

**DRAFT**

**Omnibus Essential Fish Habitat Amendment 2  
Volume 4: Cumulative effects, compliance with applicable law  
and references**

**Amendment 14 to the Northeast Multispecies FMP  
Amendment 14 to the Atlantic Sea Scallop FMP  
Amendment 4 to the Monkfish FMP  
Amendment 3 to the Atlantic Herring FMP  
Amendment 2 to the Red Crab FMP  
Amendment 2 to the Skate FMP  
Amendment 3 to the Atlantic Salmon FMP**

**Including a**

**Draft Environmental Impact Statement**

**Prepared by the  
New England Fishery Management Council  
In cooperation with the  
National Marine Fisheries Service**

**Updated January 17, 2014**

# 1 Contents: Volume 4

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PDT = Plan Development Team, CATT = Closed Area Technical Team, AP = Advisory Panel.

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**2 Practicability analysis of alternatives to minimize the adverse effects of fishing on EFH**

### **3 Cumulative effects analysis**

Include summary of all current regulations in No Action alternatives

## 4 Compliance with Magnuson-Stevens Fishery Conservation and Management Act

*For the DEIS, relevant sections of applicable law are described below. Analysis as to compliance with applicable law will be completed for the FEIS when a proposed action has been identified.*

### 4.1 EFH-related requirements

Mandatory contents of FMPs related to EFH are described in the Magnuson-Stevens Act itself, with detailed guidance provided in the EFH regulations, which can be found at 50 CFR §600.815.

#### 4.1.1 Description and identification of EFH

FMPs must describe and identify EFH in text that clearly states the habitats or habitat types determined to be EFH for each life stage of the managed species.

- FMPs should explain the physical, biological, and chemical characteristics of EFH and, if known, how these characteristics influence the use of EFH by the species/life stage. FMPs must identify the specific geographic location or extent of habitats described as EFH. FMPs must include maps of the geographic locations of EFH or the geographic boundaries within which EFH for each species and life stage is found.
- Pertinent information includes the geographic range and habitat requirements by life stage, the distribution and characteristics of those habitats, and current and historic stock size as it affects occurrence in available habitats. FMPs should summarize the life history information necessary to understand each species' relationship to, or dependence on, its various habitats. FMPs should document patterns of temporal and spatial variation in the distribution of each major life stage to aid in understanding habitat needs. FMPs should summarize all available information on environmental and habitat variables that control or limit distribution, abundance, reproduction, growth, survival, and productivity of the managed species.
- Councils should obtain information to describe and identify EFH from the best available sources, including peer-reviewed literature, unpublished scientific reports, data files of government resource agencies, fisheries landing reports, and other sources of information. Councils should consider different types of information according to its scientific rigor. FMPs should identify species-specific habitat data gaps and deficits in data quality (including considerations of scale and resolution; relevance; and potential biases in collection and interpretation). FMPs must demonstrate that the best scientific information available was used in the description and identification of EFH, consistent with national standard 2.
- The following approach should be used to organize the information necessary to describe and identify EFH. Councils should strive to describe habitat based on the highest level of

detail available. FMPs should explain the analyses conducted to distinguish EFH from all habitats potentially used by a species.

- *Level 1: Distribution data are available for some or all portions of the geographic range of the species.* At this level, only distribution data are available to describe the geographic range of a species (or life stage). Distribution data may be derived from systematic presence/absence sampling and/or may include information on species and life stages collected opportunistically. In the event that distribution data are available only for portions of the geographic area occupied by a particular life stage of a species, habitat use can be inferred on the basis of distributions among habitats where the species has been found and on information about its habitat requirements and behavior. Habitat use may also be inferred, if appropriate, based on information on a similar species or another life stage.
- *Level 2: Habitat-related densities of the species are available.* At this level, quantitative data (i.e., density or relative abundance) are available for the habitats occupied by a species or life stage. Because the efficiency of sampling methods is often affected by habitat characteristics, strict quality assurance criteria should be used to ensure that density estimates are comparable among methods and habitats. Density data should reflect habitat utilization, and the degree that a habitat is utilized is assumed to be indicative of habitat value. When assessing habitat value on the basis of fish densities in this manner, temporal changes in habitat availability and utilization should be considered.
- *Level 3: Growth, reproduction, or survival rates within habitats are available.* At this level, data are available on habitat-related growth, reproduction, and/or survival by life stage. The habitats contributing the most to productivity should be those that support the highest growth, reproduction, and survival of the species (or life stage).
- *Level 4: Production rates by habitat are available.* At this level, data are available that directly relate the production rates of a species or life stage to habitat type, quantity, quality, and location. Essential habitats are those necessary to maintain fish production consistent with a sustainable fishery and the managed species' contribution to a healthy ecosystem.
- FMPs must describe EFH in text, including reference to the geographic location or extent of EFH using boundaries such as longitude and latitude, isotherms, isobaths, political boundaries, and major landmarks. If there are differences between the descriptions of EFH in text, maps, and tables, the textual description is ultimately determinative of the limits of EFH. Text and tables should explain pertinent physical, chemical, and biological characteristics of EFH for the managed species and explain any variability in habitat usage patterns, but the boundaries of EFH should be static.
  - If a species is overfished and habitat loss or degradation may be contributing to the species being identified as overfished, all habitats currently used by the

species may be considered essential in addition to certain historic habitats that are necessary to support rebuilding the fishery and for which restoration is technologically and economically feasible. Once the fishery is no longer considered overfished, the EFH identification should be reviewed and amended, if appropriate.

- Areas described as EFH will normally be greater than or equal to aquatic areas that have been identified as “critical habitat” for any managed species listed as threatened or endangered under the Endangered Species Act.
- FMPs must include maps that display, within the constraints of available information, the geographic locations of EFH or the geographic boundaries within which EFH for each species and life stage is found.
  - Where the present distribution or stock size of a species or life stage is different from the historical distribution or stock size, then maps of historical habitat boundaries should be included in the FMP, if known.
  - FMPs should include maps of any habitat areas of particular concern.

#### **4.1.2 Adverse effects determination**

Each FMP must contain an evaluation of the potential adverse effects of fishing on EFH designated under the FMP, including effects of each fishing activity regulated under the FMP or other Federal FMPs.

