DRAFT

Omnibus Essential Fish Habitat Amendment 2

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

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COVER SHEET

RESPONSIBLE AGENCIES:

Assistant Administrator for Fisheries
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
Washington, D.C. 20235

New England Fishery Management Council
50 Water Street
Newburyport, MA 01950

PROPOSED ACTIONS:

Adoption, approval, and implementation of 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

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TYPE OF STATEMENT:

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ABSTRACT:

This document describes management alternatives to designate EFH, designate HAPCs, minimize fishing impacts on EFH, and protect deep-sea corals, and evaluates the environmental impacts of those alternatives. In addition, this document includes prey species information, a discussion of non-fishing impacts on EFH, and a summary of EFH-related research needs.

DATE BY WHICH COMMENTS MUST BE RECEIVED: ______________________

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Table of contents

Tables

Figures

Maps

Appendices

Phase 1 Alternatives:

Appendix A – EFH designation methods
Appendix B – EFH supplementary tables, peak spawning, and prey information
Appendix C – EFH alternatives as approved by the Council in Phase 1

Phase 2 Alternatives:

Appendix D – SASI model document

Other EFH-related FMP requirements:

Appendix E – Non-fishing impacts to EFH
Appendix F – Research needs

Administrative/NEPA requirements:

Appendix G – Scoping report

1.0 Executive summary

This amendment document and draft supplemental environmental impact statement (DSEIS) presents and evaluates management measures and alternatives to achieve specific goals and objectives for the fisheries under the jurisdiction of the New England Fishery Management Council. This document was prepared by the New England Fishery Management Council and its Habitat Plan Development Team (PDT), in consultation with the National Marine Fisheries Service (NMFS, NOAA Fisheries) and the Mid-Atlantic Fishery Management Council (MAFMC). This amendment was 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).

Although these FMP amendments (EFH Omnibus Amendment #2) have been prepared primarily in response to the requirements of the MSFCMA and NEPA, the EFH Omnibus Amendment #2 also addresses the requirements of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA). When preparing a Fishery Management Plan or FMP amendment, the Council also must comply with the requirements of the Regulatory Flexibility Act (RFA), the Administrative Procedures Act (APA), the Paperwork Reduction Act (PRA), the Coastal Zone Management Act (CZMA), the Data Quality Act (DQA), and Executive Orders 13132 (Federalism), 12898 (Environmental Justice), 12866 (Regulatory Planning), and 13158 (Marine Protected Areas). These other applicable laws and executive orders help ensure that in developing an FMP/amendment, the Council considers the full range of alternatives and their expected impacts on the marine environment, living marine resources, and the affected human environment. This integrated document contains all required elements of the FMP amendment, including a DSEIS as required by NEPA and information to ensure consistency with other applicable laws and Executive Orders.

The purpose of the EFH Omnibus Amendment 2 is to address additional measures that are necessary in order to (1) To meet NMFS' published guidelines for implementation of the Magnuson-Stevens Act's EFH provisions to review and revise EFH components of FMPs at least once every five (5) years; and (2) To develop a comprehensive EFH management plan that will successfully minimize adverse effects of fishing on EFH through actions that will apply to all Council-managed FMPs. This DSEIS provides information to the New England Fishery Management Council, Mid-Atlantic Fishery

Management Council, the public and NMFS in order to select the best method of addressing the EFH responsibilities according with the law.

After the original Notice of Intent to prepare the EFH Omnibus Amendment 2 in February 2005, the Council declared its intent in September 2005 to complete the Omnibus Amendment in two-phases due to issues of public clarity and management complexity. Phase 1 included a review and update of EFH designations and consideration of HAPCs (not including consideration of management measures or restrictions), an update of prey species list, an update of non-fishing impacts, and an update of research and information needs (since moved to Phase 2). Phase 2 included a review and update of a gear effects evaluation and alternatives to optimize management measures for minimizing the adverse effects of fishing on EFH across all FMPs.

The Phase 1 work was published as a draft Environmental Impact Statement in April 2007. The Council approved the preferred EFH and HAPC designations, as well as the prey species and non-fishing impacts summaries, in June 2007. An additional HAPC in the Great South Channel was approved in September 2007.

At that time, the Habitat Committee and Plan Development Team commenced work on Phase 2. From late 2007 through early 2010, the group worked to develop an updated approach (the Swept Area Seabed Impact model) for estimating the magnitude and distribution of the adverse effects of fishing on EFH. In spring 2010, the committee used the model outputs and related information to develop alternatives to optimize and intergrate adverse effects minimization measures across all Council-managed fisheries.

