

DRAFT

AMENDMENT 8

to the

Atlantic Herring Fishery Management Plan



Including a

Draft Environmental Impact Statement (DEIS)

Updated November 13, 2017

For consideration at the November AP/Cmte Meetings

This meeting is focused on pages 43-64 only.

Measures to address potential localized depletion and user conflicts.

One outstanding issue to clarify when a “vessel is fishing for herring” (p.43)

Prepared by the

New England Fishery Management Council

in cooperation with the

National Marine Fisheries Service

Preliminary Submission of DEIS:

Formal Submission of DEIS:

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AMENDMENT 8 TO THE ATLANTIC HERRING FISHERY MANAGEMENT PLAN

Proposed Action: Propose a long-term Acceptable Biological Catch (ABC) control rule for the Atlantic herring fishery that may explicitly account for herring's role in the ecosystem and to address the biological and ecological requirements of the Atlantic herring resource. Propose measures to address potential localized depletion of Atlantic herring to minimize possible detrimental biological impacts of socioeconomic impacts on other user group.

Type of Statement: Draft Environmental Impact Statement (DEIS)

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Abstract: The New England Fishery Management Council, in consultation with NOAA's National Marine Fisheries Service, proposes to adopt and implement Amendment 8 to the Atlantic Herring Fishery Management Plan (FMP) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA). This Draft EIS presents a range of alternatives under consideration in Amendment 8, which relate to the goals and objectives outlined in the document. The proposed alternatives focus on measures related to the ABC control rule and potential localized depletion of the herring resource. This document also includes a detailed description of the affected environment and valued ecosystem components, and analyses of the impacts of the measures under consideration on the affected environment. It addresses the requirements of the National Environmental Policy Act (NEPA), the MSA, the Regulatory Flexibility Act (RFA), and other applicable laws.

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Executive Summary

This draft amendment document and draft environmental impact statement (DEIS) presents and evaluates management alternatives and measures to achieve specific goals and objectives for the Atlantic herring fishery. This document was prepared by the New England Fishery Management Council and its Herring Plan Development Team (PDT), in consultation with the National Marine Fisheries Service (NMFS, NOAA Fisheries), the Atlantic States Marine Fisheries Commission (ASMFC), and the Mid-Atlantic Fishery Management Council (MAFMC). This amendment is being developed in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA, M-S Act) and the National Environmental Policy Act (NEPA), the former being the primary domestic legislation governing fisheries management in the U.S. Exclusive Economic Zone (EEZ). In 1996, Congress passed the Sustainable Fisheries Act (SFA), which amended and reauthorized the MSFCMA and included a new emphasis on precautionary fisheries management. New provisions mandated by the SFA require managers to end overfishing and rebuild overfished fisheries within specified time frames, minimize bycatch and bycatch mortality to the extent practicable, and identify and protect essential fish habitat (EFH). The MSFCMA was again reauthorized in 2007 to require the establishment of annual catch limits (ACLs) and accountability measures (AMs) in order to end and/or prevent overfishing in all FMPs. The proposed amendment is also consistent with the provisions contained in the reauthorized Magnuson-Stevens Act (MSA, January 2007).

This document includes the Draft Amendment as well as its draft Environmental Impact Statement (DEIS) and a preliminary evaluation of impacts relative to the Regulatory Flexibility Act (RFA) and other applicable laws. This document provides the background and context for Amendment 8 (Affected Environment), describes in detail all of the management alternatives under consideration in the amendment, provides updated information about all of the components of the ecosystem and fishery potentially affected by the measures proposed in Amendment 8, evaluates the potential impacts of the management alternatives under consideration, addresses the Amendment 8 alternatives under consideration with respect to other applicable laws, provides the public and the Council with adequate information about the measures and their impacts to ultimately inform decision-making following the public comment period.

The primary purpose of this amendment is to modify the management program for the Atlantic herring fishery by:

- Proposing a long-term ABC control rule for the Atlantic herring fishery that may explicitly account for herring's role in the ecosystem and to address the biological and ecological requirements of the Atlantic herring resource.
- Proposing measures to address potential localized depletion of Atlantic herring to minimize possible detrimental biological impacts of socioeconomic impacts on other user groups.

The purposes and needs for this amendment are expected to advance the goals and objectives of the herring management program, as modified in Section ??? of this document. The management measures under consideration are intended to achieve both the goals and objectives of the management program, in addition to the primary purposes of this action. The management measures under consideration in this amendment include:

- Acceptable Biological Catch (ABC) control rules that specify a formulaic approach for establishing an annual limit or target fishing level that is based on the best available scientific information. It provides guidance to the Science and Statistical Committee (SSC) regarding how to specify the ABC for Atlantic herring based on scientific uncertainty, stock status, and the Council’s risk tolerance. The Council included Management Strategy Evaluation (MSE) to develop and analyze various ABC control rule alternatives.
- Specific measures to address concerns raised by some stakeholders about potential localized depletion causing negative biological and socioeconomic impacts on other user groups that depend on herring as forage in the ecosystem. The range of localized depletion measures considered included: area closures, gear prohibition areas, modifications to management area boundaries and various seasonal restrictions.

The Affected Environment is described in this document based on valued ecosystem components (VECs) that are identified specifically for Amendment 8. The VECs for consideration in Amendment 5 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 of an EIS since they are the “place” where the impacts of management actions are exhibited. The sections of the Affected Environment are therefore divided into the five VECs.

The impacts of the alternatives/options under consideration in Amendment 8 on each of the VECs are generally summarized below. Much of the detailed analyses to support the development of the alternatives/options under consideration in Amendment 8 were provided by the Herring PDT and 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 to the Amendment 8 document (Volume II). The no action alternative represents status quo conditions for the Atlantic herring fishery management program and forms the basis for comparison and assessment of all management options/alternatives under consideration.

Atlantic Herring:

Non-Target Species and Other Fisheries:

Physical Environment and Essential Fish Habitat:

Protected Resources:

Fishery-Related Businesses and Communities:

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List of Possible Appendices for DEIS

1. Scoping comments
2. Scoping hearing summaries
3. MSE process and technical reports (documents reviewed at peer review)
4. MSE peer review final report
5. Detailed ABC output results
6. LD references and other example fisheries
7. LD memos from PDT with Committee tasking
8. Detailed LD maps and results
9. Public comments on DEIS
10. DEIS public hearing summaries
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1.4 ACRONYMS

ABC	Acceptable Biological Catch
ABC CR	ABC Control Rule
ACL	Annual Catch Limit
AM	Accountability Measure
ASMFC	Atlantic States Marine Fisheries Commission
B	Biomass
BT	Border Transfer
CAA	Catch at Age
CC	Cape Cod
CZMA	Coastal Zone Management Act
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
F	Fishing Mortality Rate
FEIS	Final Environmental Impact Statement
FGSA	Fixed Gear Set-Aside
FMP	Fishery Management Plan
FW	Framework
FY	Fishing Year
GB	Georges Bank
GOM	Gulf of Maine
M	Natural Mortality Rate
MADMF	Massachusetts Division of Marine Fisheries
MAFMC	Mid-Atlantic Fishery Management Council
MEDMR	Maine Department of Marine Resources
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSE	Management Strategy Evaluation
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum Sustainable Yield
mt	Metric Tons
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
RH/S	River Herring/Shad
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
SNE/MA	Southern New England/Mid-Atlantic
TC	Technical Committee
TRT	Take Reduction Team
VMS	Vessel Monitoring System
VTR	Vessel Trip Report

1.0 INTRODUCTION

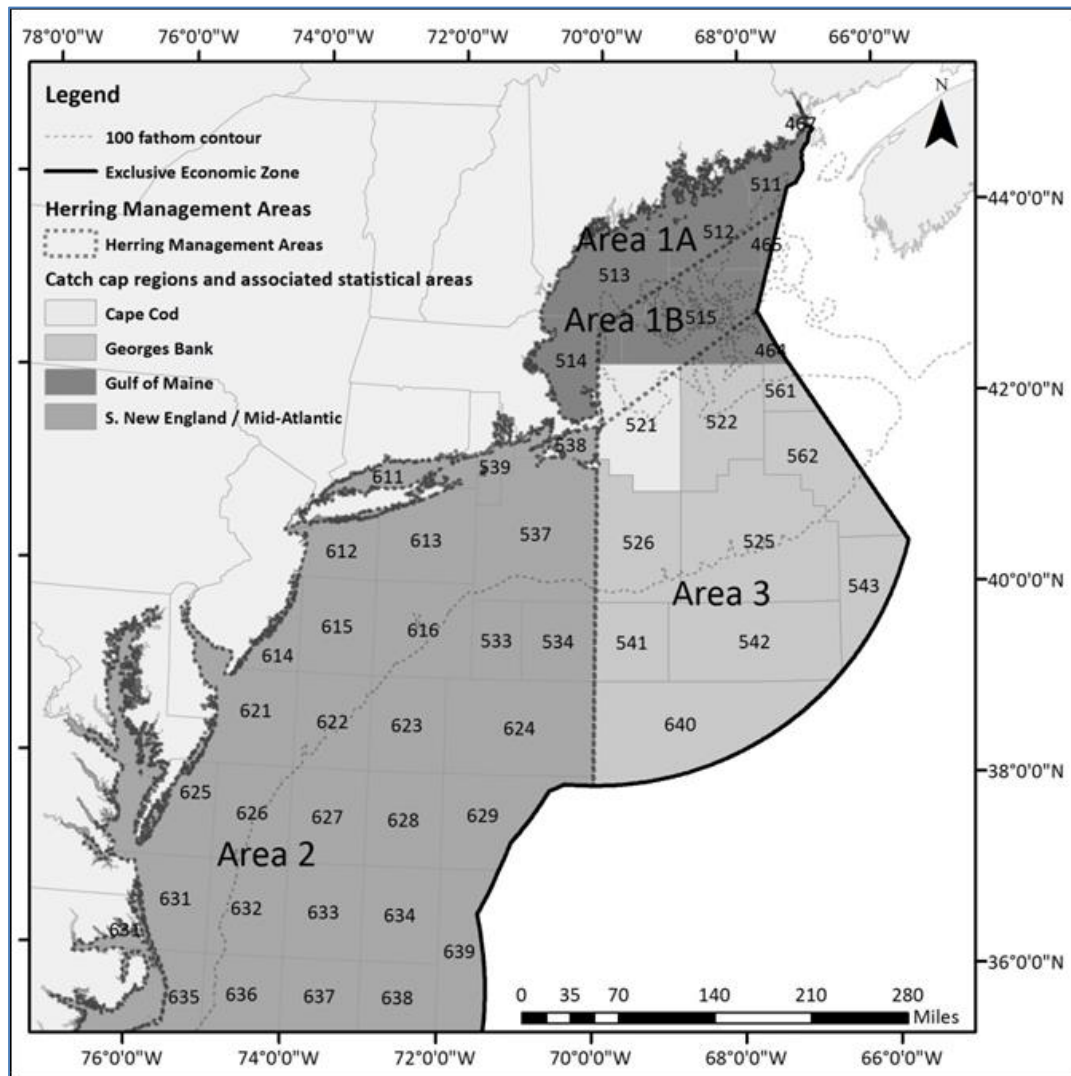
1.1 EXISTING MANAGEMENT SYSTEM

More details and background information can be found at <http://www.nefmc.org>.

1.1.1 Atlantic Herring Management

The Atlantic herring (*Clupea harengus*) fishery specifications are currently set every three years. In recognition of the spatial structure of the Atlantic herring stock complex (multiple stock components that separate to spawn and mix during other times of the year), the total annual catch limit for Atlantic herring (stockwide ACL/OY) is divided and assigned as sub-ACLs to four management areas (Figure 1), using the best available information regarding the proportion of each spawning component of the Atlantic herring stock complex in each area/season and minimizing the risk of overfishing an individual spawning component to the extent practicable.

Figure 1 - Atlantic herring management areas and river herring/shad catch cap areas



1.1.2 History of Atlantic Herring ABC Control Rules

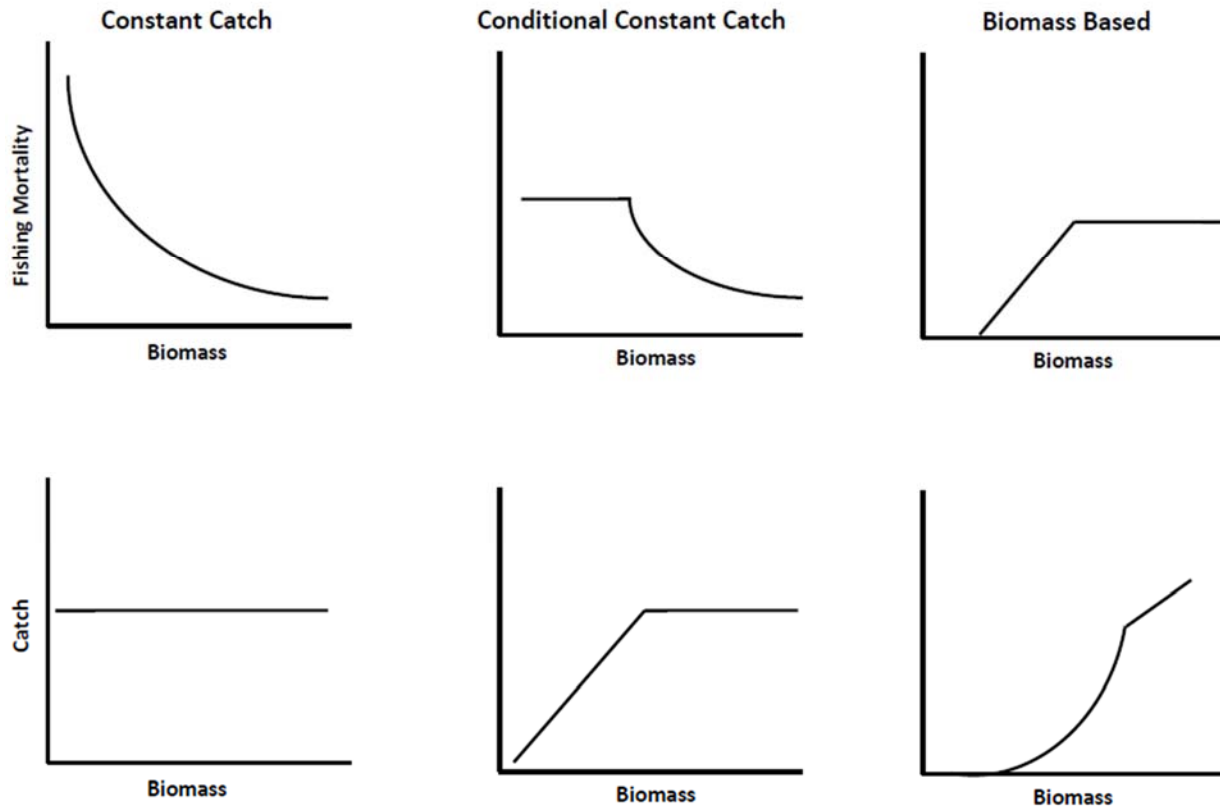
1.1.2.1 Acceptable Biological Catch control rules defined

An Acceptable Biological Catch (ABC) control rule is a formulaic approach for establishing an annual limit or target fishing level that is based on the best available scientific information. It provides guidance to the Science and Statistical Committee (SSC) regarding how to specify the ABC for Atlantic herring based on scientific uncertainty, stock status, and the Council's risk tolerance. Moreover, the ABC control rule can create a buffer between the overfishing limit (OFL) and ABC to account for scientific uncertainty such that there is a low risk in any given year that the OFL for Atlantic herring will be exceeded.

A control rule specifies a target amount of catch or fishing mortality rate depending on some measure of recent stock abundance. Many control rules exist, and they vary in their ability to achieve fishery objectives, but there are three generic types of control rules (Figure 2). A 'constant catch' control rule harvests the same amount of fish regardless of abundance. Consequently, as abundance declines, the fishing mortality rate (i.e., catch divided by abundance) increases, because the fishery is removing a larger proportion of the stock. (Note that a true constant catch control rule removes the same amount of fish in perpetuity, which is different from applying the same amount for 3-year periods as has been done recently for Atlantic herring.). A 'constant fishing mortality' control rule removes the same fraction of the population regardless of abundance, and consequently catch increases linearly with abundance (e.g., 75% F_{MSY}). A 'biomass based' control changes the fishing mortality rate depending on abundance, typically with the fishing mortality rate increasing with abundance to some maximum rate. The linear change in fishing mortality can vary in steepness, and fishing mortality does not necessarily need to equal zero at a particular level of abundance.

Many control rule variants exist, but these are the basic types. Variations to these basic types can produce a broad range of results. In the U.S., some characteristics of an ABC control are defined by law. For example, ABC cannot have a greater than 50% chance of exceeding the catch associated with F_{MSY} (i.e., the Overfishing Limit (OFL)), and so F_{MSY} should likely serve as an upper bound for any control rule considered. Beyond that, previous research can likely inform decisions about what control rules might be eliminated a priori as unlikely to meet fishery objectives.

Figure 2 - Generic types of control rules with example relationships between fishing mortality (top) or catch (bottom) and biomass



The ABC control rule currently in place for the Atlantic herring fishery (Section 1.1.2.4) does not fit neatly into any one of these generic types, but combines approaches:

Atlantic herring ABC will be specified annually as the catch that is projected to produce a probability of exceeding F_{MSY} in the third year that is less than or equal to 50%.

Essentially, a fishing mortality rate is applied, and the catch associated with it is set for a three-year period. However, below a certain biomass threshold, a stock rebuilding program would be required, which has no intuitive relationship between biomass and F , because it depends on assumptions that go into determining rebuild time.

1.1.2.2 Amendment 4 and 2010-2012 Atlantic Herring Fishery Specifications

In April 2011, several modifications to the Atlantic herring fishery specifications process were made through Amendment 4 to the Atlantic Herring FMP (NEFMC 2010), in compliance with the 2007 authorization of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). Most relevant to Amendment 8, Amendment 4 established an interim ABC control rule and revised the specifications process. Through this action, the Council's Scientific and Statistical Committee (SSC) makes a recommendation for setting ABC, which must be less than

or equal to the OFL, considering scientific management uncertainty. A stock-wide ACL is also set, less than or equal to the ABC, considering management uncertainty.

During the 2010-2012 Atlantic herring fishery specifications process, developed concurrently with Amendment 4, the SSC pointed out two of sources of considerable scientific uncertainty:

1. At the time, the latest Atlantic herring stock assessment (TRAC 2009) had a strong retrospective pattern, in which estimates of stock size are sequentially revised downward as new data are added to the assessment; and

Maximum Sustainable Yield (MSY) reference points estimated from the biomass dynamics model were inconsistent with the age-based, stochastic projection; such that fishing at the estimate of F_{MSY} was expected to maintain an equilibrium biomass that is less than the current estimate of B_{MSY} .

Given this scientific uncertainty, the SSC determined that a permanent herring ABC control rule cannot be established until a benchmark assessment is conducted to address these issues. In the meantime, the Council recommended that Amendment 4 contain an interim ABC control rule based on the SSC's 2010–2012 herring ABC recommendation:

That ABC be based on recent catch in the herring fishery (e.g., the single-most recent year or a three- or five-year average), and that the Council determines the desired risk tolerance in setting the ABC.

The 2010-2012 Atlantic herring ABC specification were adopted using the following control rule:

That ABC be based on the recent three-year average catch in the herring fishery (2006-2008; 106,000 mt).

The Council considered this to be a placeholder until a benchmark stock assessment for Atlantic herring could be completed and a more appropriate long-term control rule for Atlantic herring could be developed by the Council.

1.1.2.3 Related Lawsuits

On August 2, 2012, the U.S. District Court for the District of Columbia issued a remedial order in the civil action *Flaherty, et al. v. Blank, et al.* (i.e., *Flaherty I*) to address deficiencies with respect to Amendment 4 to the Herring FMP. A letter from NMFS to the Council on August 31, 2012, described the legal deficiencies identified by the Court:

- NMFS did not satisfy its obligation to independently determine whether the Council's designation of "stocks in the fishery" complied with the MSFCMA;
- NMFS did not adequately consider whether Amendment 4 complied with the National Standard 9 requirement to minimize bycatch to the extent practicable; and
- NMFS failed to consider the environmental impacts of alternatives to the ABC control rule and accountability measures in Amendment 4.

In this letter, NMFS also recommended that the Council, as part of the 2013-2015 Atlantic herring fishery specifications, consider a range of alternatives for the Atlantic herring ABC control rule and AMs and explain how the measures adopted in Amendment 5 to the Herring FMP minimize bycatch, to the extent practicable, in the Atlantic herring fishery.