- This evaluation should consider the effects of each fishing activity on each type of habitat found within EFH. FMPs must describe each fishing activity, review and discuss all available relevant information (such as information regarding the intensity, extent, and frequency of any adverse effect on EFH; the type of habitat within EFH that may be affected adversely; and the habitat functions that may be disturbed), and provide conclusions regarding whether and how each fishing activity adversely affects EFH. The evaluation should also consider the cumulative effects of multiple fishing activities on EFH. The evaluation should list any past management actions that minimize potential adverse effects on EFH and describe the benefits of those actions to EFH. The evaluation should give special attention to adverse effects on habitat areas of particular concern (HAPC) and should identify for possible designation as habitat areas of particular concern any EFH that is particularly vulnerable to fishing activities. Additionally, the evaluation should consider the establishment of research closure areas or other measures to evaluate the impacts of fishing activities on EFH. In completing this evaluation, Councils should use the best scientific information available, as well as other appropriate information sources. Councils should consider different types of information according to its scientific rigor.
- Each FMP must minimize to the extent practicable adverse effects from fishing on EFH, including EFH designated under other Federal FMPs. Councils must act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable, if there



is evidence that a fishing activity adversely affects EFH in a manner that is more than minimal and not temporary in nature, based on the evaluation conducted pursuant to paragraph (a)(2)(i) of this section and/or the cumulative impacts analysis conducted pursuant to paragraph (a)(5) of this section. In such cases, FMPs should identify a range of potential new actions that could be taken to address adverse effects on EFH, include an analysis of the practicability of potential new actions, and adopt any new measures that are necessary and practicable. Amendments to the FMP or to its implementing regulations must ensure that the FMP continues to minimize to the extent practicable adverse effects on EFH caused by fishing. FMPs must explain the reasons for the Council's conclusions regarding the past and/or new actions that minimize to the extent practicable the adverse effects of fishing on EFH.

- In determining whether it is practicable to minimize an adverse effect from fishing, Councils should consider the nature and extent of the adverse effect on EFH and the long and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with national standard 7. In determining whether management measures are practicable, Councils are not required to perform a formal cost/benefit analysis.
- Fishery management options may include, but are not limited to:
  - *Fishing equipment restrictions.* These options may include, but are not limited to: seasonal and areal restrictions on the use of specified equipment, equipment modifications to allow escapement of particular species or particular life stages (e.g., juveniles), prohibitions on the use of explosives and chemicals, prohibitions on anchoring or setting equipment in sensitive areas, and prohibitions on fishing activities that cause significant damage to EFH.
  - *Time/area closures.* These actions may include, but are not limited to: closing areas to all fishing or specific equipment types during spawning, migration, foraging, and nursery activities and designating zones for use as marine protected areas to limit adverse effects of fishing practices on certain vulnerable or rare areas/species/ life stages, such as those areas designated as habitat areas of particular concern.
  - *Harvest limits.* These actions may include, but are not limited to, limits on the take of species that provide structural habitat for other species assemblages or communities and limits on the take of prey species.

#### **4.1.3 Non-MSA fishing activities that may adversely affect EFH**

FMPs must identify any fishing activities that are not managed under the Magnuson-Stevens Act that may adversely affect EFH. Such activities may include fishing managed by state agencies or other authorities.

#### **4.1.4 Summary of nonfishing related activities that may adversely affect EFH**

FMPs must identify activities other than fishing that may adversely affect EFH. For each activity, the FMP should describe known and potential adverse effects to EFH.

#### **4.1.5 Cumulative impacts analysis**

Cumulative impacts are impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. To the extent feasible and practicable, FMPs should analyze how the cumulative impacts of fishing and non-fishing activities influence the function of EFH on an ecosystem or watershed scale. An assessment of the cumulative and synergistic effects of multiple threats, including the effects of natural stresses (such as storm damage or climate-based environmental shifts) and an assessment of the ecological risks resulting from the impact of those threats on EFH, also should be included.

#### **4.1.6 Conservation and enhancement of EFH**

FMPs must identify actions to encourage the conservation and enhancement of EFH, including recommended options to avoid, minimize, or compensate for the adverse effects identified pursuant to paragraphs (a)(3) through (5) of this section, especially in habitat areas of particular concern.

#### **4.1.7 Prey species evaluation**

Loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat, and the definition of EFH includes waters and substrate necessary to fish for feeding. Therefore, actions that reduce the availability of a major prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat that are known to cause a reduction in the population of the prey species, may be considered adverse effects on EFH if such actions reduce the quality of EFH. FMPs should list the major prey species for the species in the fishery management unit and discuss the location of prey species' habitat. Adverse effects on prey species and their habitats may result from fishing and non-fishing activities.

#### **4.1.8 Identification of Habitat Areas of Particular Concern**

FMPs should identify specific types or areas of habitat within EFH as habitat areas of particular concern based on one or more of the following considerations: (i) The importance of the ecological function provided by the habitat. (ii) The extent to which the habitat is sensitive to human-induced environmental degradation. (iii) Whether, and to what extent, development activities are, or will be, stressing the habitat type. (iv) The rarity of the habitat type.

#### **4.1.9 Research and information needs**

Each FMP should contain recommendations, preferably in priority order, for research efforts that the Councils and NMFS view as necessary to improve upon the description and identification of

EFH, the identification of threats to EFH from fishing and other activities, and the development of conservation and enhancement measures for EFH.

#### **4.1.10 Review and revision of EFH components of FMPs**

Councils and NMFS should periodically review the EFH provisions of FMPs and revise or amend EFH provisions as warranted based on available information. FMPs should outline the procedures the Council will follow to review and update EFH information. The review of information should include, but not be limited to, evaluating published scientific literature and unpublished scientific reports; soliciting information from interested parties; and searching for previously unavailable or inaccessible data. Councils should report on their review of EFH information as part of the annual Stock Assessment and Fishery Evaluation (SAFE) report prepared pursuant to § 600.315(e). A complete review of all EFH information should be conducted as recommended by the Secretary, but at least once every 5 years.

## **4.2 National standards**

The ten national standards for fishery management plans are as follows:

1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
2. Conservation and management measures shall be based upon the best scientific information available.
3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
4. Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
5. Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.
7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
8. Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

9. Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
10. Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

### **4.3 Other required provisions**

Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, shall:

1. Contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery; (B) described in this subsection or subsection (b), or both; and (C) consistent with the national standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;
2. Contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;
3. Assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;
4. Assess and specify (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3), (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing, and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;
5. Specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, charter fishing, and fish processing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, economic information necessary to meet the requirements of this Act, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;
6. Consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;

7. Describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;
8. In the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;
9. Include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for (A) participants in the fisheries and fishing communities affected by the plan or amendment; (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants; and (C) the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery;
10. Specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;
11. Establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided;
12. Assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;
13. Include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery, including its economic impact, and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors;
14. To the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate, taking into consideration the economic impact of the harvest restrictions or recovery benefits on the fishery participants in each sector, any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery and;
15. Establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations, or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability.

