measures on each of the VECs. The complete analyses and supporting technical documents are included in the appendices (see XXX) and are summarized below and incorporated by reference where appropriate.

4.1 IMPACTS ON ATLANTIC HERRING

The impacts on Atlantic herring are described in the management measures below regarding proposed alternatives to consider provided by the Council (see Section 2.0).

4.1.1 Impacts of OFL/ABC Alternatives on Atlantic Herring

The Council is considering XXX alternatives for specifying the OFL/ABC/ABC control rule for Atlantic herring in the 2013-2015 specifications, all of which were reviewed and evaluated by the Herring PDT and SSC. The following subsections address the impacts of these alternatives on the Atlantic herring resource.

The following will describe how fishing mortality (F), spawning stock biomass (SSB), and catch are derived. Fishing mortality is derived from the estimate of F_{MSY} (i.e. 0.27) that was derived during the 2012 stock assessment. A simulation of 1000 projections is then used to capture possible outcomes of SSB and landings for 2013-2015. The values seen in Table 9 are derived from the 2012 fishing mortality deaths, which are based on the 2012 ACL and are specified by the 2012 natural mortality rates equal to the natural mortality rates used in the assessment in 2011. The 2013 fishing mortality deaths are based on the F_{MSY} fishing rate and are specified by the 2013 natural mortality rates equal to the natural mortality rates used in the assessment in 2011. Consequently, the 2012 SSB depends on the 2012 ACL and the 2013 SSB depends on the F_{MSY} fishing rate.

The two key elements used in the projections are abundance (used 2012 projections) and recruitment (used each year for each projection). The numbers-at-age (for 2012) are randomized for each of the 1000 projections by drawing the abundance at age from the probability distributions. Once the numbers at age are projected, then the population of each projection is derived for each year, using the 2012 numbers at age to the fishing mortality rate that was specified. SSB and landings are calculated in the same manner.

4.1.1.1 Impacts of Alternative 1 (No Action) on Atlantic Herring

Alternative 1 would maintain the OFL and ABC specifications from 2012 for the 2013-2015 fishing years (see Table 2).

This approach is similar to Alternative 2 regarding a constant OFL/ABC throughout the 2013-2015, however the herring resource is not fully utilized by the herring industry in terms of better business planning and more stability in the fishery, which may be possible given the current (rebuilt) status of the stock.

During the development of the 2013-2015 herring fishery specifications Alternative 1 was discussed by the Herring PDT members briefly. Note in Table 39 that the OFL and ABC remain constant from 2013-2015 and the Fishing Mortality (F) increases by 0.04 each year. As the Fishing Mortality (F) increases, the Spawning Stock Biomass (SSB) decreases each year.

Table 39 2013-2015 Fishing Mortality (F) and Biomass (SSB) Projections Under Alternative 1 (No Action)

YEAR	2013	2014	2015
OFL (mt)	127,000	127,000	127,000
ABC (mt)	106,000	106,000	106,000
F	0.16	0.20	0.24
Prob > F_{MSY}	0.03	0.15	0.36
80% CI	0.12 – 0.22	0.14 – 0.29	0.16 – 0.36
SSB (mt)	538,838	422,472	353,218
Prob < $SSB_{MSY}/2$	0	0	0
80% CI	376,273 – 776,755	282,768 – 644,933	226,856 – 536,344

XXX

4.1.1.2 Impacts of Alternative 2 (Preferred Alternative) on Atlantic Herring

During the development of the 2013-2015 herring fishery specifications the Herring PDT discussed whether Alternative 2 (constant catch approach) (Table 3) is an option to consider when specifying a level for ABC. Constant catch may allow for better business planning and more stability in the fishery and may be possible given the current (rebuilt) status of the stock. This approach was utilized for setting ABC during the 2010-2012 specifications (average catch 2006-2008).

However, there are tradeoffs to this approach, as catch may be foregone in earlier years to allow for more catch in later years in comparison to F_{MSY} in Table 2 (catch will always be at less than the 50% threshold due to the chance of overfishing as well as a loss of quota in the first two years due to the fact that biomass will still decrease even at a constant catch rate). Table 40 provides the data projecting F at a constant catch for 2013-2015 regarding Atlantic herring. The SSB numbers decrease from 2013-2015 at this projection and the OFL/ABC catch remains at 114,000 mt.