1.1.2.4 2013-2015 Atlantic Herring Fishery Specifications

To address both the August 2012 letter from NMFS and the need to reconsider the interim ABC control rule established in Amendment 4, the Council considered a wider range of ABC control rule alternatives for the 2013-2015 Atlantic herring fishery specifications. Following the benchmark stock assessment (NEFSC 2012), the SSC, with input from the Herring Plan Development Team (PDT) and guidance from the Council, considered three alternatives (including No Action) for a herring ABC control rule for the 2013-2015 fishing years (NEFMC 2012b). One control rule set ABC at 75% F_{MSY} for 2013-2015, while the other control rule applied a constant catch over these years. In this particular situation, these two approaches resulted in an Atlantic herring ABC over the three years which was approximately the same. The SSC could not find any scientific reason to prefer one approach over the other and considered them to be comparable in terms of risk of overfishing, given the available information. All considerations led the SSC to conclude that either approach could be applied for the next three years with low probability of overfishing or causing the Atlantic herring resource to become overfished. In turn, the SSC recommended that the Council consider either approach for specifying Atlantic herring ABC for 2013-2015.

The 2012 stock assessment increased natural mortality rates for 1996–2011 by 50% to resolve a retrospective pattern and ensure that natural mortality rates take into account the estimated consumption of herring in the ecosystem. While not an explicit term of reference, the SSC discussed the role of Atlantic herring in the ecosystem and options for setting ecosystem-based ABCs, as requested by NMFS in the August 31, 2012 correspondence regarding the Amendment 4 lawsuit. The SSC concluded that both approaches for setting ABC would result in fishing mortality rates over the next three years that are well below the natural mortality rate for Atlantic herring and would produce a stock size that is well above the standard biomass target, thereby likely meeting ecosystem-based biomass targets for a forage species by default if not by design (NEFMC 2012b).

Based on analysis provided by the Herring PDT and these recommendations from the SSC, the Council selected its preferred alternative for the 2013-2015 ABC at its September 2012 meeting, applying a constant catch over a three-year period:

Atlantic herring ABC will be specified annually as the catch that is projected to produce a probability of exceeding F_{MSY} in the third year that is less than or equal to 50%.

However, after further discussion and consideration of the Amendment 4 Court Order and August 2012 NMFS correspondence, the Council requested the SSC to consider two additional ABC control rule alternatives specifically, the “Lenfest” and “Pacific” control rules, based on harvest control strategies for other forage fish. These two alternatives were recommended for consideration by EarthJustice in its comments to the Council regarding the 2013-2015 herring fishery specifications. In November 2012, the Council tasked the SSC with considering these additional alternatives.

The SSC evaluated the two additional ABC control rule alternatives in November 2012 in terms of: 1) the short-term catch advice, i.e., the 2013-2015 herring fishery specifications, and 2) development of long-term control rules to address the issue of whether the increased natural mortality rate in the assessment fully captured all the ecosystem needs (including humans) related to forage species. Regarding the short-term catch advice, the SSC stated that it would be

difficult to adopt the Pacific control rule, because the specific values of the biomass cutoff, buffer, and fraction have not been developed for Atlantic herring. This rule also would produce large and sudden changes in ABC based on small changes in biomass, which the SSC felt should be avoided. The SSC noted that the spawning stock biomass expected in 2015 under either of the previously-reviewed alternatives was well above the targeted 40% unfished amount suggested in the Pacific control rule. Similarly, the ABC alternatives already under consideration (75% F_{MSY} and constant catch) were broadly consistent with the biomass aspect of the Lenfest control rule (maximum fishing mortality threshold of 50% F_{MSY}) at currently estimated stock sizes and associated reference points. Thus, the SSC affirmed its original recommendations for specifying ABC for the 2013-2015 fishing years and concluded that the original alternatives considered by the Council were broadly consistent with the intent of the other control rules included for consideration). The SSC noted that more analysis is needed to implement long-term harvest strategies, like the Lenfest and Pacific control rules, and suggested that control rules for forage species should be part of a broader national workshop that involves the community that advises the Council system (NEFMC 2012a).

Further discussion by the Council indicated that because of uncertainties associated with adopting either of these control rules in the 2013-2015 Atlantic herring specifications and the need for additional analysis, these alternatives should be considered but rejected in the specifications package. However, the Council agreed that these alternatives may be revisited, as both the Herring PDT and the SSC expressed support for further consideration of a long-term control rule for Atlantic herring, perhaps forage-based, through a more comprehensive management action. The SSC suggested that the Council consider how to manage the Atlantic herring resource over the long-term, i.e., as a typical fishery with MSY-based reference points, or at a reduced fishing rate and higher stock size to account for its role in the ecosystem. A control rule which could be set for more than three years would need to consider a wide range of possible stock conditions and have a known objective. The Herring PDT noted that reference points and projections required under a new harvest control strategy should be developed through a scientific assessment and technically reviewed before adopted for the long-term management of the fishery.

The Council considered all available information, and it affirmed the 2013-2015 ABC specification for the Atlantic herring fishery based on a constant catch control rule, updating the interim ABC control rule established in Amendment 4. OFL was specified as 169,000 mt in 2013, 136,000 mt in 2014, and 114,000 mt in 2015 and was calculated from a projection that applies F_{MSY} in each of the three years, but assumes that ABC during each year is 114,000 mt. The Council noted that it may modify this ABC control rule or implement a new one at any time through a future action, in the context of the Council's long-term objectives for the management of this resource and the herring fishery. The Council noted that a change in management approach should include evaluation of a full range of alternatives (including reference points) to be adopted in a harvest control rule for the Atlantic herring fishery. A more applicable solution for the long term will require additional analyses for the appropriate multiple reference points and should be evaluated in a full amendment to the Herring FMP (NEFMC 2014).

1.1.2.5 Lawsuit Developments

In November 2013, the plaintiffs in the *Flaherty I* lawsuit filed a new lawsuit, *Flaherty II*, challenging the 2013-2015 Atlantic herring specifications. *Flaherty II* claimed that NMFS failed to follow the Court's Order from *Flaherty I* to:

- Consider an ABC Control Rule based on the best available science for herring and other forage fish;
- Set annual catch limits to prevent overfishing based on best available science, because the ABC is the same for all three years of the specifications and is equal to the OFL in the final year of the specifications; and
- Consider a reasonable range of ABC Control Rule alternatives.

In February 2014, the Court ruled that NMFS had complied with the remedial order (From *Flaherty I*) and deficiencies with respect to Herring Amendment 4 had been sufficiently addressed.

In March 2014, the same plaintiffs filed another lawsuit, *Flaherty III*, following the implementation of Amendment 5 to the Herring FMP. The suit claimed that Amendment 5 failed to include:

- River herring and shad as stocks in the fishery,
- Measures to prevent overfishing, and
- A hard look at the definition of the fishery.

1.1.2.6 Amendment 8

In November 2014, the Council prioritized developing an amendment in 2015 to consider control rules for the Atlantic herring fishery that account for herring's role as forage in the ecosystem. Through Amendment 8, the Council expects to establish a long-term control rule for specifying the acceptable biological catch (ABC) for Atlantic herring that manages Atlantic herring within an ecosystem context and addresses the goals of Amendment 8 (Section 1.3.2). The purpose of Amendment 8 is also to address the biological needs of the Atlantic herring resource as well as the ecological importance of Atlantic herring to the greater Atlantic region in a manner that is consistent with the requirements and intent of the Magnuson-Stevens Act. Amendment 8 is being developed to address concerns during the Amendment 4 and 2013-2015 Atlantic herring specifications lawsuits and the issues raised by the SSC during the development of the 2013-2015 Atlantic herring specifications, when the SSC was asked by the Council to examine some alternative control rules that recognize the special ecosystem status of herring as important forage.

Two scoping periods for this action was held in 2015, February 26 – April 30 and August 21 – September 30. All scoping comments and a concise summary are available for review at: <http://www.nefmc.org/library/amendment-8-2>. Through the 290 comments received (i.e., 29 oral and 261 written), 468 people gave input (duplicates removed) on Amendment 8, in addition to the 28,000 people (duplicates possible) who signed the three large form letters. However, many comments were given by people who represent businesses or organizations, and the total number of people those commenters represent cannot be determined. Most all of the comments supported addressing concerns about localized depletion and developing an approach for managing herring that explicitly accounts for its role in the ecosystem. People shared their perceptions of current

problems and desired outcomes of this action. A relatively small number of comments were specific to control rule alternatives.

1.1.2.7 2016-2018 Specifications

Following the April 2015 Atlantic Herring Operational Assessment (Deroba 2015), the SSC met on May 20, 2015 to review the results and develop recommendations for the Atlantic herring OFL and ABC for the 2016-2018 fishing years. The SSC reviewed a number of projections and possible approaches for specifying ABC (control rules) and recommended that the Council specify ABC for the 2016-2018 fishing years using the interim ABC control rule for Atlantic herring as adopted for 2013-2015. This approach produced an ABC of 111,000 mt for 2016, 2017 and 2018, and associated OFLs of 138,000 mt in 2016, 117,000 mt in 2017, and 111,000 mt in 2018. The SSC provided the following rationale for this recommendation:

- Key attributes of the stock and assessment (SSB, recruitment, F, survey indices, etc.) have not changed substantially since the benchmark assessment, on which the current control rule was based. However, survey indices suggest that the 2011 year class is the second largest in time series and will contribute significantly to the total population abundance and biomass in 2016-2018.
- The most substantial change since the benchmark stock assessment (NEFSC 2012) is that the retrospective pattern has become worse in the operational assessment. The assessment implemented a Mohn's rho correction to SSB in an attempt to account for the retrospective pattern, but there is no guarantee that the retrospective pattern will persist in sign and magnitude.
- Although the probability of overfishing may reach 50% in the third year, the probability of the stock becoming overfished is close to 0% in all years.
- The realized catch in the Atlantic herring fishery is generally well below the ABC, which reduces the expected risk of overfishing.
- In the assessment model, the current ratio of catch to estimated consumption is 1:4, which means that fishing is likely not the largest driver of stock abundance at present, however this does not negate the need to manage the fishing removals on this stock.
- A constant catch strategy is the preferred approach of the Council and the industry.

These considerations led the SSC to conclude that ABC should remain relatively constant for 2016-2018, or perhaps be reduced modestly. The recommended ABC of 111,000 mt, compared with status quo estimate of 114,000 mt, achieves that outcome. Additionally, the SSC noted that the current high herring biomass, bolstered by two very large year classes, likely meets ecosystem goals, including forage considerations, by default and not design, as ecosystem goals are not explicitly identified in the current ABC control rule (NEFMC 2015b).

1.1.2.8 Further Lawsuit Developments

On June 14, 2016, the U. S. District Court for the District of Columbia issued a ruling on the *Flaherty II* case, concluding that the ABC control rule and ACLs in the 2013-2015 Atlantic herring specifications complied with National Standards 1 and 2. The Court reasoned that there was no evidence that the specifications would fail to prevent overfishing and that they relied on the best available science concerning herring's role as forage. Further, the Court held there was no evidence that the Lenfest and Pacific ABC control rules were superior to the 2013-2015 specifications' constant catch ABC control rule.

In January 2017, plaintiffs in *Flaherty III* sought to amend their complaint to add the NEFMC and the Executive Director as defendants and withdraw one count of their complaint regarding measures to prevent overfishing. If granted, *Flaherty III* would limit the alleged deficiencies in Amendment 5 to including river herring and shad as stocks in the herring fishery and taking a hard look at the definition of the fishery.

In August 2017, the U.S. District Court for the District of Columbia granted the plaintiffs' motion for leave to amend the complaint to add the NEFMC and Executive Director as defendants. The parties are expected to file briefs on the issue of whether the NEFMC or Executive Director may be defendants in challenges to fishery management plans.

1.1.2.9 Ecosystem Based Fishery Management (EBFM) Process

In December 2014, when the Council approved herring work priorities for 2015, it tasked the Ecosystem Based Fishery Management (EBFM) PDT and Committee with developing ecological guidance for the Herring PDT on managing forage fish within an ecosystem context and developing appropriate control rule and reference points for potential consideration in Amendment 8. The PDT requested additional guidance at the January Council 2015 Council meeting in part due to concerns raised by the public about ecological issues at smaller scales than a stock-wide control rule may address. The Council advised the EBFM PDT focus on a stock-wide control rule that does not impair the productivity of herring predators. The Council discouraged consideration of spatial availability of herring by changing the structure of the control rule.

The conclusions of the EBFM process are summarized in Section 3.1 of the EBFM PDT Report (NEFMC, 2015). Overall, the indirect effects on productivity of other species and trophic interactions are difficult to quantify, especially when considering the various potential populations levels of a single forage species, such as herring. The EBFM PDT explored various models and potential control rule alternatives, but many models do not provide a prey feedback loop, which is critical for evaluating how various levels of herring biomass affect predator productivity. However, it was concluded that control rules which lower the risk of depleting herring will reduce risk to related predator stocks, but the response of predator populations to differences in herring biomass are difficult to identify, particularly for a wide variety of predators. The Northwest Atlantic system is comparatively complex and many of the herring predators are generalists, so there are effects from the abundance and nutritional value of alternative prey species as well (e.g. sand lance, squid, silver hake).

Overall, there may be indirect benefits from having greater abundance and availability of herring as forage for fish, marine mammals, and seabirds. Collectively, forage fish provide an important supporting ecosystem service as energy transfer between very small prey like zooplankton, and larger animals in the ecosystem including commercial fisheries, marine mammals, seabirds, and other protected species. The important role of forage fish in fueling production of valuable predator fisheries is recognized (Smith et al., 2011), but the broader role in sustaining productivity and structure of marine ecosystems is less understood (Engelhard et al, 2014). Many forage fish are highly productive and short-lived, and some exhibit "boom and bust" cycles. In addition, decadal-scale variability in abundance of major forage fish is often associated with climate drivers and ocean regime shifts that change ecosystem productivity (Alheit et al, 2009). However, fishing pressure can also affect forage fish abundance, increasing

the possibility of collapse when environmental conditions are unfavorable (Murphy 1967, 1977; Pinsky et al., 2011).

Preceding the EBFM process, the NEFMC also discussed ABC control rules with the Risk Policy Working Group, a group that met several times in 2013-2015 to assist the Council with developing a risk policy to address risk and uncertainty across fishery management plans, including ABC control rules. At the November 2014 Council meeting, the Council formally adopted the Risk Policy Statement below:

Recognizing that all fishery management is based on uncertain information and that all implementation is imperfect, it is the policy of the New England Fishery Management Council (Council) to weigh the risk of overfishing relative to the greatest expected overall net benefits to the Nation.

The risk policy has four strategic approaches: 1) it will take into account both the probability of an undesirable outcome and the negative impact of the outcome; the probability of a long-term negative impact on ecosystem function should be low; 2) the cumulative effects of addressing risks at all levels will be taken into account; 3) will consider stability in the face of uncertain information and inherent variability in the ecosystems; and 4) implementation will be analysis-based, using methods that consider the tradeoffs, detect signal from noise so that management and fisheries are less sensitive to uncertainty, and the process should be dynamic allowing review and modification where warranted.

The NEFMC Risk Policy also included different tracks for implementation. The ultimate or final track is to prepare an MSE. Section 4.0 of the Risk Policy Road Map (NEFMC, 2016) summarizes what an MSE is, the potential benefits and best practices, and several case studies. The MSE conducted as part of this action, Amendment 8, was a commitment by NEFMC with the NEFSC to develop a stakeholder driven MSE in this region to operationalize the Council's Risk Policy. The MSE completed to support this action has provided the risk-based analysis needed to support decision making that evaluates the tradeoffs of management objectives with respect to net benefits to the nation.

1.1.2.10 Management Strategy Evaluation

The Council developed Amendment 8 alternatives for the control rule using Management Strategy Evaluation (MSE). MSE is a decision-making process to determine preferred management approaches. MSE involves simulation testing of how various management approaches (e.g., ABC control rules) may perform relative to identified management objectives. MSE can take many forms, but here, the Council is using public workshops to generate stakeholder input on the simulation work.

Of particular importance to the MSE process is identification of fishery objectives and corresponding quantitative performance metrics, and relevant uncertainties (related to the biology, ecosystem, assessment, management, etc.). An example fishery objective might be maintaining enough herring as forage, with a corresponding performance metric of a minimum abundance of herring. Example uncertainties might include those related to stock assessment, fish reproduction (i.e., stock-recruitment), and the strength of interactions between predator and prey.

With this information, a simulation is constructed that involves a mathematical representation (i.e. operating model) of the necessary biological aspects of the system, the fishery, assessment, *Amendment 8 DEIS (November 2017)*

and management (e.g., a level of ABC). The operating model should account for the uncertainties identified (here, through workshops). In some cases, uncertainty about a process may be so large as to warrant construction of multiple operating models that attempt to bound the plausible range of the given process. For example, the degree to which predator abundance depends on herring abundance might be poorly understood, and so two operating models might be constructed with a high and low degree of predatory dependence, respectively. With each operating model, the performance of the ABC control rules is simulated. Performance metrics are then compared for the control rules under each operating model to evaluate which control rules are more or less robust to the uncertainties.

Ideally, a preferred management alternative or range of alternatives (ABC control rules in this case) is identified by the MSE process that will perform reasonably well for the fishery objectives regardless of the operating model (i.e., regardless of what is happening in reality). Another benefit of the MSE process is improved common understanding of what is or is not well understood about the system, which can help inform research priorities and future refinement of the MSE. In the end, the MSE will only be as useful as the degree to which those involved collaboratively work to create a useful approximation of reality that bounds the major uncertainties.

1.1.2.10.1 Process used

In 2015, the Council initiated, conducted public scoping, and set the goals of Amendment 8 to the Atlantic Herring Fishery Management Plan. In January 2016, the Council approved conducting a Management Strategy Evaluation (MSE) to support the development of alternatives regarding the ABC control rule. The Council aimed to use MSE as a collaborative decision-making process, involving more upfront public input and technical analysis than usually occur through the amendment development process. MSE is being used here to help determine how a range of control rules may perform relative to potential objectives. The MSE proceeded with four distinct phases (See timeline in Figure 3). MSEs can take several years to complete. Here, the Council aims to use the ABC control rule adopted through Amendment 8 in developing the fishery specifications for 2019-2021. Thus, this MSE proceeded under more constrained time limits than perhaps is normally the case.

Phase 1 – Identify parameters to be tested

An initial public workshop was held in May 2016 to develop recommendations to the Council for a range of potential objectives of the Atlantic herring ABC control rule, how progress towards these objectives may be measured (i.e., associated performance metrics), and the range of control rules that would undergo testing. About 70 individuals participated in the first workshop including a diverse group of stakeholders from fishing industries, private recreational anglers, scientists, managers, non-profit organizations, and other user groups. In June 2016, upon review of the workshop recommendations and additional input from the Atlantic herring Plan Development Team (PDT), Advisory Panel (AP), and Committee, the Council approved moving forward with the MSE. These bodies did not recommend specific changes to the input provided by the workshop. Although there was not universal support for all of the recommendations, these groups supported evaluation of the full range of concepts.

Phase 2 – Simulation testing

With the fishery objectives, performance metrics and control rules that would undergo testing approved in June 2016, technical work proceeded over the summer. The Northeast Fisheries Science Center (NEFSC) technical team identified, refined, or developed models of Atlantic herring, predators, and fishery economics and tested control rule performance relative to the performance metrics. This work proceeded up until the second public workshop in December 2016.

Phase 3 – Review results, identify additional improvements

The Council convened a second public workshop in December 2016 to review the results of the technical work and to provide continued opportunities for public input. This workshop drew about 65 participants, again from diverse stakeholder groups. Both workshops were completely open to the public and anyone could attend and provide input at the meeting. Herring Advisors, Committee members, and PDT members were encouraged to attend, but it was not an invitation workshop and was completely open to the public.

The input from the second workshop was intended to inform both the finalization of this MSE as well as the development of alternatives in Amendment 8. Relative to this MSE, participants were asked to identify what, if any, additional MSE simulation work (or presentation of outcomes) would be informative for establishing a long-term ABC control rule. The workshop identified which of the ideas generated could potentially be accomplished within this current, first MSE and which may be incorporated into future iterations of the MSE with future improvements to data and/or modeling capacity. Relative to the development of alternatives, participants were asked to identify acceptable ranges of performance for various metrics (to help the Council balance tradeoffs) and how the number of control rules simulated could be narrowed into an appropriate range for consideration in Amendment 8.

Phase 4 – Finalize MSE

Based on the input received at the December 2016 workshop, the NEFSC technical team made refinements to the simulations and presentation of outcomes, finalizing a summary of the technical methods and outcomes in February 2017. The Council approved a final range of ABC control rule alternatives in April 2017 following completion of the MSE. The results from the MSE models were further refined in the following months and integrated into this document.

Figure 3 – MSE timeline used for Amendment 8

2015	Jan. – Dec.	Amendment 8 initiated; public scoping; review scoping comments; develop amendment goals and objectives		
2016	Jan.	Approve using a MSE in developing amendment alternatives		
	Feb.	MSE Phase 1		
	Mar.			
	Apr.			
	May			
	Jun.		MSE Phase 2	
	Jul.			
	Aug.			
	Sept.			
	Oct.			
	Nov.			
	Dec.		MSE Phase 3	MSE Phase 4
2017	Jan.	Discuss preliminary MSE outcomes & workshop input.		
	Feb.			
	Mar.	MSE peer review; develop amendment alternatives		
	Apr.	Approves range of ABC control rule alternatives		

1.1.2.10.2 External peer review

The Council decided to have an external peer review of the MSE model and process used. Several technical models were developed to evaluate the performance of herring ABC control rules, and this was the first MSE used in this region. The goal of the peer review was to review the MSE methods, data, and results developed and determine if they are sufficient for the Council to use when identifying and analyzing a range of ABC control rules alternatives in Amendment 8 to the Atlantic Herring Fishery Management Plan.