**4.4 EFH Assessment**

*To be completed for FEIS.*

## 5 Compliance with the National Environmental Policy Act

NEPA provides a mechanism for identifying and evaluating the full spectrum of environmental issues associated with federal actions, and for considering a reasonable range of alternatives to avoid or minimize adverse environmental impacts. This document is designed to meet the requirements of both the Magnuson Stevens Act and NEPA. The Council on Environmental Quality has issued regulations specifying the requirements for NEPA documents (40 CFR 1500 – 1508). All of those requirements are addressed in this document, as referenced below.

This document includes the standard contents of an EIS:

- Cover sheet
- An Executive Summary can be found in Volume 1.
- A table of contents can be found in section Volume 1.
- The need and purpose for this action is described in Volume 1.
- The alternatives that were considered are described in Volume 2 (EFH and HAPC designations) and Volume 3 (habitat, spawning, and research area alternatives, and monitoring alternatives).
- A description of the affected environment is in Volume 1.
- The environmental impacts of the Proposed Action are described in sections Volume 2 and Volume 3; cumulative impacts of the alternatives will be described in Volume 3.
- A list of preparers is in Volume 4, section 3.2.
- References are in Volume 4, section 5.1.
- The EIS distribution list is in Volume 4, section 3.4.
- The index is in Volume 4, section 5.3.
- The agencies and persons consulted on this action are listed in Volume 4, section 3.3.
- Supporting appendices are provided in Volume 5.

### 5.1 Scoping process and opportunities for public comment

On February 24, 2004, the Council published in the Federal Register a Notice of Intent (NOI) to prepare this EIS (69 FR 8367). The Council solicited written comments to determine the issues of concern and the appropriate range of management alternatives to be addressed in the EIS and notified the public of five scoping hearings (Table 1). The Council received 13 written comments during the scoping period.

On September 9, 2005, the Council published a NOI to communicate its intent to develop the Omnibus EFH Amendment via a phased approach, separating out the development and review of EFH and HAPC designation alternatives from alternatives intended to minimize the adverse effects of fishing on designated EFH (70 FR 53636). The Council received 2 written comments during the 30 day comment period. A notice of availability for the Phase 1 Draft EIS (DEIS) was published on April 6, 2007 (72 FR 17157). Public hearings were conducted in 2007 to gather feedback on the alternatives proposed in the Phase 1 DEIS (Table 1). The Council received XX written comments during the 45 day comment period.

On October 5, 2009, the Council published a NOI to indicate that a final EIS for the Phase 1 components would not be published separately, but rather a complete DEIS containing alternatives from both phases would be produced upon completion of Phase 2 (74 FR 51126, correction 74 FR 64049). The Council received 2 written comments during the comment period, which was initially 30 days but extended for another 14 days due to an incorrect email address in the original notice.

On June 17, 2011 the Council published a NOI indicating its intent to consider changes to the Northeast multispecies closed areas in the Omnibus EFH Amendment (76 FR 35408). The Council received 7 written comments during the 30 day comment period.

On July 27, 2012, the Council published a NOI indicating its intent to possibly remove further consideration of alternatives to protect deep-sea corals from the Omnibus EFH Amendment (77 FR 44214). The Council received 2 written comments during the 30 day comment period. These alternatives were removed by the Council into a separate Omnibus action in September 2012.

The amendment was developed and discussed at the following meetings (Table 1). Opportunities for public comment were provided at Advisory Panel, Committee, and Council meetings, and of course during public hearings. There are limited opportunities to comment during technical meetings and conference calls (i.e. Plan Development Team and Closed Area Technical Team). The Council also held three days of informational interviews during August 2013. These were closed sessions by appointment with individuals and small groups. Registration was open to the public but the meetings were targeted towards groundfishermen.

**Table 1 – List of public meetings related to the development of Omnibus EFH Amendment 2. PDT = Plan Development Team, CATT = Closed Area Technical Team, AP = Advisory Panel.**

2004		
Date	Meeting type	Location
January 27-29, 2004	Council	Newport, RI
March 5, 2004	Scoping Meeting	Rockland, ME
March 10, 2004	Scoping Meeting	New Bedford, MA
March 15, 2004	Scoping Meeting	Stonington, CT
March 16, 2004	Scoping Meeting	Wrightsville Beach, NC
March 23, 2004	Scoping Meeting	Gloucester, MA
March 23-25, 2004	Council	Gloucester, MA
May 25-26, 2004	PDT	Woods Hole, MA
June 16, 2004	Committee/AP	Portsmouth, NH
July 13-15, 2004	Council	Portland, ME
September 8, 2004	Committee	Braintree, MA
September 14-16, 2004	Council	Fairhaven, MA
2005		
Date	Meeting type	Location
January 10-12, 2005	Scientific Workshop	Mystic, CT
February 1-3, 2005	Council	Portsmouth, NH
April 13, 2005	PDT/AP	Narragansett, RI



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May 26, 2005	Committee	Narragansett, RI
June 21-23, 2005	Council	Portland, ME
August 22, 2005	Committee	Portland, ME
September 13-15, 2005	Council	Hyannis, MA
September 27, 2005	PDT	Woods Hole, MA
October 18, 2005	PDT	Mansfield, MA
October 27, 2005	PDT	Woods Hole, MA
November 14, 2005	Committee	Mansfield, MA
November 15-17, 2005	Council	Hyannis, MA
December 1, 2005	PDT	Newburyport, MA
December 14-15, 2005	PDT	Woods Hole, MA
<b>2006</b>		
<b>Date</b>	<b>Meeting type</b>	<b>Location</b>
January 11, 2006	Committee	Mystic, CT
January 25, 2006	PDT	Woods Hole, MA
January 31 – Feb 2, 2006	Council	Portland, ME
March 13-14, 2006	PDT	Woods Hole, MA
March 7, 2006	AP	Plymouth, MA
March 20, 2006	Committee	Plymouth, MA
April 4-5, 2006	Council	Mystic, CT
April 18, 2006	PDT	Woods Hole, MA
May 17-18, 2006	PDT	Woods Hole, MA
May 8, 2006	AP	Portsmouth, NH
June 6-7, 2006	Committee	Mansfield, MA
June 13-15, 2006	Council	Newport, RI
July 26, 2006	PDT	Woods Hole, MA
August 15, 2006	AP	Danvers, MA
September 7, 2006	Committee	Fairhaven, MA
September 26, 2006	Council	Peabody, MA
October 3, 2006	PDT	Woods Hole, MA
October 11, 2006	Council (MAFMC)	Kitty Hawk, NC
November 14, 2006	Committee	Gloucester, MA
November 14-16, 2006	Council	Gloucester, MA
December 12-14, 2006	Council (MAFMC)	New York, NY
<b>2007</b>		
<b>Date</b>	<b>Meeting type</b>	<b>Location</b>
January 16, 2007	Committee	Providence, RI
February 6-8, 2007	Council	Portsmouth, NH
April 10-12, 2007	Council	Mystic, CT
April 11, 2007	Publichearing	Mystic, CT
April 18, 2007	Publichearing	Ocean City, MD
May 31, 2007	PDT	Woods Hole, MA
June 5, 2007	AP, then Committee	Mystic, CT
June 19-21, 2007	Council	Portland, ME