1.1 Alternatives considered in the Amendment

1.1.1 Essential Fish Habitat designations

This amendment updates Essential Fish Habitat designations for all life stages of the species for which the New England Fishery Management Council (Council) has primary responsibility: American plaice, Atlantic cod, Atlantic halibut, Atlantic herring, Atlantic sea scallop, Atlantic wolffish, barndoor skate, clearnose skate, deep-sea red crab, haddock, little skate, monkfish, ocean pout, offshore hake, pollock, redfish, red hake, rosette skate, silver hake, smooth skate, thorny skate, white hake, windowpane flounder, winter flounder, winter skate, witch flounder, and yellowtail flounder.

EFH designations were proposed and approved during Phase 1 of the amendment process, unless otherwise noted. Each designation includes both a text description and a map representation. During Phase 1, the Council reviewed and refined three main alternatives and two minor alternatives, depending on the species, in addition to the no action (i.e. status quo) alternative. The methods used were broadly consistent with the 1998 omnibus EFH amendment. Text descriptions were based primarily on the Essential Fish Habitat Source documents, a series of Technical Memoranda produced by the

Northeast Fisheries Science Center (NEFSC). The primary data source on which the map representations were based is the NEFSC bottom trawl survey.

Table 1 – EFH designation alternatives (to be updated).

Species	*Eggs*	*Larvae*	*Juveniles*	*Adults*
American plaice				
Atlantic cod				
Atlantic halibut				
Atlantic herring				
Atlantic salmon				
Atlantic sea scallop				
Barndoor skate				
Clearnose skate				
Deep-sea red crab				
Haddock				
Little skate				
Monkfish				
Ocean pout				
Offshore hake				
Pollock				
Red hake				
Redfish				
Rosette skate				
Silver hake				
Smooth skate				
Thorny skate				
White hake				
Windowpane flounder				
Winter flounder				
Winter Skate				
Witch flounder				
Yellowtail flounder				

***N/A**: indicates that this does not exist as a distinct life history stage for this species.*
***NAD**: indicates No Alternative Designation due to lack of new information (i.e., the No Action alternative).*

1.1.2 Habitat Areas of Particular Concern

Habitat Areas of Particular Concern were proposed and approved during Phase 1 of the amendment process. Summary of methods/process.

Summary of proposed alternatives.

1.1.3 Identify and implement mechanisms to protect, conserve, and enhance the EFH of those species managed by the Council to the extent practicable

The MSA requires fishery management plans to minimize to the extent practicable the adverse effects of fishing on fish habitats. Mechanisms to protect, conserve, and enhance EFH across all FMPs were identified during Phase 2.

To meet this requirement, fishery managers would ideally be able to quantify such effects and visualize their distributions across space and time. The Swept Area Seabed Impact (SASI) model provides such a framework, enabling managers to better understand: (1) the nature of fishing gear impacts on benthic habitats, (2) the spatial distribution of benthic habitat vulnerability to particular fishing gears, and (3) the spatial and temporal distribution of realized adverse effects from fishing activities on benthic habitats. The model combines fishing effort data with substrate data and benthic boundary water flow estimates in a geo-referenced, GIS-compatible environment. Contact and vulnerability-adjusted area swept, a proxy for the degree of adverse effect, is calculated by conditioning a nominal area swept value, indexed across units of fishing effort and primary gear types, by the nature of the fishing gear impact, the susceptibility of benthic habitats likely to be impacted, and the time required for those habitats to return to their pre-impact functional value. SASI increases the utility of habitat science to fishery managers via the translation of susceptibility and recovery information into quantitative modifiers of swept area. The model was developed by the New England Fishery Management Council's (NEFMC) Habitat Plan Development Team.

Summary of proposed alternatives.

1.1.4 Alternatives to protect deep-sea corals

Fishery managers may use two primary MSA authorities to protect corals, including the EFH provisions and the discretionary provisions.

Summary of proposed alternatives.

1.2 Other EFH-related requirements

The MSA also requires FMPs to contain the following EFH-related information, in addition to the designation and advesre effects minimization requirements.

1.2.1 Prey resources

This amendment compiles prey species information for all managed species. The primary sources of information used were the NMFS NEFSC food habitats database and the EFH source documents.

1.2.2 Non-fishing impacts to EFH

This amendment identifies identify human activities that may adversely impact essential fish habitat (EFH).

1.2.3 EFH-related research needs

This amendment highlights various research needs related to EFH and EFH impacts minimization.that were identified during the EFH Omnibus 2 process.