Four external peer reviewers were selected to serve on the peer review that took place over 2.5 days in March 2017. The terms of reference required the Panel to: 1) assess the strengths and weaknesses of the MSE methods used to evaluate Atlantic herring ABC control rules, 2) evaluate whether the methods, data, and results of the MSE are sufficient for the NEFMC to use when identifying and analyzing a range of ABC control rule alternatives for the Atlantic Herring Fishery Management Plan, and 3) provide recommendations for future improvements to the process.

The Panel recognized that a tremendous amount of work was completed in a rigorous manner under the time and resource constraints of this MSE process. The Panel agreed that the NEFSC technical team constructed a series of models (Atlantic herring, predator, and economic) appropriate for evaluating ABC control rules for the Atlantic herring fishery in the context of herring’s role as a forage fish. The Panel detailed areas of strength and areas for improvement in

the MSE workshop process, modeling, and synthesis. The Panel concluded that the data, methods, and results of the MSE are sufficient for the Council to use when identifying and analyzing a range of ABC control rule alternatives for the Atlantic Herring Fishery Management Plan. Overall, the Panel concluded that the Atlantic herring MSE represents the *best available science* at this time for evaluating the performance of herring control rules and their potential impact on key predators. The Panel reached consensus regarding their conclusions on all terms of reference. The results of the peer review were presented to the Council in April 2017. More information about the peer review including the final reports can be found at: <http://www.nefmc.org/library/amendment-8-2> .

1.1.2.11 ABC control rules used in other fisheries

1.1.2.11.1 New England Fishery Management Council

A wide variety of ABC control rules are used in New England often based on the degree of information known about a particular species and fishery, as well as the risk tolerance of a management body for that particular resource. Table 1 summarizes the ABC control rules currently used in the FMPs managed by the NEFMC. Some are exclusively based on average catch (i.e. red crab) when there is little information available about the biomass of a particular species. Other control rules are more sophisticated and explicitly account for uncertainty (i.e. whiting and red hake).

Table 1 – Summary of ABC control rules used in NEFMC Fishery Management Plans

Species	ABC CR
Herring	3 year average with 50% probability of overfishing in Year 3
Scallops	Catch associated with fishing rate that has no more than a 25% chance of exceeding OFL (including discards)
Skate	Aggregate ABC for all 7 species combined; Long-term median catch/biomass ratio x 3-year avg. biomass
Monkfish	$B_{CURRENT} \times \text{Avg expl. rate 1996-2006 (North)}$ $B_{CURRENT} \times \text{Avg expl. rate 2000-2006 (South)}$ CR not used in the 2017-2019 specifications based on SSC advice. SQ ABC used based on recent data. This method may be used until age validation research is complete.
Whiting (silver and offshore hakes)	P^{*1} = 25th percentile of estimated scientific uncertainty for silver hake. 4% added to southern whiting stock ABC to account for mixed catch including offshore hake
Red Hake	P^* = 40th percentile of estimated scientific uncertainty

¹ P^* is a measure of the scientific uncertainty that an ABC is less than estimated fishing mortality that is consistent with producing MSY. $P^*=50\%$ means that there is a 50/50 chance. Lower P^* values are associated with less risk.

Red crab	long-term average catch
Groundfish stocks	For most stocks with approved assessment: 75% Fmsy x B current Other methods used for stocks with rejected assessment or other issues

1.1.2.11.2 Other regions

Similar to New England, a variety of ABC control rules are used in other regions as well. This section summarizes a few examples of ABC control rules used for other forage species.

MAFMC – summary of their tier approach to setting ABC control rules – focus on mackerel.

ASMFC is responsible for managing menhaden, another forage species found along the Atlantic coast. Summarize Amendment 3 and development of an ecosystem reference point for menhaden.

Other ABC CR research on forage fish:

Smith et al 2011 (75% rule)

Lenfest Forage Fish Task Force

Hilborn et al 2017

Few others

1.1.2.12 Future Herring Specifications

It is expected that the 2019-2021 specifications will be developed using the control rule adopted through the Amendment 8 process. Final action on Amendment 8 is expected in April 2018. Leaving several months for review and implementation, the control rule adopted in this action should be effective before the Council is scheduled to take final action on the 2019-2021 specifications (Fall 2018). If the Council does not take action in Amendment 8 relative to ABC control rule alternatives, the current/interim control rule would be used for 2019-2021 (Section 2.1.1.1).

1.1.3 Localized Depletion

Localized depletion has been a topic discussed in the herring management arena since at least the mid-2000s, when Amendment 1 to the Atlantic Herring FMP was developed. Through Amendment 1, midwater trawl (MWT) gears were excluded from management Area 1A from June-September. No evidence or data linking midwater trawling to localized depletion, however, was used at the time to support this action. The Council's rationale was to ensure access to herring for the purse-seine and fixed gear components of the fishery and to address concerns raised by the public and the SSC about concentrated catch inshore and need for precaution due, in part, to lack of data on the inshore resource. There was a concern that midwater trawl gear was particularly prone to causing localized depletion (NEFMC 2006).

Will include a summary of the LD references appendix

Summary of Amendment 1 LD measure

Summary of scoping input

Connection to user conflicts

Summary of PDT tasking on LD (2 memos prepared)

1.2 PURPOSE AND NEED FOR ACTION

A purpose of Amendment 8 is to propose a long-term ABC control rule for the Atlantic herring fishery that may explicitly account for herring’s role in the ecosystem and to address the biological and ecological requirements of the Atlantic herring resource. A long-term control rule is needed to provide guidance to the SSC regarding how to specify an annual ABC to account for scientific uncertainty, stock status, and the Council’s risk tolerance to maintain a sustainable Atlantic herring stock that includes consideration of herring as a forage species. This action is also needed to address concerns raised: 1.) by the Amendment 4 lawsuit (Section 1.1.2.3) that NMFS did not sufficiently consider the environmental impacts of alternate ABC control rules in Amendment 4; and 2.) by the SSC during the development of the 2013-2015 Atlantic herring specifications (Section 1.1.2.4), when the SSC was asked by the Council to examine some alternative control rules that recognize the special ecosystem status of herring as important forage.

Additionally, a purpose of Amendment 8 is to propose measures to address potential localized depletion of Atlantic herring. The corresponding need is to minimize possible detrimental biological impacts or socioeconomic impacts on other user groups (commercial, recreational, ecotourism) who depend upon adequate local availability of Atlantic herring to support business and recreational interests both at sea and on shore.

To better demonstrate the link between the purpose and need for this action, the following table summarizes the need for the action and corresponding purposes.

Table 2 – Summary of the purpose and need for Amendment 8

Need	Purpose
To provide guidance to the SSC regarding how to specify an annual ABC to account for scientific uncertainty, stock status, and the Council’s risk tolerance to maintain a sustainable Atlantic herring stock that includes consideration of herring as a forage species.	Propose a long-term ABC control rule for the Atlantic herring fishery that may explicitly account for herring’s role in the ecosystem and to address the biological and ecological requirements of the Atlantic herring resource.
To address concerns raised: 1.) by the Amendment 4 lawsuit that NMFS did not sufficiently consider the environmental impacts of alternate ABC control rules in Amendment 4; and 2.) by the SSC during the development of the 2013-2015 Atlantic herring specifications, when the SSC was asked by the Council to examine some alternative control rules that recognize the special ecosystem status of herring as important forage.	
To minimize possible detrimental biological impacts or socioeconomic impacts on other user groups (commercial, recreational, ecotourism) who depend upon adequate local availability of Atlantic herring to support business and recreational interests both at sea and on shore.	Propose measures to address potential localized depletion of Atlantic herring.

1.3 GOALS AND OBJECTIVES

1.3.1 Goals and Objectives of the Atlantic Herring FMP

The goals and objectives of the Atlantic Herring FMP remain as identified through Amendment 1 (NEFMC 2006) and will continue to frame the long-term management of the resource and fishery.

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 U.S. 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 Atlantic States Marine Fisheries Commission (ASMFC) management plan for Atlantic herring, and promote real-time management of the fishery.

1.3.2 Goals and Objective of Amendment 8 to the Atlantic Herring FMP

The Council has identified three goals and one objective for this action.

Goals

1. To account for the role of Atlantic herring within the ecosystem, including its role as forage.
2. To stabilize the fishery at a level designed to achieve optimum yield.
3. To address localized depletion in inshore waters.

Objective

1. Develop and implement an ABC control rule that manages Atlantic herring within an ecosystem context and addresses the goals of Amendment 8.

1.3.3 Problem statement related to localized depletion for Amendment 8

The Council approved a problem statement in April 2016 to help frame the development of alternatives in Amendment 8. This problem statement was incorporated into the purpose and need of this action.

“Scoping comments for Amendment 8 identified concerns with concentrated, intense commercial fishing of Atlantic herring in specific areas and at certain times that may cause detrimental socioeconomic impacts on other user groups (commercial, recreational, ecotourism) who depend upon adequate local availability of Atlantic herring to support business and recreational interests both at sea and on shore. The Council intends to further explore these concerns through examination of the best available science on localized depletion, the spatial nature of the fisheries, reported conflicts amongst users of the resources and the concerns of the herring fishery and other stakeholders.”

The motion **carried** unanimously on a show of hands (17/0/0).

1.4 PUBLIC SCOPING

1.4.1 Notice of Intent and Scoping Process

At the request of the Council, NMFS published a Notice of Intent (NOI) on February 26, 2015 (80 FR 10458), to announce its intent to develop Amendment 8 and prepare an Environmental Impact Statement (EIS) to analyze the impacts of the proposed management alternatives. The announcement stated that Council proposed Amendment 8 to further consider long-term harvest strategies for herring, including an allowable biological catch (ABC) control rule that addresses the biological needs of the herring resource and explicitly accounts for herring’s role in the ecosystem. The public scoping period was February 26 – April 30, 2015. During this time, oral and written comments were received at three in-person hearings and a webinar. Written comments were also submitted directly to the (Council). A number of concerns were expressed through scoping about localized depletion of Atlantic herring. In June 2015, upon preliminary review of scoping comments, the Council developed goals for Amendment 8 that expanded the scope of this action to include consideration of the spatial and temporal availability of Atlantic

herring. A supplemental scoping period was held August 21 -September 30, 2015. Comments were received in writing and at one in-person hearing.

Localized depletion was defined in the Council’s public supplemental scoping document for Amendment 8 as:

“In general, localized depletion is when harvesting takes more fish than can be replaced either locally or through fish migrating into the catch area within a given time period.”

The occurrence of localized Atlantic herring depletion suggests that the removal of herring from a given area would either leave its relatively immobile predators (e.g., monkfish) with insufficient prey for some time, or that relatively mobile predators (e.g., cod, tuna) would leave the area in search of alternative prey.

1.4.2 Scoping Comments

Comments were received from a variety of stakeholders, including nonprofit organizations, individual fishermen, fishing corporations, government agencies, and other interested citizens. Through the 290 comments (i.e., 29 oral and 261 written), 468 people gave input (duplicates removed) on Amendment 8, in addition to the 28,000 people (duplicates possible) who signed the three large form letters. All written comments and summaries of hearings are provided at www.nefmc.org. Most all of the comments supported addressing concerns about localized depletion and developing an approach for managing herring that explicitly accounts for its role in the ecosystem. Many thanked the Council for undertaking Amendment 8. Comments spoke of a need for precaution to ensure sufficient supply of herring as predators and prey in the ecosystem to, in part, benefit all fisheries that depend on herring (e.g., groundfish, tuna, as well as herring).

Plan to add some detail about the references we received – and reference the LD appendix.

2.0 ALTERNATIVES UNDER CONSIDERATION

2.1 ATLANTIC HERRING ABC CONTROL RULE

The following section describes the alternatives considered by the Council for setting a long-term ABC control rule. A control rule is a formulaic approach for establishing an annual catch limit or target fishing level that is based on the best available scientific information. An objective of Amendment 8 is to develop and implement an ABC control rule that manages Atlantic herring within an ecosystem context. The Council decided to conduct a Management Strategy Evaluation (MSE) to support the development of alternatives regarding the ABC control rule. MSE is a collaborative decision-making process, involving more upfront public input and technical analysis than the normal amendment development process. Background information about ABC control rules is found in Section 1.1.2, and several appendices contain more details on this MSE (Appendix ??, ??, and ??).

The Council declined to identify a preferred alternative for this section of Amendment 8. Additional analysis of the ABC control rule alternatives can be found in Section 5.0 of this document, as well as Appendix ?? and ??.

The specific parameters that define the range of control rule alternatives considered in this action are summarized Table 3 and Figure 4 on page 39. Some alternatives include a fishery cutoff, a lower biomass parameter greater than 0, and some do not (set the lower biomass parameter equal to 0). The range of values for the lower biomass parameters for this group of potential CR alternatives is 0.0 – 1.1. The range of values under consideration for the upper biomass parameter is 0.5 – 2.0. This value specifies the ratio of SSB/SSB_{msy} where a control rule begins to reduce fishing mortality. For example, for the alternative that sets parameter values upfront, the upper biomass parameter is 0.7, so fishing mortality would be set lower than F_{max} (in this case set at 0.9) when biomass is lower than 70% of B_{msy}. Finally, the range considered for F_{max} for this set of potential CR alternatives is between 0.5 and 0.9.

2.1.1 ABC control rule shape

2.1.1.1 No Action - Interim Control Rule – Policy used in recent specification setting processes (fishing years 2013-2018) (*No Action*)

If this alternative is selected, the ABC control rule used for the last two specification cycles, or six fishing years (2013-2018), would be used. The interim or “status quo” or “default” control rule is biomass based. The ABC is set at the same level for three years equivalent to the catch that is projected to produce $\leq 50\%$ probability of exceeding F_{MSY} in the third year. This control rule does not include a fishery cutoff, the lower biomass parameter = 0, thus ABC=0 only when biomass is zero.

If the Council takes No Action for ABC Control Rule under Amendment 8, this is the policy that would be used for future specification packages unless modified by a future action.

Draft Rationale: This control rule has been used in the last two specification setting processes (fishing years 2013-2018), and would be considered again for the next specifications package if there are no changes made under Amendment 8. This control rule has successfully prevented overfishing and herring abundance has increased under this policy. ABCs have been very stable for the last six years - 111,000 mt in 2016-2018 and 114,000 in 2013-2015. While the fishery

has not harvested the ACL, this may be the results of other aspects of management, including the division into four herring management areas and bycatch regulations for non-target species. Catch in the individual herring management areas frequently exceeds 90% of the sub-ACLs, suggesting that moderate changes in the ABC will impact some components of the fishery.

Challenges with the interim control rule:

There are a few technical challenges with the interim control rule when it comes to evaluating it using MSE.

1. The interim control rule is only applicable when abundance is projected to decline over the three-year specification cycle. Under declining abundance, year three has the lowest abundance such that if the probability of exceeding F_{MSY} equals 50% in that year, the probability will be less than that in the preceding two years. Under increasing abundance, setting F_{msy} at 50% in year three would result in having a probability over 50% in the first two years – a scenario incompatible with the legal requirement that the probability that F_{msy} will be exceeded may not be over 50%. This control rule has not been used in years when biomass was expected to increase. Because this control rule is incapable of defining ABC in all situations (e.g. when biomass is increasing), it is not possible to evaluate its long-term impact using a tool like MSE. Thus, its long-term impact is unknown, compared to other alternatives evaluated in this action that could be evaluated using MSE models.
2. It was not feasible to complete the MSE analysis for the current/interim control rule because it is not a long term policy (3 years at a time) and does not include the same parameters needed for the MSE model (i.e. maximum fishing mortality).

To address these challenges, a No Action sub-option, Strawman A, was developed that would be similar to the interim control rule but would be applicable under both declining and increasing abundance scenarios and can be analyzed in a MSE. Strawman A is intended to perform as the No Action ABC control rule has performed on average over the last six years (i.e. two specification cycles) and be a proxy for the No Action ABC control rule to compare to other alternatives.

2.1.1.2 Alternative 1 – Control rule that would resemble the interim control rule as approximated by its average performance in recent years (*Strawman A*)

If this alternative is selected, ABC would be set using the following parameters:

- a maximum fishing mortality rate equal to 90% of F_{msy} ;
- upper biomass parameter equal to 0.5 for the ratio of SSB/SSB_{msy} ; and
- No fishery cutoff, i.e., lower biomass parameter = 0, such that $ABC=0$ only when biomass is zero.
- If the fishery enters a rebuilding plan under this control rule, the linear decline in F between the upper and lower biomass parameters included in this alternative may be insufficient to meet rebuilding requirements. In such cases, deviations from the linear decline in F will be required, and projections will have to be completed to determine the ABC that will achieve rebuilding (equivalent to what is currently done to specify ABC in rebuilding plans). If the linear decline in F between the upper and lower biomass

parameters *is* sufficient to meet rebuilding requirements, then the control rule should be adhered to and the F produced by the linear decline should be used to specify ABC.

Draft Rationale: This sub-option of the No Action was developed to identify a control rule that would function like the interim control rule, but would be applicable in all cases, regardless of whether abundance is increasing or decreasing. Furthermore, it was not feasible to complete the MSE analysis for the current/interim control rule because it is not a long term policy (3 years at a time) and does not include parameters needed for MSE models (i.e. maximum fishing mortality rate). Therefore, this sub-option (Strawman A) is intended to perform as the No Action ABC control rule has performed on average over the last six years (i.e., 2 specification cycles), but it is a distinct option in this action and could be selected as an alternative to the No Action. While this sub-option is very similar to the No Action and was designed to be a proxy for the No Action ABC control rule to compare to other alternatives in the MSE process, this sub-option has different characteristics that enable it to be used in both increasing and decreasing abundance, and it has control rule parameters that can be analyzed with MSE models (i.e. maximum fishing mortality rate, upper and lower biomass thresholds).

This option was presented to stakeholders at public workshops during development of Amendment 8 and some participants supported including this alternative in this action. This option is not expected to have negative impacts on dogfish survival (Figure ???), or tuna growth (Figure???). Terns are also expected to have ???-???% chance of maintaining reproduction at replacement levels. Long-term herring biomass would be expected to be maintained above BMSY by fishing at a max of 90% F_{msy} and an upper biomass threshold of 0.5 B_{msy} . Including these two parameters in the control rule policy limits harvest levels, especially when biomass is below B_{msy} to account for the role of herring as forage in the ecosystem.

2.1.1.3 Alternative 2 – Maximum fishing mortality of 50% F_{msy} and fishery cutoff when biomass less than 1.1 of SSB/ SSB_{msy} (*Strawman B*)

If this alternative is selected, ABC is set as a function of biomass (biomass based). ABC would be set using the following parameters:

- Upper biomass parameter equals 2.0 for ratio of SSB/ SSB_{msy} .
- Maximum fishing mortality is set at 50% of F_{msy} .
- Fishery cutoff, or lower biomass parameter equals 1.1 for ratio of SSB/ SSB_{msy} .
- If the fishery enters a rebuilding plan under this control rule, the linear decline in F between the upper and lower biomass parameters included in this alternative may be insufficient to meet rebuilding requirements. In such cases, deviations from the linear decline in F will be required, and projections will have to be completed to determine the ABC that will achieve rebuilding (equivalent to what is currently done to specify ABC in rebuilding plans). If the linear decline in F between the upper and lower biomass parameters *is* sufficient to meet rebuilding requirements, then the control rule should be adhered to and the F produced by the linear decline should be used to specify ABC.

Draft Rationale: This alternative was developed based on input from stakeholders at the public workshops held during the MSE who supported expanding the range of alternatives considered in this action. Some participants at the workshops supported including alternatives in this action

that prioritize herring predator forage needs and limit catch more than traditional control rules used in this region. Some research from outside the New England region has shown that limiting fishing mortality to 50% of F_{msy} is expected to help maintain forage fish biomass and prevent negative impacts on dependent predators (Pikitch et al, 2012). Furthermore, setting the upper biomass parameter for the ratio of SSB/SSB_{msy} at a relatively large value, in this case 2.0, would reduce fishing mortality further if biomass falls below $2 * B_{msy}$. For this alternative, the maximum fishing mortality rate that can be applied is $0.5 F_{msy}$, and that is reduced when biomass falls below $2 * SSB_{msy}$. In addition, this alternative includes a fishery cutoff at $1.1 * SSB_{msy}$. If biomass falls below that level ABC would be set to zero, and no herring fishing would be allowed until biomass increases above $1.1 * SSB_{msy}$.