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August 15, 2007	PDT	Narragansett, RI
September 17, 2007	Committee	Plymouth, MA
September 18-19, 2007	Council	Plymouth, MA
November 6, 2007	PDT	Newport, RI
December 10, 2007	PDT	Plymouth, MA
<b>2008</b>		
<b>Date</b>	<b>Meeting type</b>	<b>Location</b>
January 27, 2008	PDT	call
February 4, 2008	Committee	Mansfield, MA
February 12-14, 2008	Council	Portsmouth, NH
March 3, 2008	PDT	Narragansett, RI
May 8, 2008	PDT	call
May 16, 2008	Committee	Mansfield, MA
June 3-5, 2008	Council	Portland, ME
June 11, 2008	PDT	call
July 10, 2008	Committee	Mansfield, MA
July 24, 2008	PDT	Portland, ME
September 30, 2008	PDT	call
October 2, 2008	Committee	Plymouth, MA
November 3, 2008	PDT	Gloucester, MA
November 4, 2008	PDT	Gloucester, MA
November 10, 2008	PDT	call
November 14, 2008	Committee	Mansfield, MA
November 18-20, 2008	Council	Danvers, MA
December 1, 2008	PDT	call
<b>2009</b>		
<b>Date</b>	<b>Meeting type</b>	<b>Location</b>
January 7, 2009	PDT	Woods Hole, MA
January 8, 2009	PDT	Woods Hole, MA
February 11, 2009	PDT	Portsmouth, NH
February 13, 2009	PDT	call
March 26, 2009	PDT	Plymouth, MA
March 18, 2009	SSC	Boston, MA
March 27, 2009	PDT	Plymouth, MA
May 28, 2009	PDT	Woods Hole, MA
May 29, 2009	PDT	Woods Hole, MA
June 22-25, 2009	Council	Portland, ME
August 31, 2009	PDT	Boston, MA
September 1, 2009	PDT	Boston, MA
October 28, 2009	PDT	call
November 17, 2009	PDT	Newport, RI
December 9, 2009	SSC	Boston, MA
<b>2010</b>		

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<b>Date</b>	<b>Meeting type</b>	<b>Location</b>
January 26-28, 2010	Council	Portsmouth, NH
February 22, 2010	PDT	Boston, MA
February 23, 2010	PDT	Boston, MA
April 27-29, 2010	Council	Mystic, CT
June 7, 2010	PDT	Newburyport, MA
June 8, 2010	PDT	Newburyport, MA
June 10, 2010	Committee	in person
June 22-24, 2010	Council	Portland, ME
July 26, 2010	PDT	Boston, MA
July 27, 2010	PDT	Boston, MA
August 25, 2010	SSC	Boston, MA
September 16, 2010	PDT	Boston, MA
September 27, 2010	Committee	in person
October 28, 2010	Committee	in person
<b>2011</b>		
<b>Date</b>	<b>Meeting type</b>	<b>Location</b>
January 6, 2011	Committee	East Boston, MA
January 25-27, 2011	Council	Portsmouth, NH
February 15, 2011	Ad-hocSASI review panel	Providence, RI
March 10, 2011	Committee	Portsmouth, NH
April 26-28, 2011	Council	Mystic, CT
June 8, 2011	PDT	Boston, MA
June 9, 2011	PDT	Boston, MA
June 21-23, 2011	Council	Portland, ME
July 21, 2011	Committee	Mansfield, MA
August 15, 2011	PDT	Boston, MA
August 30, 2011	Committee	Portsmouth, NH
October 17, 2011	PDT	Woods Hole, MA
October 18, 2011	PDT	Woods Hole, MA
October 25, 2011	PDT	call
December 7, 2011	PDT	Boston, MA
<b>2012</b>		
<b>Date</b>	<b>Meeting type</b>	<b>Location</b>
January 4, 2012	PDT	call
January 12, 2012	PDT	call
January 31-February 2, 2012	Council	Portsmouth, NH
February 7, 2012	PDT	Boston, MA
February 23, 2012	Committee	Portsmouth, NH
March 7, 2012	PDT	Boston, MA
April 6, 2012	Committee	Providence, RI
April 24-26, 2012	Council	Mystic, CT
June 6, 2012	PDT	Boston, MA
June 8, 2012	Committee	Portland, ME

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June 19-21, 2012	Council	Portland, ME
August 9, 2012	PDT	Boston, MA
August 23, 2012	Committee	Providence, RI
September 4, 2012	CATT	call
September 12, 2012	CATT	Braintree, MA
September 25-27, 2012	Council	Plymouth, MA
October 1, 2012	Groundfish PDT	call
October 10, 2012	PDT, AP	Hampton, NH
October 11, 2012	Groundfish Committee	Hampton, NH
October 12, 2012	CATT	Mansfield, MA
October 29, 2012	CATT	Braintree, MA
November 2, 2012	PDT	call
December 4, 2012	Committee	New Bedford, MA
December 12, 2012	CATT	Braintree, MA
<b>2013</b>		
<b>Date</b>	<b>Meeting type</b>	<b>Location</b>
January 9, 2013	CATT	Braintree, MA
January 10, 2013	CATT	Braintree, MA
January 15, 2013	PDT	call
January 17, 2013	PDT and CATT	Milford, MA
January 18, 2013	CATT	Milford, MA
January 24, 2013	Groundfish Committee and Groundfish AP	
January 29-31, 2013	Council	Portsmouth, NH
February 15, 2013	CATT	Braintree, MA
March 6, 2013	PDT	Boston, MA
March 7, 2013	CATT	Braintree, MA
March 19, 2013	Committee	Salem, MA
March 28, 2013	CATT	Braintree, MA
April 17, 2013	Groundfish Committee	Mansfield, MA
April 23-25, 2013	Council	Mystic, CT
April 29, 2013	PDT and CATT	Mansfield, MA
May 6, 2013	PDT	call
May 10, 2013	PDT and CATT	Rockland, MA
May 16, 2013	SSC	Mansfield, MA
May 17, 2013	Committee (Habitat and Groundfish)	Portsmouth, NH
May 29, 2013	PDT and CATT	Rockland, MA
May 30, 2013	PDT and CATT	Rockland, MA
June 11, 2013	Committee (Habitat and Groundfish)	Providence, RI
June 18-20, 2013	Council	Portland, ME
August 19, 2013	PDT and CATT	Rockland, MA
September 5, 2013	Committee (Habitat and Groundfish)	Portsmouth, NH

September 18, 2013	CATT	Taunton, MA
September 19, 2013	PDT	Taunton, MA
September 24-26, 2013	Council	Hyannis, MA
October-November 2013	CATT-PDT	5 conference calls
December 3, 2013	CATT-PDT	Rockland, MA
December 20, 2013	Council	Danvers, MA
January 28, 2014	Council	Portsmouth, NH
February 19, 2014	Groundfish Recreational Advisory Panel	Danvers, MA
February 25-26, 2014	Council	Danvers, MA

## 5.2 List of preparers

This document was prepared primarily by members of the New England Fishery Management Council staff, Habitat Plan Development Team, and Closed Area Technical Team. There have been numerous personnel changes over time due to the lengthy development of this action.