2.0 Background and purpose

The New England Fishery Management Council initiated the development of a second Omnibus Essential Fish Habitat (EFH) Amendment in 2004. Like the first Omnibus Habitat Amendment, this action will amend all of the fishery management plans (FMPs) managed by the Council and will become 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 Herring FMP, Amendment 2 to the Skate FMP, Amendment 2 to the Red Crab FMP and Amendment 3 to the Atlantic Salmon FMP. The following species are managed by these plans (Table 2).

Table 2 – Species managed by the New England Fishery Management Council, by plan, with common names.

FMP	*Species*	*Common Names*
Multispecies	*Anarhichus lupus*	Atlantic wolffish
Multispecies	*Gadus morhua*	Atlantic cod (official), rock cod
Multispecies	*Glyptocephalus cynoglossus*	witch flounder (official), gray sole, Craig fluke, pole flounder
Multispecies	*Hippoglossus hippoglossus*	Atlantic halibut (official)
Multispecies	*Hippoglossoides platessoides*	American plaice (official), American dab, Canadian plaice, long rough dab
Multispecies	*Limanda ferruginea*	yellowtail flounder (official), rusty flounder
Multispecies	*Macrozoarces americanus*	ocean pout (official), eelpout, Congo eel, muttonfish
Multispecies	*Melanogrammus aeglefinus*	haddock (official)
Multispecies	*Merluccius bilinearis*	silver hake (official), whiting, New England hake
Multispecies	*Pollachius virens*	pollock (official), Boston bluefish, coalfish, green cod
Multispecies	*Pleuronectes americanus*	winter flounder (official), blackback, Georges Bank flounder, lemon sole, sole, flatfish, rough flounder, mud dab, black flounder
Multispecies	*Scophthalmus aquosus*	windowpane flounder (official), sand flounder, spotted flounder, New York plaice, sand dab, spotted turbot
Multispecies	*Sebastes* spp.	redfish (official), rosefish, ocean perch, red sea perch, red bream, Norway haddock
Multispecies	*Urophycis chuss*	red hake (official), squirrel hake
Multispecies	*Urophycis tenuis*	white hake (official), Boston hake, black hake, blue hake, mud hake, ling
Multispecies	*Merluccius albidus*	Offshore hake (official), blackeye whiting
Monkfish	*Lophius americanus*	monkfish (official), American goosefish, angler, allmouth, molligut, fishing frog
Sea Scallop	*Placopecten magellanicus*	Atlantic sea scallop (official), giant scallop, smooth scallop, deep sea scallop, Digby scallop, ocean scallop

FMP	*Species*	*Common Names*
Skates	*Amblyraja radiata*	Thorny skate (official), mud skate, starry skate, Spanish skate
Skates	*Dipturus laevis*	Barndoor skate (official)
Skates	*Leucoraja erinacea*	Little skate (official), common skate, summer skate, hedgehog skate, tobacco box skate
Skates	*Leucoraja garmani*	Rosette skate (official), leopard skate
Skates	*Malacoraja senta*	Smooth skate (official), smooth-tailed skate, prickly skate
Skates	*Leucoraja ocellata*	Winter skate (official), big skate, spotted skate, eyed skate
Skates	*Raja eglanteria*	Clearnose skate (official), brier skate
Deep-Sea Red Crab	*Chaceon quinquedens*	Deep-Sea red crab (official)
Atlantic Herring	*Clupea harengus*	Atlantic sea herring (official), Labrador herring, sardine, sperling, brit
Atlantic Salmon	*Salmo salar*	Atlantic salmon (official), sea salmon, silver salmon, black salmon

2.1 Regulatory context

The Magnuson Fishery Conservation and Management Act of 1976, (renamed the Magnuson-Stevens Fishery Conservation and Management Act when amended on October 11, 1996) established a U. S. exclusive economic zone (EEZ) between 3 and 200 miles offshore, and established eight regional fishery management councils that manage the living marine resources within that area. The eighteen (18) member New England Fishery Management Council's (Council) authority extends from Maine to southern New England and, in some cases, to the mid-Atlantic because of the range of the species covered under its management plans. The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act, known as the Sustainable Fisheries Act (SFA), emphasized the importance of habitat protection to developing healthy fisheries by strengthening the ability of the National Marine Fisheries Service (NMFS) and the Councils to protect and conserve the habitat of marine, estuarine, and anadromous finfish, mollusks, and crustaceans. Such habitat is termed "essential fish habitat" and is broadly defined to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." These requirements were maintained in the 2007 reauthorization of the MSA.