The targets and limits used in this control rule alternative may account for the uncertain population dynamics of forage fish and their important role in the ecosystem for predators such as marine birds, marine mammals and larger fish. These targets and limits were suggested based on research from outside this region, and so the benefit of their application may not be generalizable in this case. For example, the MSE used in this action suggests that other alternatives would not increase risk to dogfish survival, or tuna growth, and bird reproduction rates would only be marginally improved. However, maintaining higher herring biomass may provide other benefits to the ecosystem that were not explicitly considered in the MSE. Overall, this alternative was identified to maintain lower rates of fishing mortality to maintain higher levels of forage fish biomass, compared to more conventional approaches that generally allow higher maximum fishing mortality rates and fishery cutoffs at lower biomass levels (i.e. 20%). This alternative includes a fishery cutoff of 1.1, neither No Action nor Strawman A include a fishery cutoff. In addition, this alternative has a more conservative upper biomass parameter of 2.0, compared to 0.5 for Strawman A, reducing fishing mortality at higher biomass levels than the other alternatives under consideration.

[When analysis complete – this section could reference a few figures that highlight the impacts of this option compared to Strawman A – are there additional benefits for forage or not?]

2.1.1.4 Alternative 3 – Control rule parameters defined upfront

This alternative is the result of defining parameters that dictate the shape of the control rule, rather than selecting the desired performance of control rule metrics, and using the MSE model to identify the parameters that meet those objectives (as is the case with Alternative 4). The recommended values are: 0.3 for the lower biomass parameter, 0.7 for the upper biomass parameter, and setting the maximum fishing mortality at 0.9, or 90% of F_{msy} .

If this alternative is selected, ABC is set as a function of biomass (biomass based). ABC would be set using the following parameters

- Upper biomass parameter equals 0.7 for ratio of SSB/SSB_{msy} .
- Maximum fishing mortality is set at 90% of F_{msy} .
- Fishery cutoff, or lower biomass parameter equals 0.3 for ratio of SSB/SSB_{msy} .
- If the fishery enters a rebuilding plan under this control rule, the linear decline in F between the upper and lower biomass parameters included in this alternative may be insufficient to meet rebuilding requirements. In such cases, deviations from the linear

decline in F will be required, and projections will have to be completed to determine the ABC that will achieve rebuilding (equivalent to what is currently done to specify ABC in rebuilding plans). If the linear decline in F between the upper and lower biomass parameters is sufficient to meet rebuilding requirements, then the control rule should be adhered to and the F produced by the linear decline should be used to specify ABC.

Draft Rationale: This alternative was developed by the Herring Committee with the intent of considering an alternative with fishing mortality limits similar to how the current, interim control rule performs on average in recent years (90% of F_{msy}), but include explicit control rule parameters that are intended to better account for the important role herring has in the ecosystem as a prey species. Including an upper biomass parameter of 0.7 would reduce fishing mortality lower than 90% of F_{msy} when biomass falls below 70% of SSB_{msy} . This parameter in addition to the fishery cutoff when biomass falls below 30% of SSB_{msy} were added to explicitly account for herring's role in the ecosystem as forage by reducing fishing pressure when biomass levels decline below certain thresholds. Compared to No Action and the No Action sub-option (Strawman A), Alternative 3 includes a fishery cutoff at 0.3, compared to Strawman A that does not have a fishery cutoff. In addition, this alternative has a more conservative upper biomass parameter (0.7) than Strawman A (0.5).

[When analysis complete – this section could reference a few figures that highlight the impacts of this option compared to Strawman A – are there additional benefits for forage or not?]

2.1.1.5 Alternative 4 - Control rule alternatives based on desired performance of specific metrics identified in the Management Strategy Evaluation process

This set of six control rule alternatives is based on the desired performance of four primary metrics identified by the Council, selected from a longer list of metrics identified by stakeholders that participated in the MSE process. Over fifteen different metrics were identified at a public workshop and accepted by the Council as important fishery objectives that could be evaluated in the MSE. The range of metrics was diverse including: biomass relative to B_{msy} , biomass relative to unfished biomass, frequency overfished, tuna condition, annual variation in yield, net revenue, frequency of fishery closure, tern productivity, etc.

The Council reviewed the overall list of metrics identified by stakeholders that were used in the MSE and identified a subset of primary metrics that would be used to identify a range of performance based control rules. The subset of metrics and desired performance includes:

1. Set the proportion of MSY at 100%, with an acceptable level as low as 85%;
2. Set variation in annual yield <10%, with an acceptable level as high as 25%;
3. Set probability of overfished 0%, with an acceptable level as high as 25%;
4. Set probability of herring closure ($ABC=0$) between 0-10%.

These primary metrics with desired performance values produce over 70 different control rule shapes. The PDT was asked to identify a method to reduce this range to a more practical number. The Council adopted the steps below to reduce the final range to six:

- 1) Remove shapes that have an upper biomass parameter <0.5, as these may not respond to declining stock sizes before separate rebuilding requirements would be required.

Control rules that have an upper biomass parameter $\geq 50\%SSB_{msy}$ should reduce the likelihood of a stock becoming overfished and needing a rebuilding plan. These control rules are therefore more likely to achieve rebuilding requirements and are more consistent with the goal to avoid an overfished status.

2) Set probability of overfished equal to zero; because having a low probability of overfished was a common objective for most if not all stakeholders; and

3) Set proportion of MSY to be 88% or greater, rather than 85%, to be even more consistent with the Committees desired performance of a control rule that provides an ABC of 100% of MSY.

If the fishery enters a rebuilding plan under any of these six control rule alternatives, the linear decline in F between the upper and lower biomass parameters may be insufficient to meet rebuilding requirements. In such cases, deviations from the linear decline in F will be required, and projections will have to be completed to determine the ABC that will achieve rebuilding (equivalent to what is currently done to specify ABC in rebuilding plans). If the linear decline in F between the upper and lower biomass parameters *is* sufficient to meet rebuilding requirements, then the control rule should be adhered to and the F produced by the linear decline should be used to specify ABC.

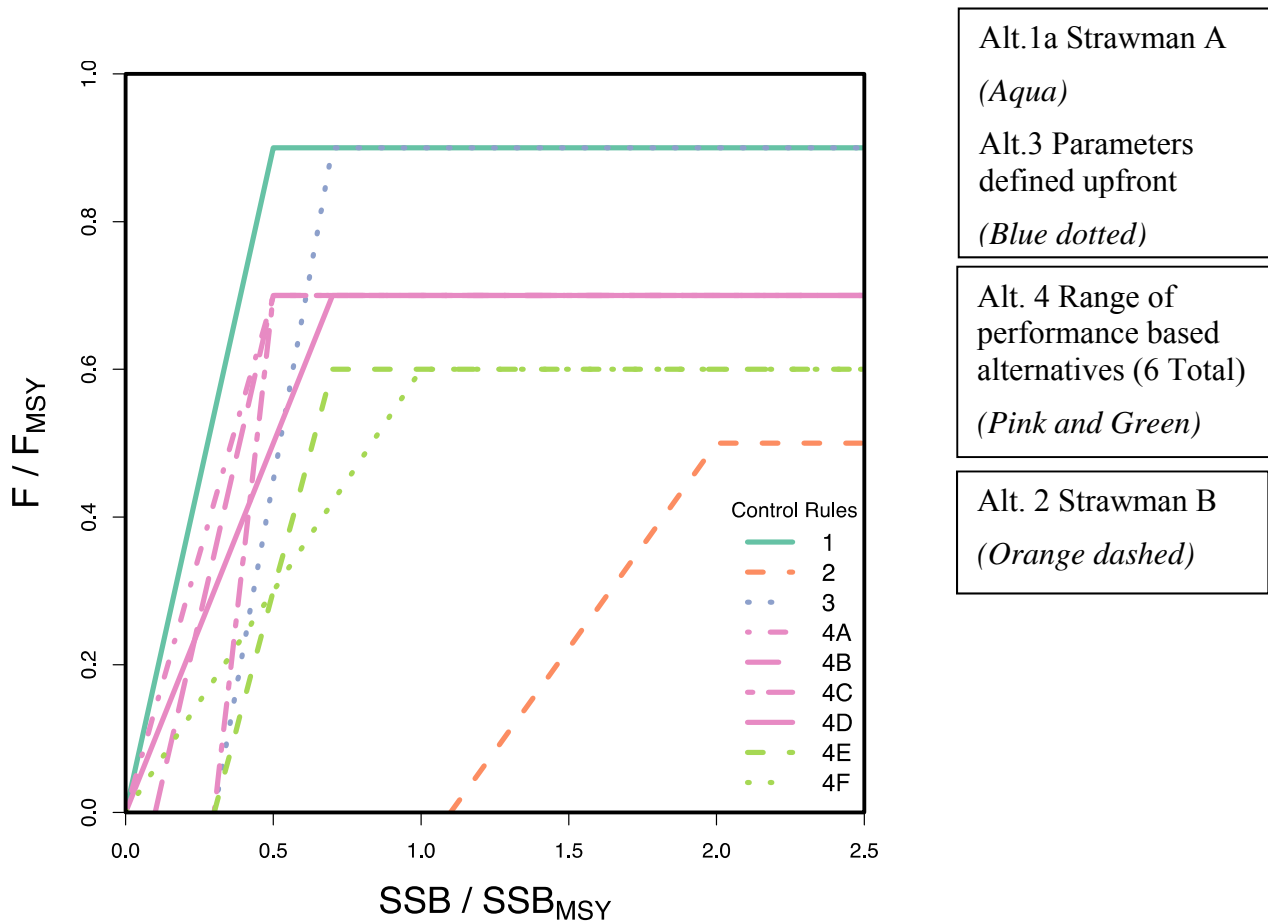
Draft Rationale: Rather than identify the values for control rule parameters upfront, Alternative 4 options were instead developed by identifying the desired performance of a handful of metrics, and the MSE model then isolated the control rule shapes to meet those standards. The results from the MSE models were used more directly to inform the types of control rule alternatives to consider. At the first stakeholder workshop over a dozen potential metrics were identified based on input from participants. The Council reviewed that list and narrowed the number of primary metrics to four: 1) %MSY; 2) variation in yield; 3) probability of overfished; and 4) probability of herring closure (ABC=0). The Council also identified the desired values for each metrics in terms of performance (i.e. variation in annual yield set at a preferred level <10%, and acceptable level as high as 25%).

In all cases, these six control rule alternatives maintain higher herring biomass but provide less yield compared to No Action and the No Action sub-option (Strawman A), with lower maximum fishing mortality rates, either 60% or 70% of F_{msy} , compared to 90% used in Strawman A. Half of these alternatives include a fishery cutoff at 0.3 or 0.1, and half do not have a fishery cutoff. Finally, half of these shapes use the same upper biomass parameter of 0.5 as Strawman A for the point where fishing mortality begins to decline, and the other half use a more conservative value of 0.7 or 1.0. In general, control rules that incorporate parameters that reduce (and/or eliminate) fishing mortality when biomass falls below certain thresholds more explicitly account for the special ecosystem status of herring as important forage.

Table 3 – Summary of control rule parameters for the potential range of alternatives

	Upper Biomass Parameters	Lower Biomass Parameters	Max F
Alt1. No Action	N/A	N/A	N/A
Alt 1a. Strawman A	0.5	0.0	0.9
Alt 2. Strawman B	2.0	1.1	0.5
Alt 3. Parameters upfront	0.7	0.3	0.9
Alt 4a. MeetCriteria1	0.5	0.0	0.7
Alt 4b. MeetCriteria2	0.5	0.1	0.7
Alt 4c. MeetCriteria3	0.5	0.3	0.7
Alt 4d. MeetCriteria4	0.7	0.0	0.7
Alt 4e. MeetCriteria5	0.7	0.3	0.6
Alt 4f. MeetCriteria6	1.0	0.0	0.6

Figure 4 – Range of ABC control rule alternatives considered in Amendment 8



2.1.2 ABC control rule timeframe

2.1.2.1 Alternative 1 – Set ABC for three years at the same level for each year (*No Action*)

If Alternative 1 is selected, the ABC control rule selected in Section 2.1.1 would be used to set ABC at the same level for three years (consistent value in mt for three years at a time). Specifications would be set for three years at a time using the most recent herring stock assessment information available. In terms of timing, this is similar to how herring specifications are set now, every three years (e.g. ABC for FY2019-2021 would be set for three years at a time, and the ABC would be set at the same value (in mt)).

If Alternative 1, the Interim Control Rule or No Action, is selected, then the ABC for the three years would be equal to the ABC that produces a 50% probability of exceeding F_{msy} in year three of the specifications cycle (see above). Again, however, this would only be applicable to cases where abundance is declining through time.

For all other alternatives, ABC for year one of the specifications cycle would be specified by applying the chosen control rule via projections from the terminal year of the stock assessment (as is currently done for all ABC specifications for all fisheries with age-based assessments). The ABC in years two and three would be set to the same ABC value from year one. If the ABC in any of the years would have a greater than 50% probability of exceeding F_{msy} , then the ABC would be reduced for that year until the probability equaled 50%.

The model used in this MSE did not include projections with the same ABC value for three years, but rather applied a control rule to the terminal year estimate from the assessment and used the resultant ABC in the subsequent three years. The effect of using the terminal year versus doing projections for year one are expected to be negligible.

Draft Rationale: This is similar to how ABC is set in this fishery currently, the same value for three years at a time. It provides stability in the fishery with positive economic impacts from a business planning perspective for both herring harvesters and industries that rely on herring as bait. Based on the results of the MSE, setting ABC at the same level for three years, compared to annually, does have some economic cost from lower yields, but they are relatively minimal (Figure ???).

2.1.2.2 Alternative 2 – Set ABC for three years with annual application of control rule

If Alternative 2 is selected, the ABC control rule selected in Section 2.1.1 would be used to set ABC every three years, but ABC would not necessarily be the same value. Each year, the ABC value could change. ABC would be set each year based on the most recent herring assessment and short-term projections. The short-term projections would apply the selected ABC control rule in each projected year. This process is essentially identical to what is done for specification setting in many other fisheries in the region. For example, some groundfish stocks not in rebuilding plans use 75% F_{msy} in short-term projections to specify annually varying ABCs.

Draft Rationale: The PDT recommended this approach replace an alternative (Section 2.3.1.3) that would set ABC annually based on annually updated assessments and specifications, because current human resources and financial resources preclude annual assessment and specification processes. This alternative would have similar performance to an annual process, but ABC values for year 2 and 3 would rely on short-term projections rather than updated assessments.

Using projections rather than updated assessments would not be expected to provide significantly different ABCs, because the age of 50% selectivity for the mobile gear fishery is age-4, with full selection at age-5. These cohorts are relatively well estimated by the assessment, as opposed to age-1 (i.e., recruits), for which few data points are available to inform the assessment. Age-1 fish, however, would be a relatively smaller fraction of the catches over the three-year specifications cycle than the age-2 and older cohorts that are better estimated and would contribute relatively more to catches. Inter-annual catch may vary more with this alternative compared to one that sets ABC at the same value for three years, but this would be more responsive to model projections that may suggest ABC vary from year to year.

2.1.3 Expand the list of frameworkable items to include modifications to ABC control rule

During development of ABC CR alternatives, the Council clarified that future changes to the ABC CR could be made by Amendment or Framework, and modifications to the ABC CR would be added to the list of frameworkable items. The Council does not support that modifications to the ABC control rule be considered in a specifications package only. This section does not have alternatives; it clarifies that future changes to any ABC CR selected in this action could be modified by Amendment or Framework, but not via a specification package.

Examples of potential modifications that could be considered by future amendment or framework would include: modifications to ABC CR parameters such as F_{max} , modifications if a quantitative assessment is not available, if the MSE model is producing ABCs that are not justified or consistent with the state of knowledge about the system, or if the stock enters into a rebuilding program under the proposed control rule (if biomass falls below 50% of SSB), then the ABC would deviate from the control rule. The specific examples listed above are explained in more detail below.

First, Amendment 8 evaluated the potential impacts of a wide range of alternatives for each parameter of a control rule (i.e. F_{max} , upper and lower biomass threshold). Therefore, since those potential impacts have been considered, relatively minor changes to the ABC control rule could be modified by future amendment or framework action.

Second, in the event that the assessment gets rejected and the selected ABC control rule cannot be applied as intended, a “Plan B” or empirical method would be used to specify ABC. For other fisheries in the region, these “Plan B” options are currently specified in an ad hoc way on an as needed basis. Such could be the case here. Given additional analysis on the performance of alternative “Plan Bs”, the Council could choose how to specify ABC in the absence of an assessment using some future action. If an acceptable assessment emerges in the future, then the selected control rule would once again be applied.

Third, this MSE used multiple operating models to represent a range of uncertainties in herring biology, herring’s relationship to some predators, and the management system. These operating models were conditioned on data, meaning the ranges of uncertainties they represent are consistent with the state of knowledge about the system. In the future, changes may occur such that the dynamics of the system are no longer bounded by the uncertainties represented by the operating models, and so the selected control rule may not behave as anticipated based on results of the MSE. The Council may schedule periodic reviews (e.g., every 5-10 years) of the models used in this MSE so that the latest data and modeling can be evaluated to determine whether the

operating models still sufficiently represent the dynamics of the system. If the operating models no longer sufficiently represent the system, then the Council should consider whether an interim control rule should be used until such time that the MSE can be updated, and the control rule alternatives re-evaluated. The details of such a process could be determined ad hoc, or be implemented through another action.

Forth, if the stock enters into a rebuilding program under the proposed control rule (if biomass falls below 50% of SSB), then the ABC would deviate from the control rule. For example, the model used for these ABC CRs has included a linear decline of F when biomass falls below 0.5. In reality, the decline in F may not be linear; based on updated projections it may be necessary to deviate from a linear decline in F. All of the CR shapes have been analyzed using a linear decline in F once biomass falls below the upper biomass parameter, but in reality if a rebuilding plan is initiated F may need to deviate from the control rule based on short term projections.

If any or all of these issues arise in the future, the Council could consider modifying the ABC control rule by Amendment of framework action. Changes to the ABC control rule should not occur in a specifications setting process only.

2.2 MEASURES TO ADDRESS POTENTIAL LOCALIZED DEPLETION AND USER CONFLICTS

The following section describes the alternatives considered by the Council for measures to address potential localized depletion and user conflicts. During the scoping period for this action many commenters spoke of a need for precaution to ensure sufficient supply of herring as forage in the ecosystem. A supplemental scoping period was held to solicit additional comments specific to concerns about potential localized depletion and the potentially negative biological and socioeconomic impacts on other dependent users (e.g., groundfish, tuna, and whale watching businesses). Summary background information about localized depletion is found in Section 1.1.3, and several appendices contain more information used to support the development and analysis of the measures to address potential localized depletion in Amendment 8 (Appendix ??, ??, and ??). The range of alternatives developed either came from recommendations during the scoping periods, or from discussions at the Herring Advisory Panel and/or Herring Committee meetings.

The Council's preferred alternative is ???, (potentially including ??? sub-options for season and area). Rationale and technical information supporting the Preferred Alternative are provided below. Additional analysis of these measures can be found in Section 5.0 of this document, as well as Appendix ?? and ??. The Council discussed that any existing or new closures approved to address potential localized depletion and user conflicts could be modified via Amendment or framework action. This list of frameworkable items already includes changes to closed areas, which would include closures to address potential localized depletion and user conflicts.

One remaining issue to clarify:

The language of some measures are specific to “**vessels fishing for herring with midwater trawl gear**”. What was the intent for vessels fishing for mackerel? Under the current regulations, if a vessel has possession of one pound of herring it is considered in the herring fishery. Therefore, as drafted these measures would also likely exclude vessels fishing for mackerel. The question has come up about the extent this action can limit mackerel fishing if there is limited co-occurrence of mackerel and herring. Furthermore, in practice most vessels declare both species when fishing. How should the alternative be worded, and what is the intent?

Cmte Motion from September

The Committee clarified the intent of many of the localized depletion measures; they are designed to restrict vessels fishing for herring with mid-water trawl gear.

Vote: 7:0:3, carries

PDT input from October

Vessels with any Atlantic herring permit (limited or open access) may not use, deploy, or fish with midwater trawl gear in __ (Area?) __ from __ (date?) __ to __ (date?) __ of each fishing year. A vessel with midwater trawl gear on board may transit the area, provided such midwater trawl gear is stowed and not available for immediate use. Vessels may use any authorized gear type to harvest herring in this area from __ (date?) __ to __ (date?) __ unless prohibited by other regulations.

2.2.1 Alternative 1: No Action

Vessels fishing for herring with midwater trawl gear are excluded from fishing in Herring Management Area 1A June 1 through September 30 (Figure 5). This was implemented in Amendment 1, effective on June 1, 2007. Amendment 1 established a seasonal purse seine/fixed gear-only area to address growing concerns about localized depletion of the inshore Gulf of Maine stock as well as the importance of herring as a forage species.