### Habitat Plan Development Team

Michelle Bachman, NEFMC staff, Chair 2009-present  
 David Stevenson, NMFS NERO  
 Jessica Coakley, MAFMC  
 Moira Kelly, NMFS NERO  
 Katie Richardson, NMFS NERO  
 Geret DePiper, NEFSC  
 Anna Henry, NEFSC  
 David Packer, NEFSC  
 Kathryn Ford, MA Division of Marine Fisheries  
 Page Valentine, United States Geological Survey  
 Peter Auster, U. of Connecticut, Sea Research Foundation  
 Heather Deese, Island Institute  
 Jonathan Grabowski, Northeastern University  
 Steve Earys, Gulf of Maine Research Institute

### Closed Area Technical Team

Andrew Applegate, NEFMC staff, Chair  
 David Thomas, NEFMC  
 Fiona Hogan, NEFMC  
 David Stevenson, NOAA NERO  
 William Whitmore, NOAA NERO  
 Timothy Cardiasmenos  
 Laurel Smith, NEFSC

Geret DePiper, NEFSC  
Anna Henry, NEFSC  
Sean Lucey, NEFSC

Previous Habitat Plan Development Team members

Chad Demarest, NEFMC staff, Chair 2007-2009, then at NEFSC 2009-2012  
Leslie-Ann McGee, NEFMC staff, Chair 2004-2007  
Tom Hoff, MAFMC  
Jennifer Anderson, NMFS NERO  
David Dow, NEFSC  
Steve Edwards, NEFSC  
Patricia Clay, NEFSC  
Bradley Harris, SMAST/UMASSD, then Alaska Pacific University  
Jeremy Collie, U. Rhode Island  
Joe DeAlteris, U. Rhode Island  
Vincent Malkoski, MA Division of Marine Fisheries  
Mark Lazzari, ME Dept. of Marine Resources  
Melissa Smith, ME Dept. of Marine Resources  
Allen Collins, NMFS/ National Systematics Lab (Ad-Hoc)

Additional current and former NEFMC staff who contributed written materials, or were consulted during preparation of this document, included Deirdre Boelke, Lori Steele, Jaime Cournane, Philip Haring, Talia Bigelow, Anne Hawkins, Demet Haksever, Lou Goodreau, Patricia Fiorelli, Rachel Feeney, Rachel Neild, Thomas Nies, and Christopher Kellogg. Administrative support, including compilation of the administrative record, was provided by Woneta Cloutier, Joan O’Leary, and Karen Roy.

### 5.3 Agencies and persons consulted

The following agencies were consulted during the development of this amendment:

- New England Fishery Management Council, which includes representatives from the following additional organizations:
  - Connecticut Department of Environmental Protection
  - Rhode Island Department of Environmental Management
  - Massachusetts Division of Marine Fisheries
  - New Hampshire Fish and Game
  - Maine Department of Marine Resources
- Mid-Atlantic Fishery Management Council
- National Marine Fisheries Service, NOAA, Department of Commerce
- United States Coast Guard, Department of Homeland Security

### 5.4 Document circulation list

*To be completed for FEIS*

## **5.5 Summary of public comments**

*A summary of comments from the public hearings and concurrent public comment period will be included in the FEIS.*

## **5.6 Response to public comments**

*To be completed for FEIS.*

## **6 Relationship to other applicable law**

*Analysis as to compliance with applicable law will be completed for the FEIS when a proposed action has been identified.*

- 6.1 Marine Mammal Protection Act (MMPA)**
- 6.2 Endangered Species Act (ESA)**
- 6.3 Administrative Procedure Act (APA)**
- 6.4 Paperwork Reduction Act (PRA)**
- 6.5 Coastal Zone Management Act (CZMA)**
- 6.6 Data Quality Act**
- 6.7 Regulatory Flexibility Act**
- 6.8 Executive Order 12866 (Planning and Coordination)**
- 6.9 Executive Order 12898 (Environmental Justice)**
- 6.10 Executive Order 13132 (Federalism)**
- 6.11 Executive order 13158 (Marine Protected Areas)**



## 7 References

### 7.1 Glossary

**A:** Refers to the area swept by a piece of fishing gear, adjusted for contact of gear with the seabed (contact index). A is added to the SASI model in annual time steps.

**Adverse effect:** An impact to EFH that is ‘more than minimal and not temporary in nature’ Any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

**Adult stage:** One of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

**Aggregation:** A group of animals or plants occurring together in a particular location or region.

**Amendment:** a formal change to a fishery management plan (FMP). The Council prepares amendments and submits them to the Secretary of Commerce for review and approval. The Council may also change FMPs through a "framework adjustment procedure" (see below). The Commission prepares amendments and submits them to the Commission’s Atlantic Herring Section for approval. Implementing regulations are adopted by the states.

**Amphipods:** A small crustacean of the order Amphipoda, such as the beach flea, having a laterally compressed body with no carapace.

**Anadromous species:** fish that spawn in fresh or estuarine waters and migrate to ocean waters

**Anemones:** Any of numerous flowerlike marine coelenterates of the class Anthozoa, having a flexible cylindrical body and tentacles surrounding a central mouth.

**Bay:** An inlet of the sea or other body of water usually smaller than a gulf; a small body of water set off from the main body; e.g. Ipswich Bay in the Gulf of Maine.

**Benthic community:** Benthic means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. Benthic community refers to those organisms that live in and on the bottom.

**Biological feature:** Any living seabed structure assumed to be used for shelter by managed species of fish or their prey

**Biota:** all the plant and animal life of a particular region.

**Benthic community:** *Benthic* means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. *Benthic community* refers to those organisms that live in and on the bottom. (*In* meaning they live within the substrate; e.g. within the sand or mud found on the bottom. See *Benthic infauna*, below)

**Benthic infauna:** See *Benthic community*, above. Those organisms that live *in* the bottom sediments (sand, mud, gravel, etc.) of the ocean. As opposed to *benthic epifauna*, that live *on* the surface of the bottom sediments.