<u>Requirements of the SFA for NMFS, Councils, and Federal Agencies</u>

To protect fish habitat, the SFA requires or authorizes the Councils, NMFS, and other federal agencies to take new actions. Relevant to the goals of Omnibus EFH Amendment 2, the SFA requires the Council amend its fishery management plans to:

- Describe and identify essential fish habitat (EFH) for every fishery
- Minimize to the extent practicable the adverse impacts of fishing on EFH
- List the major prey species for the species in the FMU and discuss their location
- Identify non-fishing activities that may adversely affect EFH

Essential Fish Habitat Guidelines (Final Rule)
The National Marine Fisheries Service promulgated guidelines interpreting the EFH components of the SFA on January 17, 2002. These guidelines:

- Require EFH designations for all managed species, including unique descriptions of EFH for each life-stage for those species, and provide guidance for making such designations
- Introduce the concept of habitat areas of particular concern (HAPC)
- Requires Councils to review EFH documents every five years
- Specifies the requirements for minimizing to the extent practicable the adverse effects from fishing on habitat, specifically:

"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 Final Rule further specifies that:

"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. 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."

2.2 Goals of the EFH Omnibus Amendment

The Council has expressed dissatisfaction with its current practice of evaluating EFH and management measures to minimize to the extent practicable adverse effects from fishing on EFH through individual plans, believing instead that it is preferable to meet the EFH requirements by developing a comprehensive EFH Omnibus Amendment for all its FMPs. The purpose of Omnibus Amendment 2 is to address measures necessary to meet NMFS' published guidelines for implementation of the Magnuson-Stevens Act's EFH provisions to review and revise EFH components of FMPs at least once every five (5) years; and to develop a comprehensive EFH management plan that will successfully minimize adverse effects from fishing on EFH through actions that will apply to all Council-managed FMPs.

More specifically, the goals for the Omnibus Habitat Amendment 2 are as follows:

1) Phase 1:
    a. Update the identification and description all EFH for those species of finfish and mollusks managed by the Council
    b. Identify all major threats (fishing and non-fishing) to the EFH of those species managed by the Council
    c. Review and update prey species information as required

2) Phase 2:
    a. Identify and implement mechanisms to protect, conserve, and enhance the EFH of those species managed by the Council to the extent practicable
    b. Define the measurable thresholds for achieving the requirements to minimize adverse impacts to the extent practicable
    c. Integrate and optimize measures to minimize the adverse impacts to EFH across all Council managed FMPs
    d. Update research and information needs, including consideration of dedicated habitat research areas

On February 24, 2004 a notice of intent to prepare a programmatic EIS and a second omnibus EFH amendment to all New England Fishery Management Council plans was filed in the Federal Register (69 FR 8367). Issues scoped included: (1) the review and update of the description and identification of EFH; (2) the review and development of analytical tools used to analyze alternatives to minimize adverse effects of fishing on EFH; (3) the review and update of non-Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) fishery council management actions and fishing activities that may adversely affect EFH; (4) the review and update of non-fishing related activities that may adversely affect EFH; (5) the review and update of the cumulative impact analysis; (6) the review and update of conservation and enhancement recommendations; (7) the review and update of prey species information; the identification of new HAPCs; (8) the review and update of research and information needs including the consideration of Dedicated Habitat Research Areas (DHRA); and (9) the integration of alternatives to minimize any adverse effects of fishing on EFH across all FMPs principally managed by the Council by developing a comprehensive EFH Management Plan.

On September 9, 2005, a supplemental notice of intent was filed to split the omnibus EFH amendment into two phases. Under this phased approach, items 1, 4, 7, and 8 were included in Phase 1, and items 2, 3, 5, 6, and 9 were included in Phase 2. A DEIS for phase 1 was made available on April 6, 2007. On October 5, 2009, a second supplemental NOI was filed to indicate that a final EIS for both phases would be published together upon completion of the amendment, and that a separate final EIS for Phase 1 would not be published prior to completion of the full action.

Phase 1 was completed prior to and separately from phase 2, although broadly speaking the results of the EFH designations in phase 1 informed the scope of the phase 2 analyses. This DEIS document includes some alternatives, information, and analyses already reviewed and approved by the Council, and some new alternatives, information and analyses. By goal, the location of information in this DEIS document is described in Table 3.

Table 3 – Omnibus EFH amendment goals and their location in the DEIS document.