Draft Rationale: When this measure was adopted in Amendment 1, the primary reason cited was that, “there is significant and growing concern about the status of the inshore component of the herring resource and the potential impacts of midwater trawl fishing effort, which can be highly concentrated at times, in the inshore Gulf of Maine.” In addition, the Council noted that given the importance of herring as forage and its role in the Gulf of Maine ecosystem, proactive measures should be taken to prevent overfishing in a very important area for both the fishery and predators.

In addition, a prohibition on trawl effort during the summer was also expected to help ensure access to herring for purse seine and fixed gears. During development of Amendment 1, some purse seiners suggested that midwater trawl gear disperses herring schools, making it difficult to purse seine, while fixed gear participants argued that midwater trawl gear keeps herring schools from coming inshore, limiting opportunities for that gear type. While there was no specific data available to link midwater trawling to localized depletion and overall declines in herring abundance, this measure was expected to reduce overall fishing effort on herring since MWT was the primary gear type used to catch herring during the peak months of the season, which also happens to be spawning months for this stock component, (late summer). While there may have been several reasons fixed gear fisheries in the inshore GOM declined over the years, gear conflicts between purse seine and MWT were cited as one of the primary reasons the Council considered and approved this purse seine/fixed gear only area.

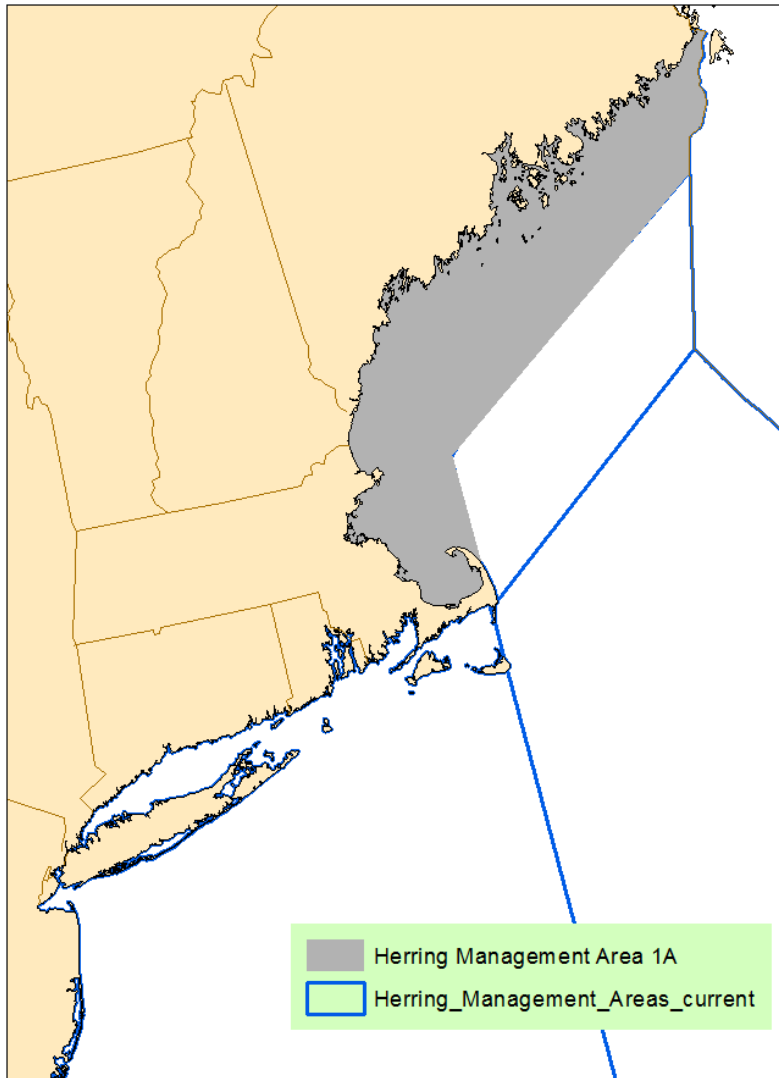
The gear prohibition was also expected to reduce risks to some marine mammal species that are present in the GOM in the summer (primarily harbor porpoise, harbor, gray, and possibly other seal species) as well as reduce bycatch of groundfish species in the GOM. In addition, the measure was cited as an opportunity to improve scientific information to potentially observe differences in catch rates inside and outside of the area and any short-term/long-term changes in the ecosystem within the area where MWT gear is restricted. Finally, Amendment 1 references substantial public testimony from other stakeholders (i.e. whale watching community, commercial and recreational tuna fishermen, and other recreational users) that midwater trawl gear is too efficient, and is causing negative economic impacts on income for those businesses. This measure was in part proposed to help mitigate these conflicts.

From Amendment 1:

The information presented during the development of this amendment, the testimony received during public hearings, the numerous concerns expressed about the health of the inshore stock and the impact of midwater trawling on the resource and the ecosystem, the importance of herring as a forage species, the need to improve ecological information and move towards ecosystem-based management, and the general need to improve information about fisheries-related impacts all support a precautionary approach to managing a high-volume fishery for this important keystone species. The Council believes that the long-term benefits of this measure to the herring resource and

the Gulf of Maine ecosystem far outweigh the short-term costs to the industry, particularly midwater trawl vessels, the vast majority of which are able to fish farther offshore and travel to other fishing grounds in a safe manner.

Figure 5 – Alternative 1 (No Action) to address localized depletion – Area 1A closed to midwater trawl gear June 1 – Sept 30 and user conflicts



2.2.2 Alternative 2: Closure within 6 nautical miles from shore in Area 114 to all vessels fishing for Atlantic herring (all gear types)

If this alternative is adopted, waters within 6 nautical miles from shore in the thirty minute square 114 would be closed to all vessels fishing for herring, regardless of gear type or herring permit type (Figure 6). This alternative includes a two-year sunset provision from the date of implementation. It was discussed that during that time the PDT/NEFSC should continue analysis into defining localized depletion and determining whether it exists in the Atlantic herring fishery. This closure would sunset after two years while additional analyses are conducted to further define and evaluate whether localized depletion is occurring. For example, if Amendment 8 is implemented on June 1, 2018 this provision would be effective until May 30, 2020, unless a subsequent action is taken by the Council to extend the closure. To date this is the only alternative that includes a sunset provision.

Alternative 2 would be additive to the existing measure in place to address potential localized depletion of herring in Area 1A, the seasonal prohibition of mid-water trawl gear between June 1 – September 30 in Area 1A. That measure was adopted through Amendment 1 to the Herring FMP (effective June 1, 2007). Furthermore, RSA compensation fishing is currently exempt from seasonal closures (January – May for Area 1A and January – April for Area 1B), as well as any closures after a sub-ACL is reached for a herring management area. However, RSA compensation fishing with MWT gear is NOT exempt from the prohibition of MWT gear in Area 1A (from June-September), the No Action alternative in Amendment 8. Currently, a vessel can fish RSA compensation allocation in Area 1A between June through September, but not with MWT gear. The gear prohibition is for all fishing, including RSA compensation fishing.

If this alternative is selected, the Council clarified that RSA compensation fishing would be exempt from these restrictions, regardless of gear type. Specifically, RSA compensation fishing could take place in the area and season adopted by this alternative. RSA compensation fishing trips are authorized under an exempted fishing permit (EFP). While the exemption from the localized depletion measure(s) is an overarching exemption from the restrictions, it does not mean that EFPs will be without restriction. Terms and conditions of the EFP must be consistent with the Magnuson-Stevens Fishery Conservation and Management Act, applicable law, the Herring FMP, and other FMPs. As such. The Regional Administrator must consider whether additional terms and conditions should be required for the compensations fishing EFPs to ensure these consistencies are met, and additional terms and conditions may restrict compensation fishing.

Draft Rationale: This alternative was originally developed by the Herring AP. The scale of this alternative was limited to only encompass the area that was believed to be the primary area of concern - coastal waters off the backside of Cape Cod in Area 114. This alternative would apply to all herring fishing, to address the concern that the removal or depletion of herring is what causes potential negative impacts on other users, not the impacts of a specific gear type. A sunset clause is included in this alternative to potentially alleviate current tensions between users, but it is temporary in nature to help ensure that there is a serious commitment from the Council and/or the Center to more thoroughly analyze and define localized depletion in the herring fishery. When that research is done to define localized depletion and document that it is occurring, then more permanent closures or restrictions could be adopted.

To some extent, this measure is expected to address the potential localized depletion and user conflicts that were raised during the scoping process. This measure is expected to provide a seasonal closure when interactions would be most expected between the herring fishery and both recreational and commercial small vessel activity. This alternative is specific to the back side of the Cape, an area that was identified during scoping. In addition, this alternative helps to maintain optimum yield by minimizing the impacts on both the herring and lobster fisheries compared to other options discussed in this action. Furthermore, it was discussed that this alternative would support fair and equitable allocation of fishery access by minimizing the extent of closed areas.

2.2.2.1 Seasonal options (*choose one*)

2.2.2.1.1 Sub-option A - June 1 – August 31 (3 months)

Under Sub-option A, the 6nm closure would be applicable June 1 – August 31.

Draft Rationale: This season was originally identified by the Herring advisors as the time of year when the highest level of interactions would be expected between the herring fishery and other users in both recreational and commercial activities in this area. Summer months generally have increased levels in both recreational and some commercial fishing operations in nearshore waters. If there are concerns about removal of herring for other user groups, eliminating herring fishing in the time and place other users fish in the area should have beneficial impacts on the predators of herring in that area. This season was not extended beyond three months to still provide flexibility to the herring fishery to fish in that area and minimize economic impacts of a seasonal closure. (plan to reference maps and analysis when available).

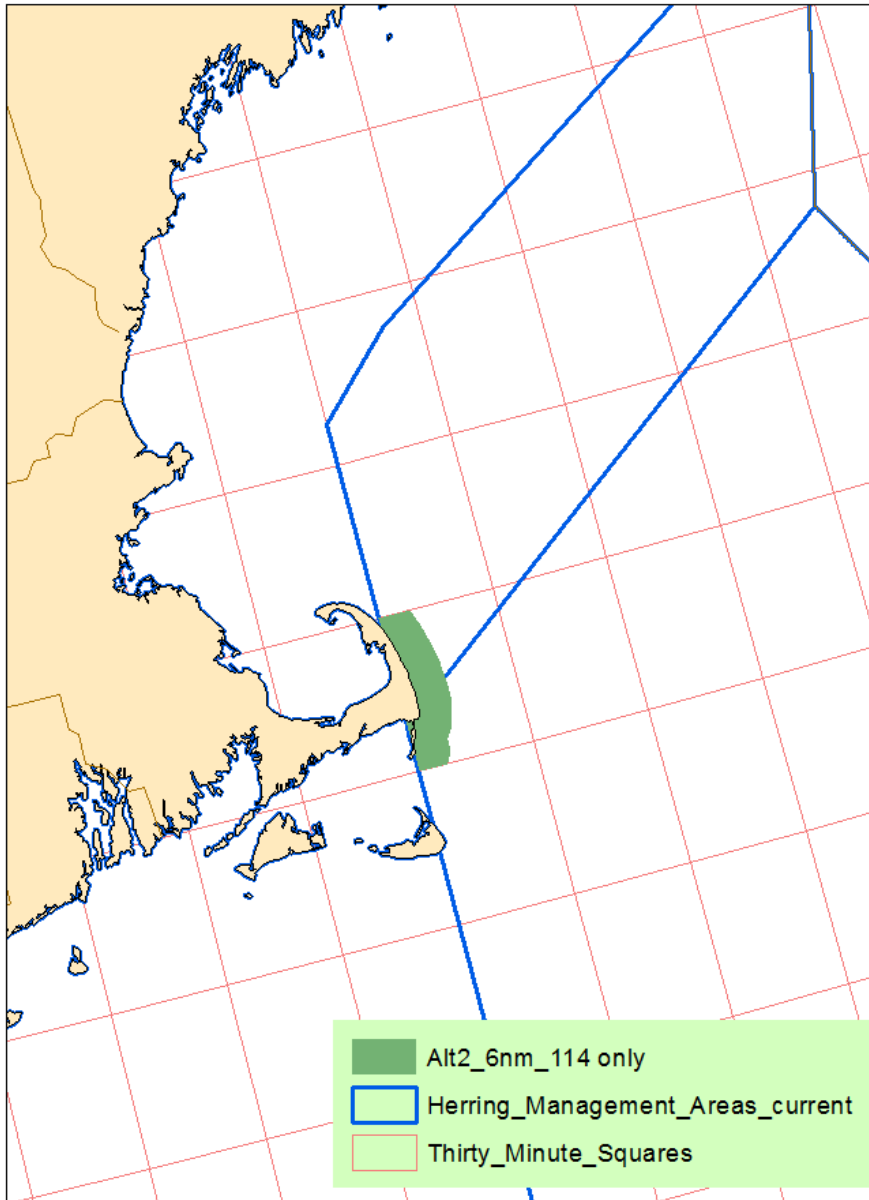
2.2.2.1.2 Sub-option B - June 1 – October 31 (5 months)

Under Sub-option B, the 6nm closure would be applicable June 1 – October 31.

This sub option is two months longer than the previous sub-option and was included to further address potential user conflicts in this area by preventing all herring fishing to occur for these five months when activity is greatest for other recreational and commercial participants that rely on herring for bait.

Draft Rationale: Extending this seasonal closure was first discussed at the Advisory Panel level, and recommended by the Herring Committee. Extending the seasonal closure to herring fishing into the early fall could have beneficial impacts on the commercial and recreational fisheries in that area, in particular groundfish and tuna fisheries off the back side of Cape Cod. (plan to reference maps and analysis when available).

Figure 6 – Alternative 2 (6 mile closure in Area 114) to address localized depletion and user conflicts



2.2.3 Alternative 3: A year-round prohibition of midwater trawl gear in Herring Management Area 1A

If adopted, this alternative would extend the midwater trawl gear restriction in Area 1A to be a year-round restriction (Figure 7). Vessels fishing for herring with midwater trawl gear area is currently prohibited in that area from June 1 – September 30; this alternative would extend that prohibition to be year-round. Vessels using other gear types would still be permitted to fish for herring, i.e. purse seine or fixed gears. Vessels that currently use midwater trawl gear would be permitted to convert to other gear types allowed in the area.

If this alternative is adopted, it would include the current measure in place to address potential localized depletion of herring in Area 1A, the seasonal prohibition of mid-water trawl gear between June 1 – September 30 in Area 1A. That measure was adopted through Amendment 1 to the Herring FMP (effective June 1, 2007), and is contained within this alternative.

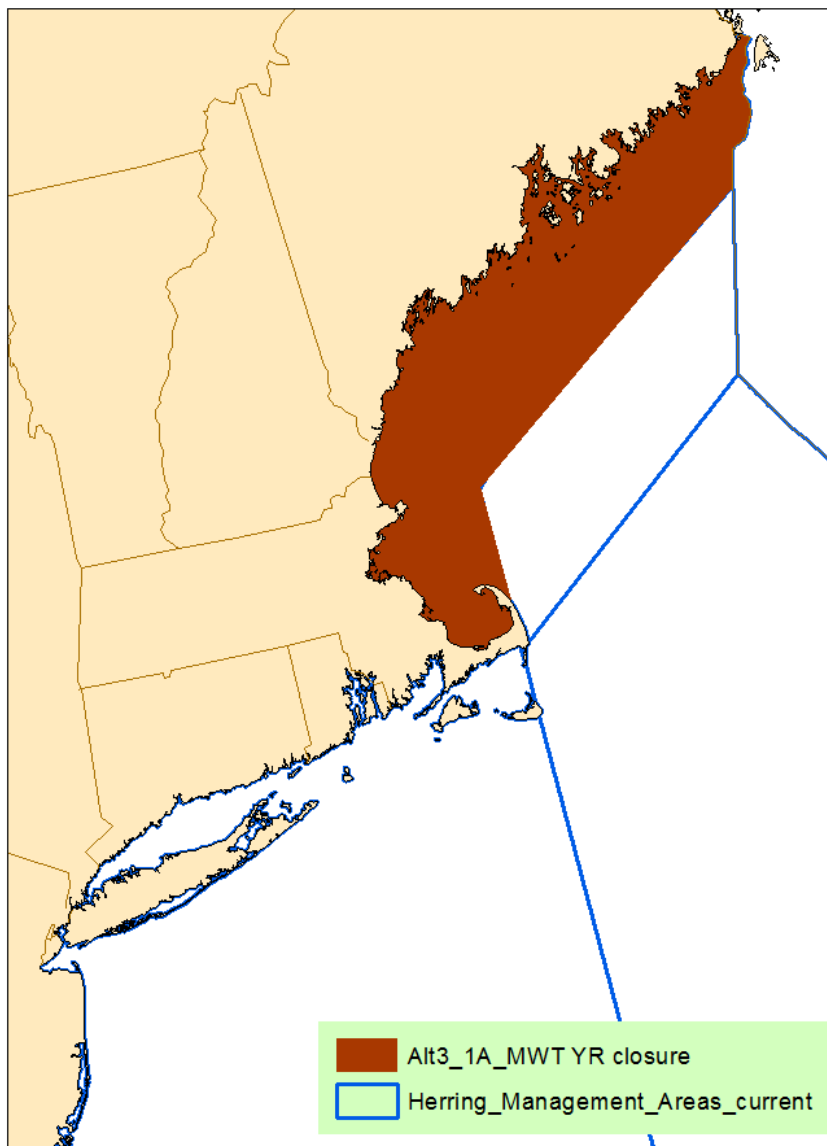
Furthermore, RSA compensation fishing is currently exempt from seasonal closures (January – May for Area 1A and January – April for Area 1B), as well as any closures after a sub-ACL is reached for a herring management area. However, RSA compensation fishing with MWT gear is NOT exempt from the prohibition of MWT gear in Area 1A (from June-September), the No Action alternative in Amendment 8. Currently, a vessel can fish RSA compensation allocation in Area 1A between June through September, but not with MWT gear. The gear prohibition is for all fishing, including RSA compensation fishing.

If this alternative is selected, the Council clarified that RSA compensation fishing would be exempt from these restrictions, regardless of gear type. Specifically, RSA compensation fishing could take place in the area and season adopted by this alternative. RSA compensation fishing trips are authorized under an exempted fishing permit (EFP). While the exemption from the localized depletion measure(s) is an overarching exemption from the restrictions, it does not mean that EFPs will be without restriction. Terms and conditions of the EFP must be consistent with the Magnuson-Stevens Fishery Conservation and Management Act, applicable law, the Herring FMP, and other FMPs. As such. The Regional Administrator must consider whether additional terms and conditions should be required for the compensations fishing EFPs to ensure these consistencies are met, and additional terms and conditions may restrict compensation fishing.

Draft Rationale: The alternative was developed by the Herring Committee as part of a suite of measures, some suggested by scoping comments. To some extent, this measure is expected to address the potential localized depletion and user conflicts that were raised during the scoping process. This alternative expands the current measure in place to address concerns about potential localized depletion by making the midwater trawl gear prohibition in Area 1A year round. Some stakeholders have argued that there are additional months that could use similar protections from concentrated herring removals that would have beneficial impacts on the GOM ecosystem. For example, if whale migrations south do not start until October or later, limiting herring fishing in the GOM longer into early fall could have beneficial impacts on whales and other marine mammals that consume herring (cite references provided during scoping). In addition, commercial tuna fishing takes place in the GOM in months outside of the current MWT prohibition in Area 1A (June – September). Therefore, if reducing herring effort by MWT vessels has positive impacts on tuna (and tuna fishing), expanding the season of the current

prohibition on MWT gear in that area could have beneficial impacts on tuna, as well as positive impacts on tuna fisheries.

Figure 7 – Alternative 3 (Closure of Area 1A year-round) to address localized depletion and user conflicts



2.2.4 Alternative 4: Prohibit midwater trawl gear inside of 12 nautical miles south of Area 1A

If this alternative is adopted, waters within 12 nautical miles south of Herring Management Area 1A would be closed to midwater trawl gear (either throughout Herring Management Areas 1B, 2 and 3 or throughout Herring Management Areas 1B and 3 – depending on the Area sub-option selected AND either year round or between June 1 through September 30 – depending on the sub-option selected). Vessels approved to use other gear types would still be permitted to fish for herring, i.e. purse seine or fixed gears, and small mesh bottom gear in some areas. Vessels that currently use midwater trawl gear would be permitted to convert to other gear types. Figure 8 depicts Alternative 4, 5 and 6.

If this alternative is adopted, it would be in addition to the existing measure in place to address potential localized depletion of herring in Area 1A, the seasonal prohibition of mid-water trawl gear between June 1 – September 30 in Area 1A. That measure was adopted through Amendment 1 to the Herring FMP (effective June 1, 2007), and would remain in place if this alternative is adopted. Furthermore, RSA compensation fishing is currently exempt from seasonal closures (January – May for Area 1A and January – April for Area 1B), as well as any closures after a sub-ACL is reached for a herring management area. However, RSA compensation fishing with MWT gear is NOT exempt from the prohibition of MWT gear in Area 1A (from June-September), the No Action alternative in Amendment 8. Currently, a vessel can fish RSA compensation allocation in Area 1A between June through September, but not with MWT gear. The gear prohibition is for all fishing, including RSA compensation fishing.