**Benthivore:** Usually refers to fish that feed on benthic or bottom dwelling organisms.

**Berm:** A narrow ledge typically at the top or bottom of a slope; e.g. a berm paralleling the shoreline caused by wave action on a sloping beach; also an elongated mound or wall of earth.

**Biogenic habitats:** Ocean habitats whose physical structure is created or produced by the animals themselves; e.g. coral reefs.

**Biomass:** The total mass of living matter in a given unit area or the weight of a fish stock or portion thereof. Biomass can be listed for beginning of year (Jan-1), Mid-Year, or mean (average during the entire year). In addition, biomass can be listed by age group (numbers at age \* average weight at age) or summarized by groupings (e.g., age 1<sup>+</sup>, ages 4+ 5, etc). See also spawning stock biomass, exploitable biomass, and mean biomass.

**B<sub>MSY</sub>:** The stock biomass that would produce MSY when fished at a fishing mortality rate equal to F<sub>MSY</sub>. For most stocks, B<sub>MSY</sub> is about ½ of the carrying capacity. The proposed overfishing definition control rules call for action when biomass is below ¼ or ½ B<sub>MSY</sub>, depending on the species.

**B<sub>threshold</sub>:** 1) A limit reference point for biomass that defines an unacceptably low biomass i.e., puts a stock at high risk (recruitment failure, depensation, collapse, reduced long term yields, etc). 2) A biomass threshold that the SFA requires for defining when a stock is overfished. A stock is overfished if its biomass is below B<sub>threshold</sub>. A determination of overfished triggers the SFA requirement for a rebuilding plan to achieve B<sub>target</sub> as soon as possible, usually not to exceed 10 years except certain requirements are met. In Amendment 9 control rules, B<sub>threshold</sub> is often defined as either 1/2B<sub>MSY</sub> or 1/4 B<sub>MSY</sub>. B<sub>threshold</sub> is also known as B<sub>minimum</sub>.

**B<sub>target</sub>:** A desirable biomass to maintain fishery stocks. This is usually synonymous with B<sub>MSY</sub> or its proxy.

**Biomass weighted F:** A measure of fishing mortality that is defined as an average of fishing mortality at age weighted by biomass at age for a ranges of ages within the stock (e.g., ages 1<sup>+</sup> biomass weighted F is a weighted average of the mortality for ages 1 and older, age 3<sup>+</sup> biomass weighted is a weighted average for ages 3 and older). Biomass weighted F can also be calculated using catch in weight over mean biomass. See also fully-recruited F.

**Biota:** All the plant and animal life of a particular region.

**Bivalve:** A class of mollusks having a soft body with platelike gills enclosed within two shells hinged together; e.g., clams, mussels.

**Bottom roughness:** The inequalities, ridges, or projections on the surface of the seabed that are caused by the presence of bedforms, sedimentary structures, sedimentary particles, excavations, attached and unattached organisms, or other objects; generally small scale features.

**Bottom tending mobile gear:** All fishing gear that operates on or near the ocean bottom that is actively worked in order to capture fish or other marine species. Some examples of bottom tending mobile gear are otter trawls and dredges.

**Bottom tending fixed gear:** All fishing gear that operates on or near the ocean bottom that is not actively worked; instead, the effectiveness of this gear depends on species moving to the gear which is set in a particular manner by a vessel, and later retrieved. Some examples of bottom tending static gear are gillnets, traps, and pots.

**Boulder reef:** An elongated feature (a chain) of rocks (generally piled boulders) on the seabed.

**Bryozoans:** Phylum aquatic organisms, living for the most part in colonies of interconnected individuals. A few to many millions of these individuals may form one colony. Some bryozoans encrust rocky surfaces, shells, or algae others form lacy or fan-like colonies that in some regions may form an abundant component of limestones. Bryozoan colonies range from millimeters to meters in size, but the individuals that make up the colonies are rarely larger than a millimeter. Colonies may be mistaken for hydroids, corals or seaweed.

**Burrow:** A hole or excavation in the sea floor made by an animal (as a crab, lobster, fish, burrowing anemone) for shelter and habitation.

**Bycatch:** (v.) the capture of nontarget species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

**Continental shelf waters:** waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

**Crustaceans:** invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

**Capacity:** the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

**Catch:** the sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards (bycatch), and incidental deaths.

**Contact index:** The proportion of a gear component that is assumed to touch the seabed during fishing

**Coarse sediment:** Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

**Commensalism:** See *Mutualism*. An interactive association of two species where one benefits in some way, while the other species is in no way affected by the association.

**Continental shelf waters:** The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

**Control rule:** A pre-determined method for determining fishing mortality rates based on the relationship of current stock biomass to a biomass target. Amendment 9 overfishing control rules define a target biomass ( $B_{MSY}$  or proxy) as a management objective. The biomass threshold ( $B_{threshold}$  or  $B_{min}$ ) defines a minimum biomass below which a stock is considered overfished.

**Cohort:** see yearclass.

**Crustaceans:** Invertebrates characterized by a hard outer shell and jointed appendages and bodies. They usually live in water and breathe through gills. Higher forms of this class include lobsters, shrimp and crawfish; lower forms include barnacles.

**Data Poor Working Group (DPWG):** A standing assessment panel assembled to address stocks with limited or poor data..

**Days-at-sea (DAS):** the total days, including steaming time that a boat spends at sea to fish. Amendment 13 categorized DAS for the multispecies fishery into three categories, based on each individual vessel's fishing history during the period fishing year 1996 through 2001. The three categories are: Category A: can be used to target any groundfish stock; Category B: can only be used to target healthy stocks; Category C: cannot be used until some point in the future. Category B DAS are further divided equally into Category B (regular) and Category B (reserve).

**Demersal species:** Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

**Discards:** animals returned to sea after being caught; see Bycatch

**Echinoderms:** A member of the Phylum Echinodermata. Marine animals usually characterized by a five-fold symmetry, and possessing an internal skeleton of calcite plates, and a complex water vascular system. Includes echinoids (sea urchins), crinoids (sea lillies) and asteroids (starfish).

**Egg stage:** One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that occurs after reproduction and refers to the developing embryo, its food store, and sometimes jelly or albumen, all surrounded by an outer shell or membrane. Occurs before the *larval* or *juvenile stage*.

**Embayment:** A bay or an indentation in a coastline resembling a bay.

**Environmental Impact Statement (EIS):** an analysis of the expected impacts of a fishery management plan (or some other Proposed Action) on the environment and on people, initially prepared as a “Draft” (DEIS) for public comment. After an initial EIS is prepared for a plan, subsequent analyses are called “Supplemental” (i.e., DSEIS, FSEIS).