Phase	***Goal***	***Location in document***	***Old, new, or updated information as compared to Phase 1 DEIS***
1	Update EFH designations	Section 3.1 (EFH designation alternatives), Appendices A (methods), B (supplementary tables), and C (considered and rejected EFH designation alternatives)	The proposed EFH designations in Section 3.1 were voted on by the Council in 2007. Some slight modifications were made subsequently to the Council meeting at which these designations were approved. This new information is clearly noted in each species' designation.
1	Review and update prey information	Appendix B (summary of important prey species for each managed species)	This information was presented to the Council in 2007.
1 and 2	Identify threats to EFH	Appendix E (non-fishing threats), Appendix F (fishing threats)	In the Phase 1 DEIS, non-fishing threats were summarized in an appendix. Since that time, the non-fishing threats information has been published as a NOAA Technical Memorandum (TM-NMFS-NE-209). This document is summarized in Appendix E, and more briefly summarized in the body of the combined EIS. Fishing threats were identified and described as shown in Appendix F, which describes the fishing impacts vulnerability assessment and Swept Area Seabed Impact model.
2	Alternatives to protect EFH, including: definition of thresholds to achieve EFH impacts minimization requirements, and integration and optimization of EFH impacts minimization	Section 3.3, supported by Appendix F	Using the results of the vulnerability assessment and SASI model combined with additional information, alternatives were developed to minimize the adverse effects of fishing on EFH to the extent practicable.

Phase	Goal	Location in document	Old, new, or updated information as compared to Phase 1 DEIS
	measures		
2	Update research and information needs	Appendix H (summary of research and information needs indentified during Omnibus Amendment development)	Research and information needs were identified by the PDT throughout the development of the amendment, and compiled towards the conclusion of Phase 2.

2.3 Brief history of prior management actions

2.3.1 Omnibus Habitat Amendment 1

The Omnibus EFH Amendment #1 was prepared in 1998 to identify and describe the EFH for all species of marine, estuarine, anadromous finfish and mollusks managed by the Council to better protect, conserve, and enhance this habitat. This was done through the following FMP amendments: Northeast Multispecies (11), Atlantic Sea Scallops (9), Atlantic Salmon (1), and Atlantic Herring (added to FMP later). The 1998 EFH Amendment also identified the major threats to EFH from both fishing and non-fishing related activities and conservation and enhancement measures. The Council began implementation of the SFA's EFH requirements based on guidance provided by NMFS on interpreting the mandate and timelines. Amendments to the FMPs managed by the Council were initiated in 1998 and combined in one management action that was termed the "Habitat Omnibus Amendment of 1998." The Council approved the final EFH FMP amendments (EA) in September 1998 and the EA was submitted to NMFS in October 1998. The Secretary of Commerce approved the amendments to all FMPs, with the exception of the Monkfish FMP, on March 1999. The EFH requirements of FMPs that were not included in the Omnibus Amendment of 1998 were completed on the following schedule: Monkfish FMP (April 1999), Red Crab FMP (October 2002), and Skate FMP (July 2003).

2.3.2 AOC v. Daley lawsuit

A lawsuit brought by several environmental organizations (American Oceans Campaign (AOC) *et al*. v. Daley et al.) resulted in a ruling in 2000 that prevented the Department of Commerce (DOC) from enforcing the EFH amendments challenged in the suit, which included amendments to all of the New England Council's fishery management plans amended under the Omnibus Habitat Amendment. The Council was required to perform "a new and thorough EA or EIS" for each of the EFH amendments, in compliance with NEPA. Specifically, the DOC agreed to instruct the Councils to:

- Prepare EISs for all fisheries challenged in the lawsuit.
- Comply with the requirements of all applicable statues, including NEPA; the Council on Environmental Quality (CEQ) NEPA implementing regulations, 40

C.F.R. Parts 1500-1508; and the National Oceanic and Atmospheric Administration (NOAA) Administrative Order 216-6.

- Include analyses of environmental impacts of fishing on EFH, including direct and indirect effects, as defined in the EFH regulations at 50 C.F.R. 600.810, and analyses of the environmental impacts of alternatives for implementing the requirement of the M-S Act, that the FMP "minimize, to the extent practicable, adverse effects on [EFH] caused by fishing."
- Consider a range of reasonable alternatives for minimizing the adverse effects (as defined by the EFH regulations) of fishing on EFH, including potential adverse effects. This range of alternatives will include "no action" or status quo alternatives and alternatives set forth specifying fishery management actions that can be taken by NMFS under the M-S Act. The alternatives may include a suite of fishery management measures, and the same fishery management measures may appear in more than one alternative.
- Identify one preferred alternative, except that, in the draft EIS, NMFS may elect, if it deems appropriate, to designate a subset of the alternatives considered in the draft EIS, as the preferred range of alternatives, instead of designating only one preferred alternative.
- Present the environmental impacts of the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among the options, as set forth in CEQ regulation 40 C.F.R. 1502.14.