Table 40 2013-2015 Fishing Mortality (F) and Biomass (SSB) Projections Under Alternative 2 (Preferred Alternative – Constant Catch)

YEAR	2013	2014	2015
OFL (mt)	169,000	136,000	114,000
ABC (mt)	114,000	114,000	114,000
F	0.17	0.22	0.27
Prob > F_{MSY}	0.05	0.24	0.50
80% CI	0.12 – 0.24	0.15 – 0.32	0.18 – 0.41
SSB (mt)	533,289	411,951	338,957
Prob < $SSB_{MSY}/2$	0	0	0
80% CI	370,787 – 771,161	272,517 – 634,105	212,915 – 521,760

XXX

4.1.1.3 Impacts of Alternative 3 on Atlantic Herring

This approach has been a default ABC control rule utilized by the SSC in some cases to address uncertainty. The SSC recommended that the Council should consider an Acceptable Biological Catch (ABC) specification that uses the same method for all stocks, similar to guidelines for stocks that have not rebuilt at the end of the required building period:

- A. ABC should be determined as the catch associated with 75% of F_{MSY} .
- B. If fishing at 75% of F_{MSY} does not achieve the mandated rebuilding requirements for overfished stocks, ABC should be determined as the catch associated with the fishing mortality that meets rebuilding requirements ($F_{rebuild}$).
- C. For stocks that cannot rebuild to B_{MSY} in the specified rebuilding period, even with no fishing, the ABC should be based on incidental bycatch, including a reduction in bycatch rate (i.e., the proportion of the stock caught as bycatch).
- D. Interim ABCs should be determined for stocks with unknown status according to case-by-case recommendations from the SSC.

The most recent assessment classifies Atlantic sea herring as not overfished with overfishing not occurring. It is not in a rebuilding plan. Following previous SSC guidance, ABC could be set at the projected catch from $F = 75\% F_{MSY}$. Projected catch and SSB at 75% F_{MSY} for 2013-2015 are shown below in Table 4. The SSB and resulting catch decrease from 2013 to 2015 at this projection and are less than the values in the projections seen in Table 41 (F_{MSY} projection) represented in Section 4.0 (OFL).

In many cases, 75% of F_{MSY} provides a slightly lower catch than fishing at F_{MSY} , however, many stocks, use $F_{40\%MSY}$ proxies for F_{MSY} . The fundamental idea is that one would take slightly less catch than F_{MSY} with less effort (costs) so that there would be a net gain in value. Ultimately, with respect to groundfish, the Groundfish PDT presented evidence that the 75% F_{MSY} approach did not adequately account for scientific uncertainty in the most recently-updated assessments.

Table 41 provides the data projecting F at a constant 0.2 for 2013-2015 regarding Atlantic herring. The SSB numbers decrease from 2013-2015 at this projection and the OFL/ABC catch remains also decreases from 130,000 mt in 2013 to 88,000 mt in 2015.

Table 41 2013-2015 Fishing Mortality (F) and Biomass (SSB) Projections Under Alternative 3 (Non-Preferred – 75% F_{MSY})

YEAR	2013	2014	2015
OFL (mt)	169,000	127,000	104,000
ABC (mt)	130,000	102,000	88,000
F	0.2	0.2	0.2
Prob > F_{MSY}	0.14	0.15	0.17
80% CI	0.14 – 0.28	0.14 – 0.29	0.14 – 0.30
SSB (mt)	523,243	409,309	354,559
Prob < $SSB_{MSY}/2$	0	0	0
80% CI	382,573 – 723,975	306,011 – 574,128	272,751 – 473,021

XXX

4.1.2 Impacts of Sub-ACL Options on Atlantic Herring

Sub-ACLs (formerly known as Total Allowable Catches (TACs)) for each of the four herring management areas are categorized as 1A, 1B, 2, and 3 (represented in Figure 1). Set-asides for research and fixed gear fisheries in Area 1A are also specified as necessary. The Council uses the best information available to estimate the proportion of each spawning component of the Atlantic herring stock complex in each area/season and distributes the sub-ACLs such that the risk of overfishing an individual spawning component is minimized to the extent possible based on the options under consideration. The purpose of this action is to establish specifications for the Atlantic herring fishery during the 2013-2015 fishing years.