**Epifauna:** Animals that live on the surface of the substrate, and are often associated with surface structures such as rocks, shells, vegetation, or colonies of other animals.

**Exclusive Economic Zone (EEZ):** for the purposes of the Magnuson-Stevens Fishery Conservation and Management Act, the area from the seaward boundary of each of the coastal states to 200 nautical miles from the baseline.

**Essential Fish Habitat (EFH):** Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

**Estuarine area:** The area of an estuary and its margins; an area characterized by environments resulting from the mixing of river and sea water.

**Estuary:** A water passage where the tide meets a river current; especially an arm of the sea at the lower end of a river; characterized by an environment where the mixing of river and seawater causes marked variations in salinity and temperature in a relatively small area.

**Eutrophication:** A set of physical, chemical, and biological changes brought about when excessive nutrients are released into the water.

**Euphotic zone:** The zone in the water column where at least 1% of the incident light at the surface penetrates.

**Exclusive Economic Zone (EEZ):** a zone in which the inner boundary is a line coterminous with the seaward boundary of each of the coastal States and the outer boundary is line 200 miles away and parallel to the inner boundary

**Exempt fisheries:** Any fishery determined by the Regional Director to have less than 5 percent regulated species as a bycatch (by weight) of total catch according to 50 CFR 648.80(a)(7).

**Exploitable biomass:** The biomass of fish in the portion of the population that is vulnerable to fishing.

**Fathom:** A measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

**FMP (fishery management plan):** also referred to as a “plan,” this is a document that describes a fishery and establishes measures to manage it. The New England Fishery Management Council prepares FMPs and submits them to the Secretary of Commerce for approval and implementation. The Atlantic States Marine Fisheries Commission prepares FMPs and implementing regulations are adopted by the States.

**Fishing mortality (F):** A measurement of the rate of removal of fish from a population caused by fishing. This is usually expressed as an instantaneous rate (F) and is the rate at which fish are harvested at any given point in a year. Instantaneous fishing mortality rates can be either fully recruited or biomass weighted. Fishing mortality can also be expressed as an exploitation rate (see exploitation rate) or less commonly, as a conditional rate of fishing mortality (m, fraction of fish removed during the year if no other competing sources of mortality occurred. Lower case m should not be confused with upper case M, the instantaneous rate of natural mortality).

**Fishing effort:** the amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

**Framework adjustments:** adjustments within a range of measures previously specified in a fishery management plan (FMP). A change usually can be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

**GARM: Groundfish Assessment Review Meeting;** peer reviewed assessment of groundfish stock managed by the Northeast Multispecies Fishery Management Plan.

**Geological feature:** Any non-living seabed structure assumed to be used for shelter by managed species of fish or their prey

**Glacial moraine:** A sedimentary feature deposited from glacial ice; characteristically composed of unsorted clay, sand, and gravel. Moraines typically are hummocky or ridge-shaped and are located along the sides and at the fronts of glaciers.

**Glacial till:** Unsorted sediment (clay, sand, and gravel mixtures) deposited from glacial ice.

**Grain size:** the size of individual sediment particles that form a sediment deposit; particles are separated into size classes (e.g. very fine sand, fine sand, medium sand, among others); the classes are combined into broader categories of mud, sand, and gravel; a sediment deposit can be composed of few to many different grain sizes.

**Habitat complexity:** Describes or measures a habitat in terms of the variability of its characteristics and its functions, which can be biological, geological, or physical in nature. Refers to how complex the physical structure of the habitat is. A bottom habitat with *structure-forming organisms*, along with other three dimensional objects such as boulders, is more complex than a flat, featureless, bottom.

**Highly migratory species:** tuna species, marlin, oceanic sharks, sailfishes, and swordfish

**Hydroids:** Generally, animals of the Phylum Cnidaria, Class Hydrozoa; most hydroids are bush-like polyps growing on the bottom and feed on plankton, they reproduce asexually and sexually.

**Individual Fishing Quota (IFQ):** federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by an individual person or entity

**Juvenile stage:** One of several marked phases or periods in the development and growth of many animals. The life history stage of an animal that comes between the *egg* or *larval stage* and the *adult stage*; juveniles are considered immature in the sense that they are not yet capable of reproducing, yet they differ from the larval stage because they look like smaller versions of the adults.

**Landings:** The portion of the catch that is harvested for personal use or sold.

**Larvae stage:** One of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the *egg* for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

**Limited-access permits:** permits issued to vessels that met certain qualification criteria by a specified date (the "control date").

**Maturity ogive:** A mathematical model used to describe the proportion mature at age for the entire population.  $A_{50}$  is the age where 50% of the fish are mature.

**Meter:** A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

**Metric ton:** A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,205 lbs. A thousand metric tons is equivalent to 2.2 million lbs.

**Molluscs:** Common term for animals of the phylum Mollusca. Includes groups such as the bivalves (mussels, oysters etc.), cephalopods (squid, octopus etc.) and gastropods (abalone, snails). Over 80,000 species in total with fossils back to the Cambrian period.

**Multispecies:** the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

**Natural disturbance:** A change caused by natural processes; e.g. in the case of the seabed, changes can be caused by the removal or deposition of sediment by currents; such natural processes can be common or rare at a particular site.

**Natural mortality:** A measurement of the rate of death from all causes other than fishing such as predation, disease, starvation, and pollution. Commonly expressed as an instantaneous rate (M). The rate of natural mortality varies from species to species, but is assumed to be  $M=0.2$  for the five critical stocks. The natural mortality rate can also be expressed as a conditional rate (termed  $n$  and not additive with competing sources of mortality such as fishing) or as annual expectation of natural death (termed  $v$  and additive with other annual expectations of death).

**Northeast Shelf Ecosystem:** The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream.

**Observer:** any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under the Magnuson-Stevens Act

**Open access:** describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

**Opportunistic species:** Species that colonize disturbed or polluted sediments. These species are often small, grow rapidly, have short life spans, and produce many offspring.

**Optimum Yield (OY):** the amount of fish which A) will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery



**Overfished:** A condition defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

**Overfishing:** A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

**Pelagic gear:** Mobile or static fishing gear that is not fixed, and is used within the water column, not on the ocean bottom. Some examples are mid-water trawls and pelagic longlines.

**Phytoplankton:** Microscopic marine plants (mostly algae and diatoms) which are responsible for most of the photosynthetic activity in the oceans.

**Polychaetes:** Polychaetes are segmented worms in the phylum Annelida. Polychaetes (poly-chaetae = many-setae) differ from other annelids in having many setae (small bristles held in tight bundles) on each segment.

**Pre-recruits:** Fish in size or age groups that are not vulnerable to the fishery (including discards).

**Prey availability:** The availability or accessibility of prey (food) to a predator. Important for growth and survival.