In response to the Stipulation, the Council determined that the analysis and subsequent management alternatives required by the Court Order would be presented within separate NEPA documents currently being developed by NMFS and the Council for the Northeast Multispecies and Atlantic Sea Scallops Fishery Management Plans. These documents were completed and submitted in 2004, and included extensive analysis of the adverse effects from fishing on essential fish habitat and a range of alternatives to address such effects.

2.3.3 Amendment 13 to the Northeast Multispecies FMP and Amendment 10 the Atlantic Sea Scallop FMP

These two amendments included descriptions of fishing gears used in the New England Region, descriptions of existing habitats, and summaries of the existing knowledge on the affects of fishing gears on habitats. Both documents included a gear effects evaluation to assess the vulnerability of each Council-managed species and life stage's EFH to mobile bottom-tending gear.

A simple matrix was developed for each benthic life stage for each species to determine the vulnerability of its EFH to effects from bottom tending mobile gear. Six criteria were qualitatively evaluated for each life stage based upon existing information. Each evaluation consisted of a value based upon a predefined threshold. The first three criteria were related to habitat function and included shelter, food and reproduction. Values for these criteria were determined as follows:

Shelter: (Scored from 0-2) If the life stage had no dependence upon bottom habitat to provide shelter then a 0 was selected. If the life stage had some dependence upon unstructured or non-complex habitat for shelter it was scored a 1. For example, flatfishes that rely primarily on cryptic coloration for predator avoidance or small scale sand waves for refuge were scored a 1. If the life stage had a strong reliance on complex habitats for shelter it was scored a 2. For example, species such as juvenile cod and haddock that are heavily reliant on structure or complex habitat for predator avoidance were scored a 2.

Food: (Scored from 0-2) If the life stage had no dependence on benthic prey it was scored a 0. If the life stage utilized benthic prey for part of its diet but not exclusively a benthic feeder it was scored a 1. For example, species feeding opportunistically on crabs as well as squid or fish were scored a 1. If the life stage feeds exclusively on benthic organisms and cannot change its mode of feeding it was scored a 2.

Reproduction: (Scored from 0-1) If the species had no dependence upon bottom habitats for spawning or its life stage was not a reproductive stage it was scored a 0. If the species had some dependence upon bottom habitats for spawning it was scored a 1. For example, species that spawn on or over the bottom were scored a 1.

Habitat Sensitivity: (Scored from 0-2) This criterion looked at EFH-based relative habitat sensitivity to disturbances. The habitat needed by the species was based primarily upon its EFH designation. If a habitat was not considered sensitive to disturbance it was scored a 0. If the habitat was considered to have a low sensitivity it was scored a 1. If the habitat type was considered highly sensitive it was scored a 2. These values were based upon the existing conceptual models that show a direct relationship between structural complexity of the habitat and recovery time with increasing vulnerability.

Habitat Rank: The habitat rank was determined quantitatively as the sum of the previous values (shelter + food + reproduction + habitat sensitivity). Another way to characterize the habitat rank is the relative vulnerability of the habitat to non-natural physical disturbance. The rank could range from 0-7, with 7 being the most vulnerable.

Gear Distribution: (Scored from 0-2) This criterion factored in the use of a particular gear type (otter trawl, scallop dredge, hydraulic clam dredge) in EFH for a particular life stage. If the gear is not used in the described EFH it was scored a 0. If the gear operated in only a small portion of the described EFH it was scored a 1. If the gear operated in more than a small amount of the described EFH it was scored a 2. Distribution was determined as the qualitative overlap of EFH on the Vessel Trip Report location data which has been described in previous sections of this report.

Gear Rank: The gear rank provides the vulnerability of EFH to a particular gear type and was calculated as the product of the Habitat Rank x Gear Distribution. Based upon natural breaks in the ranking frequency distribution, the following interpretations of the ranking were made: 0 = no vulnerability to the gear; 1 - 6 = low vulnerability to the gear; 7 - 9 = moderate vulnerability to the gear; 10 - 14 = high vulnerability to the gear.