If this alternative is selected, the Council clarified that RSA compensation fishing would be exempt from these restrictions, regardless of gear type. Specifically, RSA compensation fishing could take place in the area and season adopted by this alternative. RSA compensation fishing trips are authorized under an exempted fishing permit (EFP). While the exemption from the localized depletion measure(s) is an overarching exemption from the restrictions, it does not mean that EFPs will be without restriction. Terms and conditions of the EFP must be consistent with the Magnuson-Stevens Fishery Conservation and Management Act, applicable law, the Herring FMP, and other FMPs. As such. The Regional Administrator must consider whether additional terms and conditions should be required for the compensations fishing EFPs to ensure these consistencies are met, and additional terms and conditions may restrict compensation fishing.

Draft Rationale: This alternative was developed by the Herring Committee as part of a suite of measures, some suggested by scoping comments. To some extent, this measure is expected to address the potential localized depletion and user conflicts that were raised during the scoping process. This alternative would focus on relatively nearshore areas, within 12 nautical miles along the coast south of Herring Management Area 1A, because there are measures in place already to address concerns of potential localized depletion and user conflicts for Area 1A. The intent of this alternative is to reduce concentrated removals of herring from MWT fishing gear to provide conservation benefits for inshore ecosystems. Herring plays an important role in the ecosystem as forage, and this alternative is designed to address concerns raised about nearshore localized depletion and user conflicts throughout the range of the herring resource.

2.2.4.1 Area options (*choose one*)

2.2.4.1.1 Sub-option A – Herring Management Areas 1B, 2 and 3

This sub-option would include all areas south of Herring Management Area 1A. Because there is a seasonal prohibition on mid-water trawl gear in Area 1A already, this option was developed to focus on coastal waters that do not already have measures in place to reduce the potential of negative impacts on other users that depend on herring for forage.

Draft Rationale: This option would consider measures similar to the one already in place for Area 1A that prohibits the use of mid-water trawl gear in nearshore waters. The intent is to extend that measure throughout the range of the resource, and not just Area 1A.

2.2.4.1.2 Sub-option B - Herring Management areas 1B and 3 only

This sub-option would limit the gear prohibition to Areas 1B and 3; there would not be any gear prohibitions in Herring Management Area 2. Most of the concerns raised during this process have been focused around the backside of the Cape and farther north. Therefore, this sub-option would not include any gear prohibitions for the southernmost Herring Management Area (Area 2).

Draft Rationale: When concerns about localized depletion have been raised they have primarily been focused on the GOM and the back side of Cape Cod. Therefore, this sub-option was developed to consider an option that would exclude any restrictions on MWT fishing in Area 2 since that has not been identified as an area of concern where concentrated herring fishing has caused negative impacts from localized depletion. Area 2 has been identified as an area of concern for river herring bycatch, but that is not a goal or objective for the measures being identified in this action. The potential impacts of all measures on river herring will be evaluated in this action in terms of impacts on non-target species or bycatch, but the alternatives were not designed to specifically reduce impact on river herring.

2.2.4.2 Seasonal options (*choose one*)

2.2.4.2.1 Sub-option A – Year round (12 months)

This sub-option would prohibit the use of mid-water trawl gear within 12 nautical miles year-round.

Draft Rationale: Banning the use of mid-water trawl gear in coastal waters was identified during the scoping process for Amendment 8. Prohibiting that gear was identified as a way to reduce the potential negative impacts on other users that use herring as forage.

2.2.4.2.2 Sub-option B – June 1 – September 30 (4 months)

This sub-option would limit the season of the gear prohibition to June 1 – September 30, instead of being a year-round restriction. If this sub-option is adopted, midwater trawl gear would not be permitted to fish for herring in the proposed area for those four consecutive months. Midwater trawl gear would be permitted to fish for herring in the proposed area during the remaining months (October – May). This sub-option was developed to potentially refine the restriction to the time of year when potential impacts with other user groups may be higher. Specifically, during the summer/early fall when herring fishing in these areas is typically higher, and other

users are more active (i.e. predation by marine mammals and other predators as well as associated fishing and whale watching businesses, etc).

Draft Rationale: The Committee included this sub-option to focus on the months when interactions with other user groups were expected to be highest, summer and early fall. This season is consistent with the current measure in place to address potential concerns of localized depletion in Area 1A. Limiting the seasonal prohibition is expected to minimize economic impacts on herring and lobster fisheries, and reduce unintended consequences of MWT effort shifts that could occur from longer seasonal restrictions.

2.2.5 Alternative 5: Prohibit midwater trawl gear inside of 25 nautical miles in areas south of Herring Management Areas 1A

If this alternative is adopted, waters within 25 nautical miles south of Herring Management Area 1A would be closed to midwater trawl gear (either throughout Herring Management Areas 1B, 2 and 3 or throughout Herring Management Areas 1B and 3 – depending on the Area sub-option selected AND either year round or between June 1 through September 30 – depending on the sub-option selected). Vessels approved to use other gear types would still be permitted to fish for herring, i.e. purse seine or fixed gears, and small mesh bottom gear in some areas. Vessels that currently use midwater trawl gear would be permitted to convert to other gear types. Figure 8 depicts Alternative 4, 5 and 6.

If this alternative is adopted, it would be in addition to the existing measure in place to address potential localized depletion of herring in Area 1A, the seasonal prohibition of mid-water trawl gear between June 1 – September 30 in Area 1A. That measure was adopted through Amendment 1 to the Herring FMP (effective June 1, 2007), and would remain in place if this alternative is adopted. Furthermore, RSA compensation fishing is currently exempt from seasonal closures (January – May for Area 1A and January – April for Area 1B), as well as any closures after a sub-ACL is reached for a herring management area. However, RSA compensation fishing with MWT gear is NOT exempt from the prohibition of MWT gear in Area 1A (from June-September), the No Action alternative in Amendment 8. Currently, a vessel can fish RSA compensation allocation in Area 1A between June through September, but not with MWT gear. The gear prohibition is for all fishing, including RSA compensation fishing.

If this alternative is selected, the Council clarified that RSA compensation fishing would be exempt from these restrictions, regardless of gear type. Specifically, RSA compensation fishing could take place in the area and season adopted by this alternative. RSA compensation fishing trips are authorized under an exempted fishing permit (EFP). While the exemption from the localized depletion measure(s) is an overarching exemption from the restrictions, it does not mean that EFPs will be without restriction. Terms and conditions of the EFP must be consistent with the Magnuson-Stevens Fishery Conservation and Management Act, applicable law, the Herring FMP, and other FMPs. As such. The Regional Administrator must consider whether additional terms and conditions should be required for the compensations fishing EFPs to ensure these consistencies are met, and additional terms and conditions may restrict compensation fishing.

Draft Rationale: This alternative was developed by the Herring Committee as part of a suite of measures, some suggested by scoping comments. The Committee originally considered an alternative at 35 miles based on input from scoping comments, but at the full Council meeting

the 35 mile alternative was replaced with two alternatives instead, this alternative at 25 miles, and another alternative that extends to 50 miles. To some extent, this measure is expected to address the potential localized depletion and user conflicts that were raised during the scoping process. This alternative focuses on relatively nearshore areas, but extends farther than the 12 nautical mile alternative, primarily to encompass more area where herring MWT fishing overlaps with other users of herring, both predators foraging on herring, and predator fisheries (i.e. groundfish and tuna).

This alternative does not include Area 1A, because there are measures in place already to address concerns of potential localized depletion and user conflicts for that management area. The intent of this alternative is to reduce concentrated removals of herring from MWT fishing gear to provide conservation benefits for inshore ecosystems. Herring plays an important role in the ecosystem as forage, and this alternative is designed to address concerns raised about nearshore localized depletion and user conflicts throughout the range of the herring resource.

2.2.5.1 Area options (*choose one*)

2.2.5.1.1 Sub-option A – Herring Management Areas 1B, 2 and 3

This sub-option would include all areas south of Herring Management Area 1A. Because there is a seasonal prohibition on mid-water trawl gear in Area 1A already, this option was developed to focus on coastal waters that do not already have measures in place to reduce the potential of negative impacts on other users that depend on herring for forage.

Draft Rationale: This option would consider measures similar to the one already in place for Area 1A that prohibits the use of mid-water trawl gear in nearshore waters. The intent is to extend that measure throughout the range of the resource, and not just Area 1A.

2.2.5.1.2 Sub-option B - Herring Management areas 1B and 3 only

This sub-option would limit the gear prohibition to Areas 1B and 3; there would not be any gear prohibitions in Herring Management Area 2. Most of the concerns raised during this process have been focused around the backside of the Cape and farther north. Therefore, this sub-option would not include any gear prohibitions for the southernmost Herring Management Area (Area 2).

Draft Rationale: When concerns about localized depletion have been raised they have primarily been focused on the GOM and the back side of Cape Cod. Therefore, this sub-option was developed to consider an option that would exclude any restrictions on MWT fishing in Area 2 since that has not been identified as an area of concern where concentrated herring fishing has caused negative impacts from localized depletion. Area 2 has been identified as an area of concern for river herring bycatch, but that is not a goal or objective for the measures being identified in this action. The potential impacts of all measures on river herring will be evaluated in this action in terms of impacts on non-target species or bycatch, but the alternatives were not designed to specifically reduce impact on river herring.

2.2.5.2 Seasonal options (*choose one*)

2.2.5.2.1 Sub-option A – Year round (12 months)

This sub-option would prohibit the use of mid-water trawl gear within 25 nautical miles year-round.

Draft Rationale: Banning the use of mid-water trawl gear in coastal waters was identified during the scoping process for Amendment 8. Prohibiting that gear was identified as a way to reduce the potential negative impacts on other users that use herring as forage.

2.2.5.2.2 Sub-option B – June 1 – September 30 (4 months)

This sub-option would limit the season of the gear prohibition to June 1 – September 30, instead of being a year-round restriction. If this sub-option is adopted, midwater trawl gear would not be permitted to fish for herring in the proposed area for those four consecutive months. Midwater trawl gear would be permitted to fish for herring in the proposed area during the remaining months (October – May). This sub-option was developed to potentially refine the restriction to the time of year when potential impacts with other user groups may be higher. Specifically, during the summer/early fall when herring fishing in these areas is typically higher, and other users are more active (i.e. predation by marine mammals and other predators as well as associated fishing and whale watching businesses, etc).

Draft Rationale: The Committee included this sub-option to focus on the months when interactions with other user groups were expected to be highest, summer and early fall. This season is consistent with the current measure in place to address potential concerns of localized depletion in Area 1A. Limiting the seasonal prohibition is expected to minimize economic impacts on herring and lobster fisheries, and reduce unintended consequences of MWT effort shifts that could occur from longer seasonal restrictions.

2.2.6 Alternative 6: Prohibit midwater trawl gear inside of 50 nautical miles in waters south of Herring Management Areas 1A

If this alternative is adopted, waters within 50 nautical miles south of Herring Management Area 1A would be closed to midwater trawl gear (either throughout Herring Management Areas 1B, 2 and 3 or throughout Herring Management Areas 1B and 3 – depending on the Area sub-option selected AND either year round or between June 1 through September 30 – depending on the sub-option selected). Vessels approved to use other gear types would still be permitted to fish for herring, i.e. purse seine or fixed gears, and small mesh bottom gear in some areas. Vessels that currently use midwater trawl gear would be permitted to convert to other gear types. Figure 8 depicts Alternative 4, 5 and 6.

If this alternative is adopted, it would be in addition to the existing measure in place to address potential localized depletion of herring in Area 1A, the seasonal prohibition of mid-water trawl gear between June 1 – September 30 in Area 1A. That measure was adopted through Amendment 1 to the Herring FMP (effective June 1, 2007), and would remain in place if this alternative is adopted. Furthermore, RSA compensation fishing is currently exempt from seasonal closures (January – May for Area 1A and January – April for Area 1B), as well as any closures after a sub-ACL is reached for a herring management area. However, RSA compensation fishing with MWT gear is NOT exempt from the prohibition of MWT gear in Area 1A (from June-September), the No Action alternative in Amendment 8. Currently, a vessel

can fish RSA compensation allocation in Area 1A between June through September, but not with MWT gear. The gear prohibition is for all fishing, including RSA compensation fishing.

If this alternative is selected, the Council clarified that RSA compensation fishing would be exempt from these restrictions, regardless of gear type. Specifically, RSA compensation fishing could take place in the area and season adopted by this alternative. RSA compensation fishing trips are authorized under an exempted fishing permit (EFP). While the exemption from the localized depletion measure(s) is an overarching exemption from the restrictions, it does not mean that EFPs will be without restriction. Terms and conditions of the EFP must be consistent with the Magnuson-Stevens Fishery Conservation and Management Act, applicable law, the Herring FMP, and other FMPs. As such, The Regional Administrator must consider whether additional terms and conditions should be required for the compensations fishing EFPs to ensure these consistencies are met, and additional terms and conditions may restrict compensation fishing.

Draft Rationale: This alternative was added by the Council to the original motion from the Herring Committee as part of a suite of measures, some of which were suggested by scoping comments. The Committee originally considered an alternative at 35 miles based on input from scoping, but at the full Council meeting the 35 mile alternative was replaced with two alternatives instead, this alternative at 50 miles, and another alternative at 25 miles. To some extent, this measure is expected to address the potential localized depletion and user conflicts that were raised during the scoping process. A 50 mile buffer was recommended for consideration from a variety of stakeholders, and the Council decided to include this alternative to be responsive to that input and to consider a wide range of alternatives.

This alternative does not include Area 1A, because there are measures in place already to address concerns of potential localized depletion and user conflicts for that management area. The intent of this alternative is to reduce concentrated removals of herring from MWT fishing gear to provide conservation benefits for inshore ecosystems. Herring plays an important role in the ecosystem as forage, and this alternative is designed to address concerns raised about nearshore localized depletion and user conflicts throughout the range of the herring resource.

2.2.6.1 Area options (*choose one*)

2.2.6.1.1 Sub-option A – Herring Management Areas 1B, 2 and 3

This sub-option would include all areas south of Herring Management Area 1A. Because there is a seasonal prohibition on mid-water trawl gear in Area 1A already, this option was developed to focus on coastal waters that do not already have measures in place to reduce the potential of negative impacts on other users that depend on herring for forage.

Draft Rationale: This option would consider measures similar to the one already in place for Area 1A that prohibits the use of mid-water trawl gear in nearshore waters. The intent is to extend that measure throughout the range of the resource, and not just Area 1A.

2.2.6.1.2 Sub-option B - Herring Management areas 1B and 3 only

This sub-option would limit the gear prohibition to Areas 1B and 3; there would not be any gear prohibitions in Herring Management Area 2. Most of the concerns raised during this process have been focused around the backside of the Cape and farther north. Therefore, this sub-option

would not include any gear prohibitions for the southernmost Herring Management Area (Area 2).

Draft Rationale: When concerns about localized depletion have been raised they have primarily been focused on the GOM and the back side of Cape Cod. Therefore, this sub-option was developed to consider an option that would exclude any restrictions on MWT fishing in Area 2 since that has not been identified as an area of concern where concentrated herring fishing has caused negative impacts from localized depletion. Area 2 has been identified as an area of concern for river herring bycatch, but that is not a goal or objective for the measures being identified in this action. The potential impacts of all measures on river herring will be evaluated in this action in terms of impacts on non-target species or bycatch, but the alternatives were not designed to specifically reduce impact on river herring.

2.2.6.2 Seasonal options (*choose one*)

2.2.6.2.1 Sub-option A – Year round (12 months)

This sub-option would prohibit the use of mid-water trawl gear within 50 nautical miles year-round.

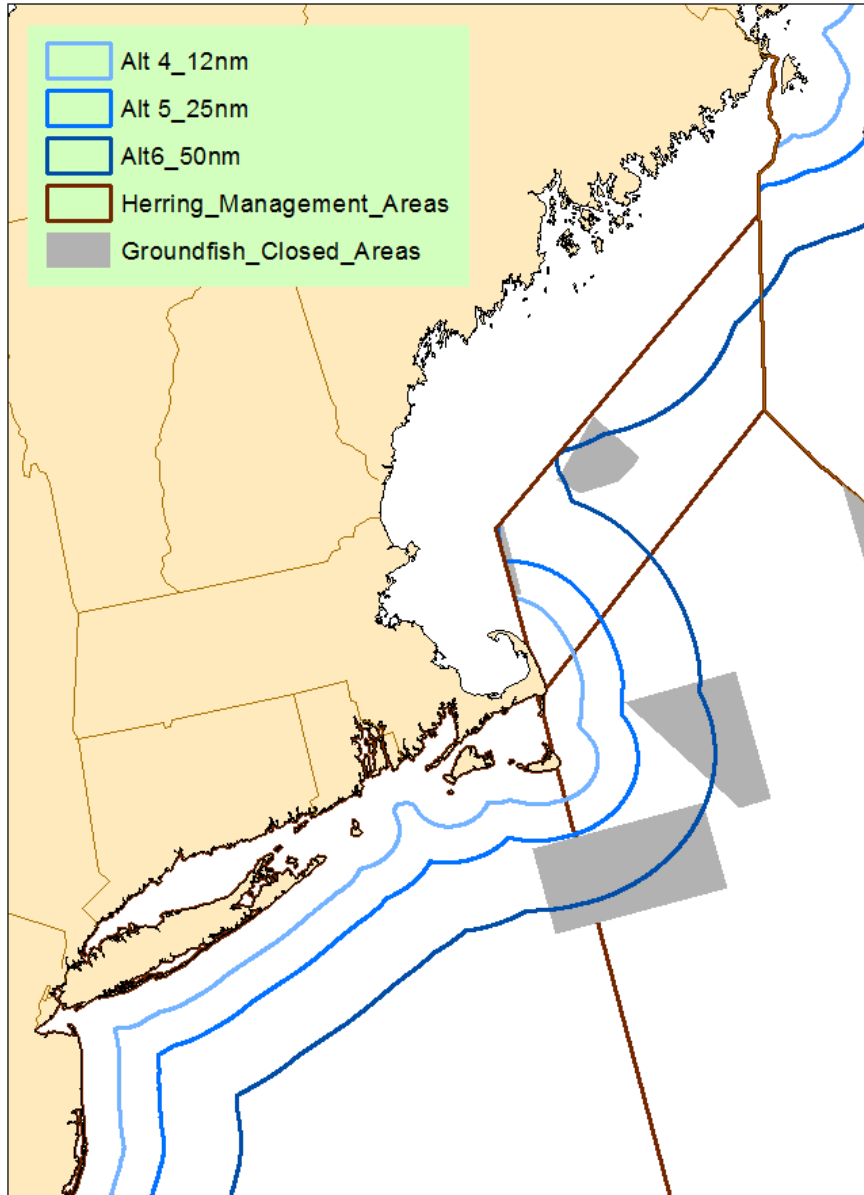
Draft Rationale: Banning the use of mid-water trawl gear in coastal waters was identified during the scoping process for Amendment 8. Prohibiting that gear was identified as a way to reduce the potential negative impacts on other users that use herring as forage.

2.2.6.2.2 Sub-option B – June 1 – September 30 (4 months)

This sub-option would limit the season of the gear prohibition to June 1 – September 30, instead of being a year-round restriction. If this sub-option is adopted, midwater trawl gear would not be permitted to fish for herring in the proposed area for those four consecutive months. Midwater trawl gear would be permitted to fish for herring in the proposed area during the remaining months (October – May). This sub-option was developed to potentially refine the restriction to the time of year when potential impacts with other user groups may be higher. Specifically, during the summer/early fall when herring fishing in these areas is typically higher, and other users are more active (i.e. predation by marine mammals and other predators as well as associated fishing and whale watching businesses, etc).

Draft Rationale: The Committee included this sub-option to focus on the months when interactions with other user groups were expected to be highest, summer and early fall. This season is consistent with the current measure in place to address potential concerns of localized depletion in Area 1A. Limiting the seasonal prohibition is expected to minimize economic impacts on herring and lobster fisheries, and reduce unintended consequences of MWT effort shifts that could occur from longer seasonal restrictions.