**Primary production:** The synthesis of organic materials from inorganic substances by photosynthesis.

**Plan Development Team (PDT):** a group of technical experts responsible for developing and analyzing management measures under the direction of the Council.

**Prey feature:** One of six benthic invertebrate taxa commonly consumed by managed species in the Northeast Region

**Recruitment:** the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in one year would be the recruitment to the fishery. “Recruitment” also refers to new year classes entering the population (prior to recruiting to the fishery).

**Recruitment overfishing:** fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

**Regulated groundfish species:** cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish. These species are usually targeted with large-mesh net gear.

**Realized:** Refers to an area swept data layer that is intended to realistically represent actual fishing effort, where gear dimensions, fishing locations, and number of trips/tows/sets are based

on observer, trip report, or other data sources. Realized area swept is aggregated on an annual basis.

**Recovery, R:** Recovery is defined as the time in years that would be required for the functional value of that habitat feature to be restored.

**SASI model:** The combination of vulnerability assessment and geo-referenced fishing effort and habitat data used to estimate the magnitude and location of the adverse effects of fishing on habitat

**Simulated:** Refers to an area swept data layer that is intended to allow for spatial visualization the underlying seabed vulnerability, independent of the magnitude of area swept. Simulated area swept might be uniformly distributed, or non-uniformly distributed.

**Substrate classes:** Mud, sand, granule-pebble, cobble, and boulder, as defined by the Wentworth particle grade scale

**Susceptibility, S:** Susceptibility is defined as the percentage of total habitat features encountered by fishing gear during a hypothetical single pass fishing event that have their functional value reduced.

**Structured grid:** A regular grid of consisting of 100 km<sup>2</sup> cells to which area swept estimates are inferred.

**Sea whips:** A coral that forms long flexible structures with few or no branches and is common on Atlantic reefs.

**Sea pens:** An animal related to corals and sea anemones with a featherlike form.

**Sediment:** Material deposited by water, wind, or glaciers.

**Sediment suspension:** The process by which sediments are suspended in water as a result of disturbance.

**Sedimentary bedforms:** Wave-like structures of sediment characterized by crests and troughs that are formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes.

**Sedimentary structures:** Structures of sediment formed on the seabed or land surface by the erosion, transport, and deposition of particles by water and wind currents; e.g. ripples, dunes, buildups around boulders, among others.

**Sediment types:** Major combinations of sediment grain sizes that form a sediment deposit, e.g. mud, sand, gravel, sandy gravel, muddy sand, among others.

**Spawning adult stage:** See *adult stage*. Adults that are currently producing or depositing eggs.

**Spawning stock biomass (SSB):** the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

**Species assemblage:** Several species occurring together in a particular location or region

**Species composition:** A term relating the relative abundance of one species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

**Species diversity:** The number of different species in an area and their relative abundance

**Species richness:** See *Species diversity*. A measurement or expression of the number of species present in an area; the more species present, the higher the degree of species richness.

**Status Determination:** A determination of stock status relative to  $B_{\text{threshold}}$  (defines overfished) and  $F_{\text{threshold}}$  (defines overfishing). A determination of either overfished or overfishing triggers a SFA requirement for rebuilding plan (overfished), ending overfishing (overfishing) or both.

**Stock:** A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

**Stock assessment:** determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

**Structure-forming organisms:** Organisms, such as corals, colonial bryozoans, hydroids, sponges, mussel beds, oyster beds, and seagrass that by their presence create a three-dimensional physical structure on the bottom. See *biogenic habitats*.

**Surficial sediment:** Sediment forming the sea floor or land surface; thickness of the surficial layer may vary.

**Ten-minute- “squares” of latitude and longitude (TMS):** Are a measure of geographic space. The actual size of a ten-minute-square varies depending on where it is on the surface of the earth, but in general each square is approximately 70-80 square nautical miles in this region. This is the spatial area that EFH designations, biomass data, and some of the effort data have been binned into for analysis purposes in various sections of this document.

**Topography:** The depiction of the shape and elevation of land and sea floor surfaces.

**Total Allowable Catch (TAC):** The amount (in metric tons) of a stock that is permitted to be caught during a fishing year. In the Multispecies FMP, TACs can either be “hard” (fishing ceases

when the TAC is caught) or a “target” (the TAC is merely used as an indicator to monitor effectiveness of management measures, but does not trigger a closure of the fishery).

**Unstructured grid:** An irregular grid based on the distribution of substrate data points. High or low energy and a suite of features are inferred to each unstructured grid cell

**Vulnerability:** The combination of a feature’s susceptibility to fishing gear impact and its ability to recover from fishing gear impact

**Voronoi tessellation:** A mathematical procedure used to develop the unstructured substrate grid based on point data

**Valued Ecosystem Component:** A resource or environmental feature that is important (not only economically) to a local human population, or has a national or international profile, or if altered from its existing status, will be important for the evaluation of environmental impacts of industrial developments, and the focusing of administrative efforts.

**Wentworth:** A size-based sediment classification scheme

**Yield-per-recruit (YPR):** the expected yield (weight) of individual fish calculated for a given fishing mortality rate and exploitation pattern and incorporating the growth characteristics and natural mortality.

**Yearclass:** also called cohort. Fish that were spawned in the same year. By convention, the “birth date” is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

**Zooplankton:** Small, often microscopic animals that drift in currents. They feed on detritus, phytoplankton, and other zooplankton. They are preyed upon by fish, shellfish, whales, and other zooplankton.

**Z:** A measure of the adverse effect of fishing effort on seabed habitat features, measured in  $\text{km}^2$  units.  $Z$  is area swept ( $A$ ) that has been adjusted for susceptibility ( $S$ ) and recovery ( $R$ ).  $Z$  is considered a “stock” effect that accumulates over time based on the amount of adverse effect entering the fishery in any particular time step ( $Y$ ), and the amount of adverse effect deemed to have recovered in that time step ( $X$ ), such that  $Z = X - Y$ .

**$Z_{\infty}$ :** (Vulnerability) The asymptotically stable equilibrium level of  $Z$ .  $Z_{\infty}$  is reached when a constant annual level of fishing area swept is applied to the all grid cells in the model for a length of time just slightly greater than the greatest terminal year of recovery estimated for all features in the Vulnerability Assessment.

***Z<sub>realized</sub>***: The actual distribution of Z by gear type based on past area swept estimates. Annual *Z<sub>realized</sub>* estimates for each 100 km<sup>2</sup> grid cell include the current year Z summed across all area swept in the cell, adjusted for feature susceptibility, plus Z accumulated from fishing events in past years that has not yet decayed.

## **7.2 Literature cited**

***To be completed***

## **7.3 Index**

***Will be included with FEIS***