Primary analysis focuses on the impacts of the proposed sub-ACL distributions on the individual spawning components of the herring stock complex, with particular attention to the inshore (Gulf of Maine) spawning component. The inshore component is considered to be the smaller stock component and is the focus of more fishing effort and recent concerns related to localized depletion (see Amendment 1 for more discussion). Therefore, the inshore component can be characterized, for the purposes of analysis, as the “limiting factor” in terms of allocating herring sub-ACLs to management areas such that the risk of overfishing individual stock components can be minimized. Canadian catch in the NB weir fishery also is considered in this analysis, as that catch is assumed to come entirely from the inshore component of the Atlantic herring stock complex.

ANALYSIS TBD

4.1.3 Impacts of Other Specifications on Atlantic Herring

XXX

4.1.4 Impacts of Alternatives for AMs on Atlantic Herring

XXX

4.2 IMPACTS ON NON-TARGET SPECIES AND OTHER FISHERIES

The impacts on Non-Target Species and Other Fisheries are described in the management measures below regarding proposed alternatives to consider provided by the Council (see Section 2.3 and 3.2 for further detail).

The no action alternative would allocate observer coverage on limited access herring vessels through the current optimization/allocation process. The non-target species most pertinent to this document are described in detail in 3.2 of this document (Affected Environment) and include river herring, mackerel, and multispecies (groundfish).

4.2.1 Impacts of OFL/ABC Alternatives on Non-Target Species and Other Fisheries

XXX

4.2.2 Impacts of Sub-ACL Options on Non-Target Species and Other Fisheries

XXX

4.2.3 Impacts of Other Fishery Specifications on Non-Target Species and Other Fisheries

XXX

4.2.4 Impacts of Alternatives for AMs on Non-Target Species and Other Fisheries

XXX

4.3 IMPACTS ON PHYSICAL ENVIRONMENT AND ESSENTIAL FISH HABITAT

The impacts on the Physical Environment and Essential Fish Habitat are described in the management measures below regarding proposed alternatives to consider provided by the Council (see Section 3.3 for further detail).

4.3.1 Impacts of OFL/ABC Alternatives on Physical Environment and Essential Fish Habitat

XXX

4.3.2 Impacts of Sub-ACL Options on Physical Environment and Essential Fish Habitat

XXX

4.3.3 Impacts of Other Fishery Specifications on Physical Environment and Essential Fish Habitat

XXX

4.3.4 Impacts of Alternatives for AMs on Physical Environment and Essential Fish Habitat

XXX

4.4 IMPACTS ON PROTECTED RESOURCES

The impacts on Protected Resources are described in the management measures below regarding proposed alternatives to consider provided by the Council (see Section 3.4 for further detail).

4.4.1 Impacts of OFL/ABC Alternatives on Protected Resources

XXX

4.4.2 Impacts of Sub-ACL Options on Protected Resources

XXX

4.4.3 Impacts of Other Fishery Specifications on Protected Resources

XXX

4.4.4 Impacts of Alternatives for AMs on Protected Resources

XXX

4.5 IMPACTS ON FISHERY-RELATED BUSINESSES/COMMUNITIES

The impacts on Fishery-Related Businesses/Communities are described in the management measures below regarding proposed alternatives to consider provided by the Council (see Section 3.5 for further detail).

4.5.1 Impacts of OFL/ABC Alternatives on Fishery-Related Businesses/Communities

XXX

4.5.2 Impacts of Sub-ACL Options on Fishery-Related Businesses/Communities

XXX

4.5.3 Impacts of Other Fishery Specifications on Fishery-Related Businesses/Communities

XXX

4.5.4 Impacts of Alternatives for AMs on Fishery-Related Businesses/Communities

XXX

4.6 CUMULATIVE EFFECTS

XXX

5.0 RELATIONSHIP TO APPLICABLE LAW

XXX

6.0 REFERENCES

XXX

7.0 LIST OF PREPARERS AND AGENCIES CONSULTED

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