Figure 8 – Alternatives 4, 5, and 6 (12, 25, and 50 nautical mile prohibition on MWT gear south of Area 1A) to address localized depletion and user conflicts (Effective throughout the extent of Herring Management Areas 1B, 2 and 3, US EEZ waters south of Area 1A to the NC/SC border)



2.2.7 Alternative 7: Prohibit midwater trawl gear within thirty minute squares off Cape Cod (99, 100, 114, 115 and 123)

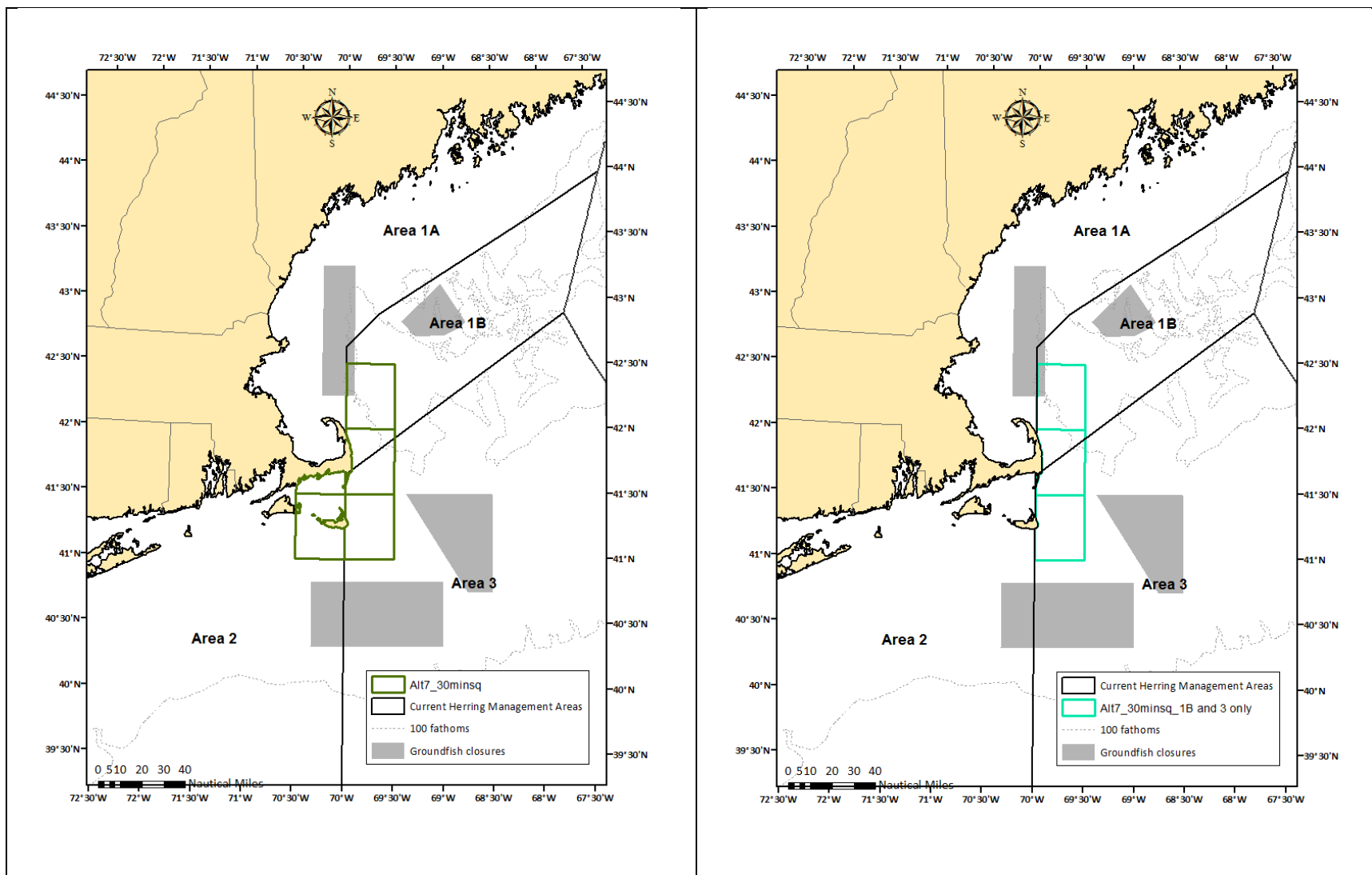
If this alternative is adopted, vessels with midwater trawl gear would be prohibited to fish within several thirty minute squares (Areas 99, 100, 114, 115, and 123) with several area and seasonal options included (Figure 9). Vessels approved to use other gear types would still be permitted to fish for herring, i.e. purse seine or fixed gears, and small mesh bottom gear in some areas. Vessels that currently use midwater trawl gear would be permitted to convert to other gear types.

If this alternative is adopted, it would be in addition to the existing measure in place to address potential localized depletion of herring in Area 1A, the seasonal prohibition of mid-water trawl gear between June 1 – September 30 in Area 1A. That measure was adopted through Amendment 1 to the Herring FMP (effective June 1, 2007), and would remain in place if this alternative is adopted. Furthermore, RSA compensation fishing is currently exempt from seasonal closures (January – May for Area 1A and January – April for Area 1B), as well as any closures after a sub-ACL is reached for a herring management area. However, RSA compensation fishing with MWT gear is NOT exempt from the prohibition of MWT gear in Area 1A (from June-September), the No Action alternative in Amendment 8. Currently, a vessel can fish RSA compensation allocation in Area 1A between June through September, but not with MWT gear. The gear prohibition is for all fishing, including RSA compensation fishing.

If this alternative is selected, the Council clarified that RSA compensation fishing would be exempt from these restrictions, regardless of gear type. Specifically, RSA compensation fishing could take place in the area and season adopted by this alternative. RSA compensation fishing trips are authorized under an exempted fishing permit (EFP). While the exemption from the localized depletion measure(s) is an overarching exemption from the restrictions, it does not mean that EFPs will be without restriction. Terms and conditions of the EFP must be consistent with the Magnuson-Stevens Fishery Conservation and Management Act, applicable law, the Herring FMP, and other FMPs. As such. The Regional Administrator must consider whether additional terms and conditions should be required for the compensations fishing EFPs to ensure these consistencies are met, and additional terms and conditions may restrict compensation fishing.

Draft Rationale: This alternative was developed by the Herring Committee as part of a suite of measures, some suggested by scoping comments. This alternative is focused on waters adjacent to the back side of the Cape, and area that was cited during scoping that has experienced negative impacts from localized depletion and user conflicts. The boundaries of this alternative use thirty minute squares instead of distances from the coast, so the boundaries are more regular in shape. The core area in the center, Area 114, is the square that has the highest amount of herring fishing activity. The eastern most boundary of this alternative is about 20 nautical miles from the coastline. Additional thirty minute squares were added around Area 114 to be precautionary and add additional conservation benefits around the core area of herring fishing off the back side of Cape Cod. The intent of this alternative is to reduce concentrated removals of herring from MWT fishing gear to provide conservation benefits for inshore ecosystems. Herring plays an important role in the ecosystem as forage, and this alternative is designed to address concerns raised about potential nearshore localized depletion and user conflicts throughout the range of the herring resource.

Figure 9 – Alternative 7 Area sub-option A (LEFT) (midwater trawl gear restriction in thirty minute squares 99, 100, 114, 115, and 123) and Alternative 7 Area Sub-option B (RIGHT) (midwater trawl gear restriction in thirty minute squares 99, 114, and 123 only)



2.2.7.1 Area options (*choose one*)

2.2.7.1.1 Sub-option A – all five thirty minute squares within Herring Management Areas 1B, 2 and 3

This sub-option would include all five thirty minute squares identified within Herring Management Area 1B, 2 and 3 (Areas 99, 100, 114, 115, and 123) (Figure 9).

Draft Rationale: This option would consider measures similar to the one already in place for Area 1A that prohibits the use of mid-water trawl gear in nearshore waters. The intent is to consider a similar measure for the back side of Cape Cod, an area that was identified during scoping that experiences negative impacts of localized depletion of herring on other users that depend on herring as forage.

2.2.7.1.2 Sub-option B – subset of thirty minute squares within Herring Management areas 1B and 3 only (Areas 99, 114, and 123 only)

This sub-option would limit the gear prohibition to the thirty minute squares within Areas 1B and 3 only (Areas 99, 114, and 123 only), it would exclude Areas 115 and 100 that are within Area 2. Most of the concerns raised during this process have been focused around the backside of the Cape and farther north. Therefore, this sub-option would not include any gear prohibitions for the southernmost Herring Management Area (Area 2) (Figure 9).

Draft Rationale: When concerns about localized depletion have been raised they have primarily been focused on the GOM and the back side of Cape Cod. Therefore, this sub-option was developed to consider an option that would exclude any restrictions on MWT fishing in Area 2 since that has not been identified as an area of concern where concentrated herring fishing has caused negative impacts from localized depletion. Area 2 has been identified as an area of concern for river herring bycatch, but that is not a goal or objective for the measures being identified in this action. The potential impacts of all measures on river herring will be evaluated in this action in terms of impacts on non-target species or bycatch, but the alternatives were not designed to specifically reduce impact on river herring.

2.2.7.2 Seasonal options (*choose one*)

2.2.7.2.1 Sub-option A – Year round (12 months)

This sub-option would prohibit the use of mid-water trawl gear in the specified thirty-minute squares year-round.

Draft Rationale: Banning the use of mid-water trawl gear in coastal waters was identified during the scoping process for Amendment 8. Prohibiting that gear was identified as a way to reduce the potential negative impacts on other users that use herring as forage.

2.2.7.2.2 Sub-option B – June 1 – September 30 (4 months)

This sub-option would limit the season of the gear prohibition to June 1 – September 30, instead of being a year-round restriction. If this sub-option is adopted, midwater trawl gear would not be permitted to fish for herring in the proposed area for those four consecutive months. Midwater trawl gear would be permitted to fish for herring in the proposed area during the remaining months (October – May). This sub-option was developed to potentially refine the restriction to

the time of year when potential impacts with other user groups may be higher. Specifically, during the summer/early fall when herring fishing in these areas is typically higher, and other users are more active (i.e. predation by marine mammals and other predators as well as associated fishing and whale watching businesses, etc).

Draft Rationale: The Committee included this sub-option to focus on the months when interactions with other user groups were expected to be highest, summer and early fall. This season is consistent with the current measure in place to address potential concerns of localized depletion in Area 1A. Limiting the seasonal prohibition is expected to minimize economic impacts on herring and lobster fisheries, and reduce unintended consequences of MWT effort shifts that could occur from longer seasonal restrictions.

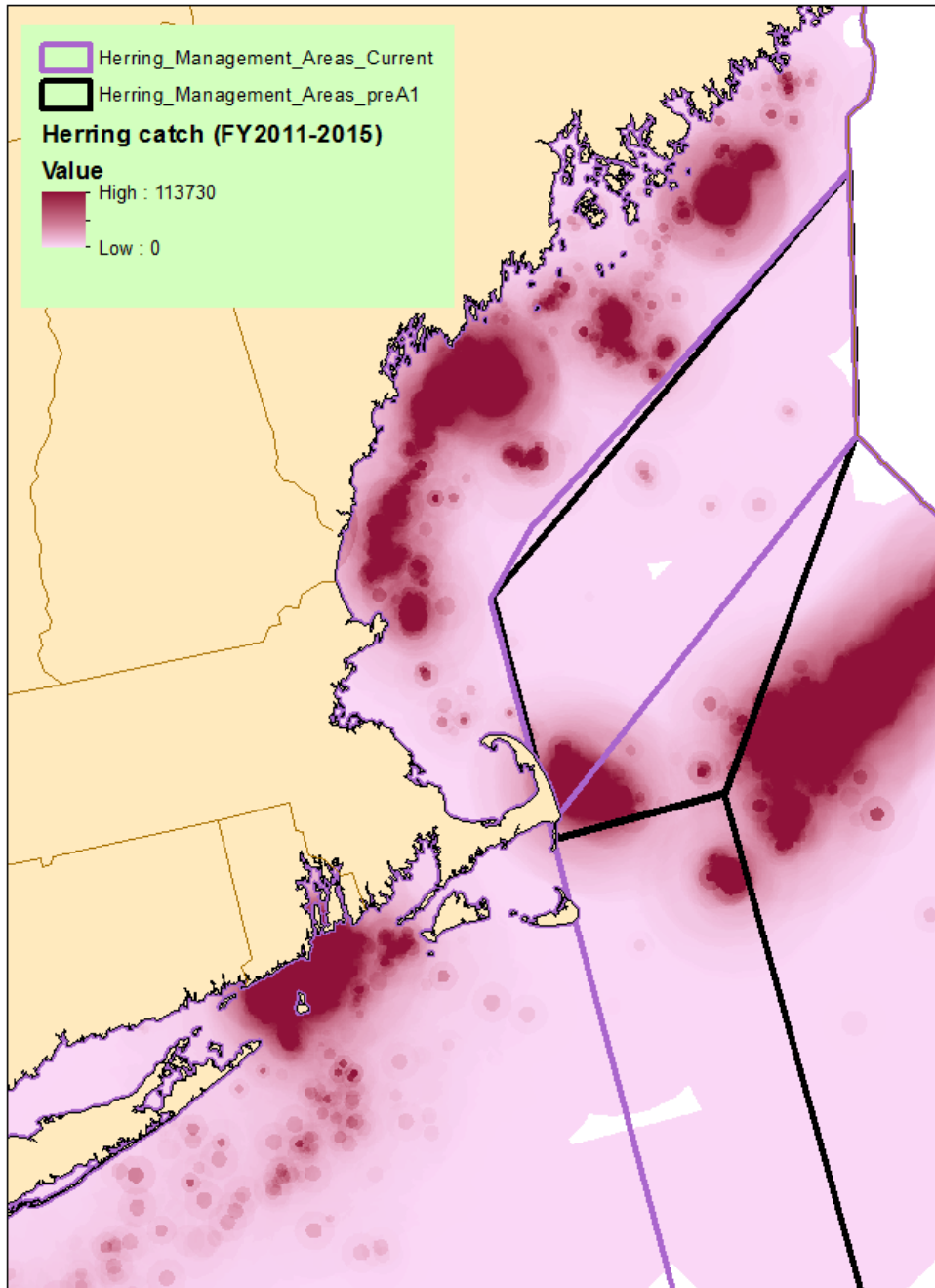
2.2.8 Alternative 8: Revert the boundary between Herring Management Areas 1B and 3 back to original boundary

This alternative would revert the Herring Management Area boundaries between Area 1B and 3 back to what they were under the original Herring FMP, but maintain the current boundary between Areas 2 and 3. The boundaries were changed in Amendment 1 (effective June 1, 2007) based on recommendations from the 2003 TRAC meeting to better reflect spawning distributions and movement of spawning concentrations. For this action, the boundaries would be changed for a different reason. By moving the boundary between 1B and 3 farther offshore the measure is expected to prevent Area 3 catch from being caught relatively close to shore, along the backside of the Cape. The intended result of this measure is to consider an alternative that would still reduce the total herring removals along the backside of the Cape, but not using an area closure or gear restriction to do so. If herring removals from the area of concern are managed under the Area 1B TAC only, and not both the Area 1B and Area 3 TAC, total removals may be lower, reducing potential impacts of localized depletion and user conflicts.

If this alternative is adopted, it would be in addition to the existing measure in place to address potential localized depletion of herring in Area 1A, the seasonal prohibition of mid-water trawl gear between June 1 – September 30 in Area 1A. That measure was adopted through Amendment 1 to the Herring FMP (effective June 1, 2007), and would remain in place if this alternative is adopted.

Draft Rationale: The intent of this alternative is to support the goal of Amendment 8 to address localized depletion by modifying the boundaries to maintain adequate forage and afford protection to marine ecosystems. It was argued that since the management boundaries have changed, the fishing communities on Cape Cod, Barnstable County in particular, have faced a disproportionate increase in herring removals from the coastal fishing areas near those communities. Reverting the boundaries back to what they were before Amendment 1 changed them would prevent Area 3 catch from being harvested closer to shore. This alternative does not use area closures to address this concern. Instead, if the boundary reverts back to where it was, Area 3 effort would need to take place farther offshore, potentially addressing concerns about localized depletion and user conflicts in nearshore areas.

Figure 10 – Summary of herring landings from FY2011-2015 compared to current (purple) versus original FMP boundaries (black)



2.2.9 Alternative 9: Remove seasonal closure of Area 1B

This alternative would remove the seasonal closure in Area 1B that currently exists from January 1 – April 30. Framework 2 to the Herring FMP allowed sub-ACLs to be split seasonally to provide more flexibility by reducing derby fishing and distributing catch throughout the year. That action also included fishery specifications for FY2013-2015, which allocated 0% of the ACL for January 1 – April 30. That seasonal closure was primarily implemented to boost herring landings when the bait market needed it most, right before the summer lobster fishery. Before the seasonal closure was used, herring could be caught from Area 1B starting in January. Another reason cited in the plan is to reduce impacts on river herring bycatch, which is generally higher in the winter months in this area.

If this alternative is adopted, it would be in addition to the existing measure in place to address potential localized depletion of herring in Area 1A, the seasonal prohibition of mid-water trawl gear between June 1 – September 30 in Area 1A. That measure was adopted through Amendment 1 to the Herring FMP (effective June 1, 2007), and would remain in place if this alternative is adopted.

Draft Rationale: This action would remove the sub-ACL allocation of 0% for those months, essentially removing the seasonal closure that currently exists from January 1 through April 31 as a measure to reduce potential localized depletion and user conflicts. In recent years Area 1B has opened May 1 and in many cases the TAC is caught relatively quickly in a matter of weeks, concentrating effort in the late spring when other users are in the area. If the 0% ACL restriction for January 1 through April 30 is removed, herring fishing in that area may spread out and shift earlier when potential concerns about localized depletion and user conflicts may be less.

2.3 CONSIDERED AND REJECTED ALTERNATIVES

During development of this action the Council considered a handful of alternatives that were rejected for a variety of reasons. This section briefly describes the alternatives that were discussed by the full Council and the primary rationale for not including them in the final range of alternatives for full consideration in this document.

2.3.1 ABC control rule alternatives

Many ideas for a control rule were discussed during development of this action from scoping comments, input from the stakeholder workshops, as well as discussions at both the Herring Advisory Panel and Herring Committee meetings. If a proposal passed by motion or consensus at the Herring Committee it was forwarded to the full Council. Most of the recommendations for potential ABC control rule alternatives from the Herring Committee were included by the Council for full consideration in this action. However, a handful were not and those are briefly described in this section.

2.3.1.1 Constant catch control rule

A ‘constant catch’ control rule harvests the same amount of fish regardless of abundance. Consequently, as abundance declines, the fishing mortality rate (i.e., catch divided by abundance) increases, because the fishery is removing a larger proportion of the stock. This control rule type was identified as the first stakeholder workshop as a potential alternative to

explore. Analysts included a constant catch control rule in the initial analyses completed during the MSE. Those results were presented at the second stakeholder workshop and the overwhelming majority of input from participants in attendance was to remove further consideration of constant catch alternatives.

Draft Rationale for Rejection: The Council rejected this alternative based on input from the second stakeholder workshop, as well as the Herring Advisory Panel and Herring Committee. While a constant catch strategy can provide stability in allowable catch, overall the performance of this control rule compared to others examined was inferior. For example, for a constant catch strategy to provide stable catches for the longer term, it must sacrifice yield, or have an ABC with a lower ratio of yield to MSY. Figure 11 shows that the two constant catch alternatives examined, 'CC' and 'CCC', had relatively low variation in yield, less than 20% for all of the runs, but that came at a cost of achieving higher yields, the ratio of yield to MSY was never greater than 80%. When stakeholders were presented with these tradeoffs, the potential benefits of stable catches did not seem to outweigh the costs of lower yields.

Similarly, the performance of predator metrics were generally inferior for constant catch strategies compared to others evaluated. There were some constant catch strategies that performed well for predators, but only with a relatively large reduction in yield.

Figure 12 shows the frequency with which tuna weight was greater than average for the operating model that assumes high natural mortality and fast growth of herring. When herring are assumed to have high recruitment and growth, the median tuna weight is above average (>1.0) for all of runs for most of the control rules examined. However, for the constant catch control rule, there are some runs that have poor tuna weights (<1.0). The same is true for the tern model results. Figure 13 shows that the frequency with which tern production was ≥ 1.0 (i.e., terns able to maintain replacement) was generally about 85% or higher for all of the biomass based control rule runs, but the constant catch alternative had some runs that produced lower tern production and lower herring biomass.

In summary, the constant catch control rule alternative had poor performance for several of the metrics considered compared to other control rule alternatives. The Council decided not to include constant catch control rule alternatives in Amendment 8 at the January 2017 Council meeting.