Based upon this species-by-species matrix, the Council determined that:

Otter Trawls
The use of Otter Trawls may have an adverse effect on the following species (and life stages) EFH as designated in Amendment 11 to the Northeast Multispecies FMP (1998): *American plaice (J, A), Atlantic cod (J, A), Atlantic halibut (J, A), Atlantic sea scallops (J), haddock (J, A), ocean pout (E, L, J, A), red hake (J, A), redfish (J, A), white hake (J), silver hake (J), winter flounder (A), witch flounder (J, A), yellowtail flounder (J, A), red crab (J, A), black sea bass (J, A), scup (J), tilefish (J, A), barndoor skate* (J, A), clearnose skate* (J, A), little skate* (J, A), rosette skate* (J, A), smooth skate* (J, A), thorny skate* (J, A), and winter skate* (J, A).*

Scallop Dredge (New Bedford style)
The use of New Bedford style scallop dredges may have an adverse effect on the following species (and life stages) EFH as designated in Amendment 11 to the Northeast Multispecies FMP (1998): *American plaice (J, A), Atlantic cod (J, A), Atlantic halibut (J, A), Atlantic sea scallops (J), haddock (J, A), ocean pout (E, L, J, A), red hake (J, A), redfish (J, A), white hake (J), silver hake (J), winter flounder (J, A), yellowtail flounder (J, A), black sea bass , (J, A), scup (J), barndoor skate* (J, A), clearnose skate* (J, A), little skate* (J, A), rosette skate* (J, A), smooth skate* (J, A), thorny skate* (J, A), and winter skate* (J, A).*

Hydraulic Clam Dredges
The use of Hydraulic clam dredges may have an adverse effect on the following species (and life stages) EFH as designated in Amendment 11 to the Northeast Multispecies FMP (1998): *Atlantic sea scallops (J), ocean pout (E, L, J, A), red hake (J), silver hake (J), winter flounder (A), yellowtail flounder (J, A), black sea bass (J, A), scup (J),clearnose skate* (J, A), little skate* (J, A), rosette skate* (J, A), and winter skate* (J, A).*

*(Notes: * =, E = eggs lifestage, L = larvae lifestage, J = juvenile lifestage, and A = adult lifestage).*

Building on these conclusions, the documents proposed and evaluated a suite of measures designed to minimize the adverse effects of fishing on EFH. Specifically, they included the following management options:

<u>Incidental benefits of other Amendment 10 and 13 measures</u>:

Because management measures that were designed to reduce fishing mortality may also provide benefits to fish habitat, such management measures were explicitly considered as part of a formal strategy to reduce impacts on habitat.

<u>Modification of current groundfish closed areas to protect habitat</u>:
Modifications to the boundaries of the existing closed areas were proposed to better protect sensitive habitat. Some entirely new closed areas were proposed.

<u>Identification of important habitat areas within current groundfish closures:</u>
Areas within currently existing closed area containing important habitat were identified. Such areas may be subject to more severe restrictions in order protect the habitat.

<u>Closed areas designed to protect habitat and minimize impact on fisheries</u>:
This alternative was proposed to close areas with important habitat elements that are of low value to the multispecies, scallop, and monkfish fisheries in terms of productivity.

<u>Current closed areas, with the exception of scallop access areas</u>:
The then-current year round closed areas were considered for designation as habitat closures, with the exception of portions of those areas that have been made accessible to the scallop fishery through time-limited openings.

<u>Expand List of prohibited gears in closed areas</u>:
This alternative would have expanded the number of types of fishing gears that may not be used in the closed areas to include shrimp trawls, herring mid-water trawls, clam dredges, and pots and traps.

<u>Restrictions on the use of rockhopper and roller gear</u>:
This alternative was proposed to restrict the use of rockhopper and roller trawl gear. Various alternatives with respect to the maximum size of the gear allowed were evaluated.