Figure 11 – MSE tradeoff plot for median yield relative to MSY versus interannual variation in yield

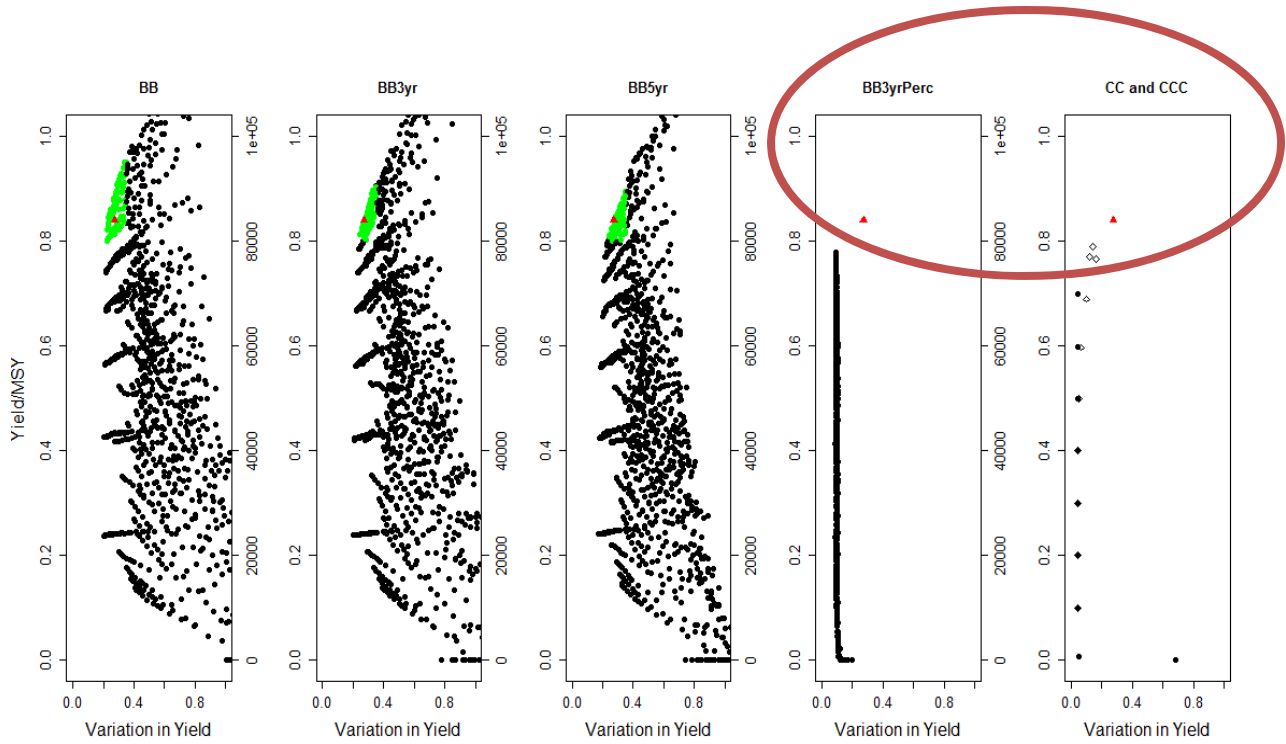


Figure 12 – MSE tradeoff plot for median frequency with which tuna weight was greater than average (Prob Wt>Avg) versus SSB relative to unfished SSB

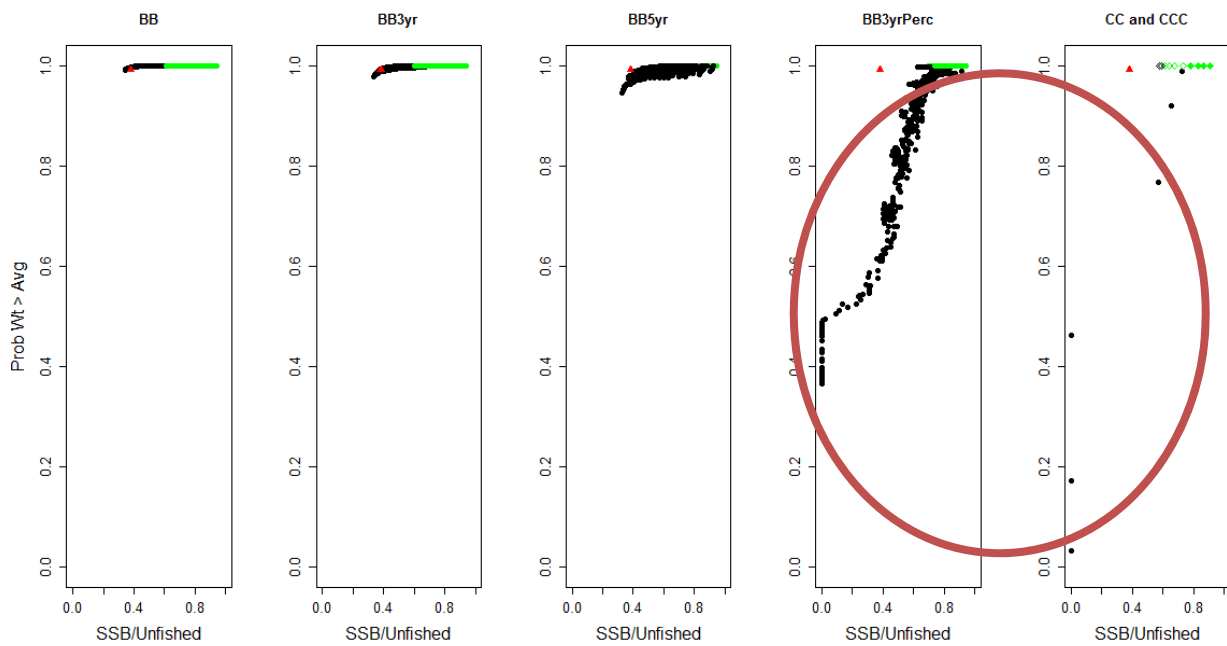
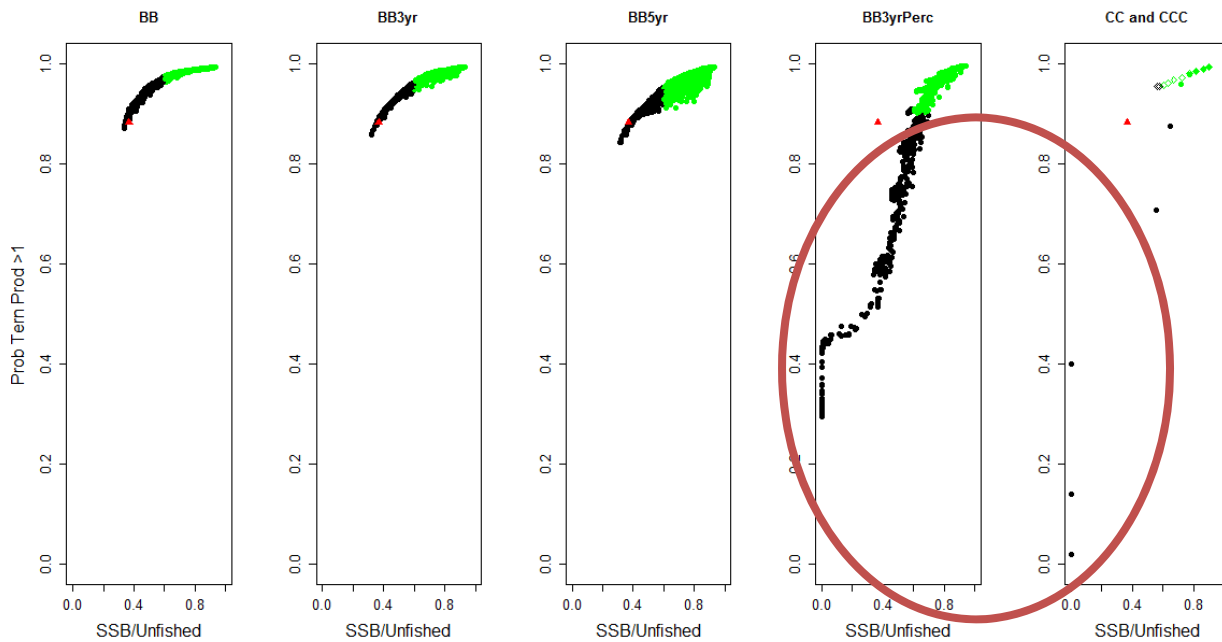


Figure 13 – MSE tradeoff plot for median frequency with which tern production was greater than average (Prob Tern Product>1) versus SSB relative to unfished SSB



2.3.1.2 Constant catch with 15% restriction on annual yield change (conditional constant catch or CCC)

A ‘constant catch’ control rule harvests the same amount of fish regardless of abundance. Analysts developed this ‘conditional constant catch’ alternative based on input that some stakeholders that desire stable catches that would not change too drastically from year to year. This alternative is not a strict constant catch control rule that would maintain the same ABC every year, instead it would allow some variation from year to year, but not more than 15%. Therefore, this alternative could be more responsive to changes in herring abundance compared to a strict constant catch control rule, but there would be limits on how much variation could occur between years. Analysts included a conditional constant catch control rule in the initial analyses completed during the MSE. Those results were presented at the second stakeholder workshop and the overwhelming majority of input from participants in attendance was to remove further consideration of both constant catch alternatives.

Draft Rationale for Rejection: The Council rejected this alternative based on input from the second stakeholder workshop, as well as the Herring Advisory Panel and Herring Committee. While a constant catch strategy can provide stability in allowable catch, overall the performance of this control rule compared to others examined was inferior. For example, for a constant catch strategy to provide stable catches for the longer term, it must sacrifice yield, or have an ABC with a lower ratio of yield to MSY. Figure 11 shows that the two constant catch alternatives examined, ‘CC’ and ‘CCC’, had relatively low variation in yield, less than 20% for all of the

runs, but that came at a cost of achieving higher yields, the ratio of yield to MSY was never greater than 80%. When stakeholders were presented with these tradeoffs, the potential benefits of stable catches did not seem to outweigh the costs of lower yields.

Similarly, the performance of predator metrics were inferior for constant catch strategies compared to others evaluated.

Figure 12 shows the frequency with which tuna weight was greater than average for the operating model that assumes high natural mortality and fast growth of herring. When herring are assumed to have high recruitment and growth, the median tuna weight is above average (>1.0) for all of runs for most of the control rules examined. However, for the conditional constant catch control rule, there were a few runs that had poor tuna weights (<1.0). The same is true for the term model results. Figure 13 shows that the frequency with which term production was ≥ 1.0 (i.e., terms able to maintain replacement) was generally about 85% or higher for all of the biomass based control rule runs, but the conditional constant catch alternative had some runs that produced lower term production and lower herring biomass.

In summary, the conditional constant catch control rule alternative had poor performance for several of the metrics considered compared to other control rule alternatives. The Council decided not to include either the constant catch or the conditional constant control rule alternatives in Amendment 8 at the January 2017 Council meeting.

2.3.1.3 Control rule timeframe of one year

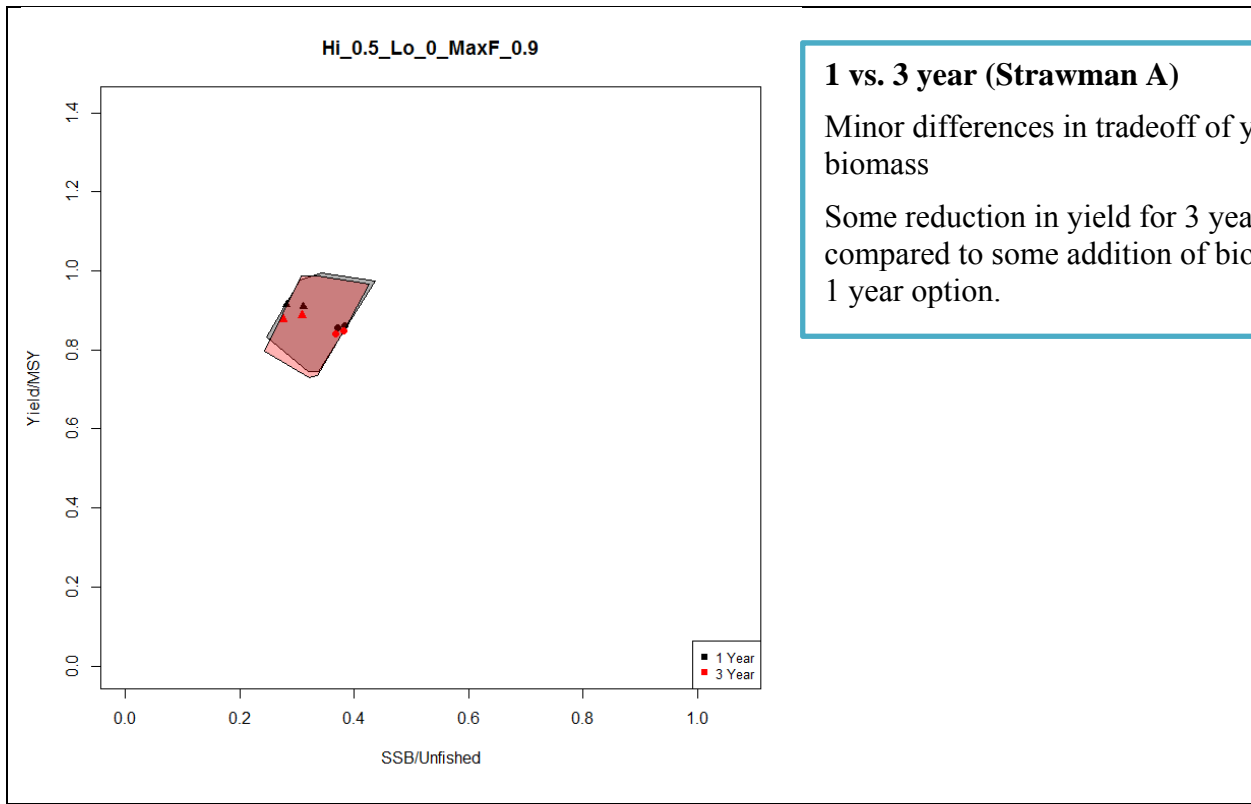
During the stakeholder workshops it was discussed that setting ABC annually would enable use of the best available science, if there was time and resources available to update the assessment and set regulations to set ABC every year, as is currently done in the Multispecies and Scallop FMPs. Analysts explored alternatives that would set ABC annually, every three years, and every five years. Those results were presented at the second stakeholder workshop and the differences in performance between annual and three year specifications were not substantially different.

Draft Rationale for Rejection: An annual biomass based control rule would set ABC one year at a time, based on an updated assessment of the herring stock. This approach requires more resources than are currently available to the herring assessment and management process. Each year herring biomass would be estimated based on updated fishery and available data. Based on the updated estimates, the Council would develop annual specifications. The PDT recommended the Council reject this alternative at this time because it is not feasible given current resources. A modified alternative was recommended by the PDT instead, a three year biomass based approach that uses an annual application based on the most recent herring assessment and short-term projections. The Council agreed to reject inclusion of an annual ABC control rule alternative, and instead included a timeframe alternative that would set ABC for three years based on an annual application of short-term projections.

The Council reviewed the initial analysis of annual ABC versus setting ABC every three years and the performance was not very different to justify the additional resources required. The performance of several examples from the MSE has shown that most control rules perform similarly when using an annual biomass based control rule or a three year control rule. Generally, the performance for most metrics slightly degrades when switching from an annual to a three application, with the slight costs of using a three year application coming to the benefit of short-term fishery stability. Given the robust nature of the control rules to annual or three year

applications, the Council could choose the general control rule shape (i.e., a set of biomass based control rule parameters) in Amendment 8, but then choose separately whether to apply the control rule annually or in three year blocks during each specifications cycle. The long-term performance of switching between annual or three year application would likely fall within the combined range of uncertainty for the annual and three year block performance for the given control rule in the MSE. For example, the minor differences are displayed in Figure 14 for Strawman A and Strawman B.

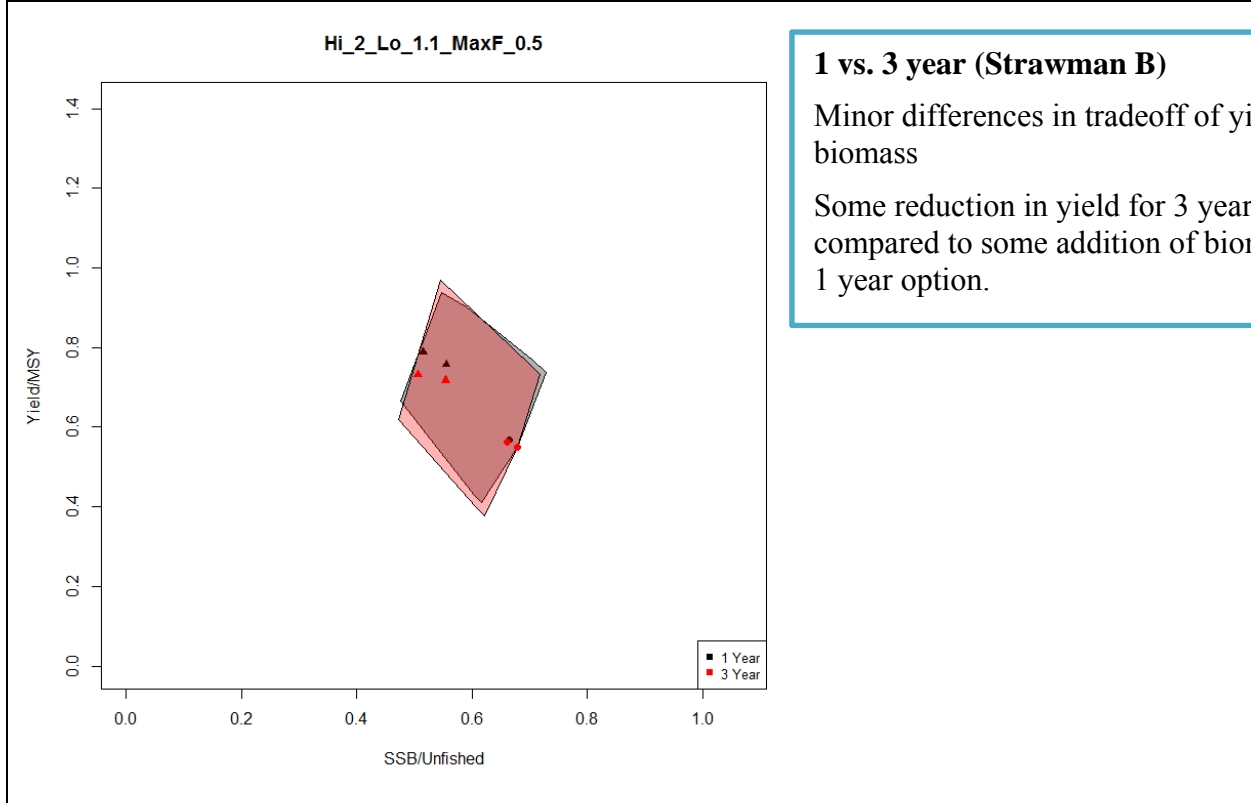
Figure 14 – Comparison of using annual (black) or three year (red) biomass based control rules for Strawman A (top) and Strawman B (bottom)



1 vs. 3 year (Strawman A)

Minor differences in tradeoff of yield vs. biomass

Some reduction in yield for 3 year compared to some addition of biomass for 1 year option.



1 vs. 3 year (Strawman B)

Minor differences in tradeoff of yield vs. biomass

Some reduction in yield for 3 year compared to some addition of biomass for 1 year option.

2.3.1.4 Control rule timeframe of five years

During the stakeholder workshops it was discussed that it may be useful to evaluate an option that would set ABC for a longer time period to potentially improve business planning and stability in the fishery, i.e. five years. Analysts explored alternatives that would set ABC every five years. Those results were presented at the second stakeholder workshop and ???.

Draft Rationale for Rejection: Initial results were presented at the second stakeholder workshop and overall participants both in the fishery and other stakeholders agreed that waiting five years to review information to set ABC may be too long. This is a fast growing, relatively short lived species, and a lot can change in five years in this ecosystem. Larger changes in ABC were expected if information was not reviewed more frequently, and the plan may not be responsive enough to changes if ABC is not re-evaluated every few years. Overall the potential benefits of short-term stability in the fishery did not outweigh the potential costs of not updating ABC more frequently based on new information about the resource and ecosystem. The current process of a benchmark assessment every three years followed by setting fishery specifications seems to be working, so stakeholders and the Council were most comfortable with status quo, in terms of timing for setting ABC.

Insert figures for MSE analysis of 5 years vs other time frames – what are the best figures to use?

2.3.2 Measures to address potential localized depletion and user conflicts

During the scoping process for this action many concerns and potential recommendations were provided by the public related to the negative impacts of localized depletion of herring on other user groups such as the whale watching industry and commercial and recreational fisheries of predator fisheries (i.e., tuna and striped bass). A variety of potential management options were discussed during development of this action based on input from scoping comments, as well as discussions at both the Herring Advisory Panel and Herring Committee meetings. If a proposal passed by motion or consensus at the Herring Committee it was forwarded to the full Council. The majority of the recommendations from the Herring Committee to include as alternatives for measures to address potential localized depletion and user conflicts were included by the Council for full consideration in this action. One alternative that was originally recommended by the Herring Committee that was not included in the DEIS is described below.

2.3.2.1 Prohibit midwater trawl gear inside 35 nautical miles in Herring Management Areas 1B, 2, and 3 year-round

This alternative would have considered a prohibition of midwater trawl gear in waters within 35 nautical miles south of Herring Management Area 1A year-round (throughout Herring Management Areas 1B, 2 and 3). Vessels approved to use other gear types would still be permitted to fish for herring, i.e. purse seine or fixed gears, and small mesh bottom gear in some areas. Vessels that currently use midwater trawl gear would be permitted to convert to other gear types.

Draft Rationale for Rejection: The Herring Committee originally recommended the Council include a range of buffer alternatives including 12 and 50 nautical miles. **Include more detail from Council meeting discussion???**