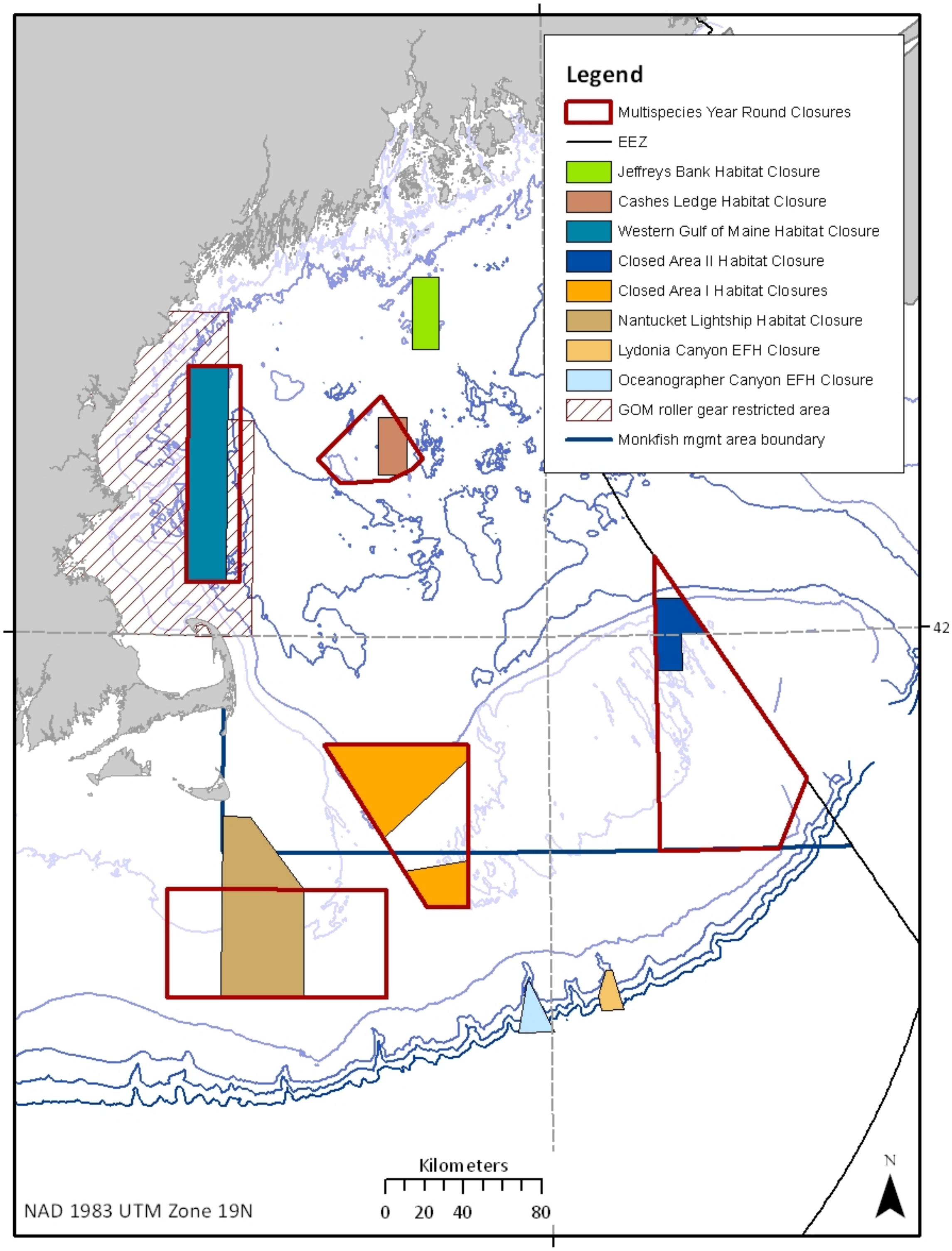
To assess the impacts of management alternatives on fish habitats, Amendments 10 (Sea Scallop FMP) and 13 (Multispecies FMP) used a suite of different metrics including:

- Days at Sea use
- Days absent, as reported in the Vessel Trip Reports (VTRs)
- % of overlap with areas designated EFH
- Biomass inside/outside area closure alternatives for five trophic guilds and five spatio-temporal species assemblages
- Biomass inside/outside area closure alternative for six species with high levels of association with benthic habitats: longhorn sculpin, sea raven, redfish, ocean pout, jonah crab and American lobster
- Sediment composition inside/outside area closure alternatives based on the Poppe et. Al. (1989) dataset

Alternatives were ranked based primarily on various methods of summing the raw values provided by these metrics. Ultimately, Amendment 13 to the Northeast Multispecies FMP adopted the following measures to minimize the adverse effects of fishing on EFH to the extent practicable:

- Effort reductions, by significantly reducing DAS reductions and including seasonal closures
- Area closure, by designating new areas both inside and outside then-existing year-round closures as "habitat closure areas" to reduce the effect of fishing on benthic habitats
- Amendment 10 to the Atlantic Sea Scallop FMP adopted the following measures:
- Effort reductions, by significantly reducing DAS reductions and including seasonal closures
- Area closure, by designating new areas both inside and outside then-existing year-round closures as "habitat closure areas" to reduce the effect of fishing on benthic habitats
- Gear modifications that increased dredge ring size to 4" throughout fishery, which were shown through analysis to be more efficient than 3.5" rings and therefore minimized bottom contact time
- Mandated a portion of the TAC set-aside for habitat research

Map 1 – Existing management areas and the Habitat Closure Areas established under Amendments 10 and 13 to the Atlantic sea scallop and Northeast multispecies FMPs



3.0 Management alternatives under consideration

Four categories of management alternatives are included in this amendment: measures to designate EFH (maps and text descriptions, section 3.1), measures to designate HAPCs (section 3.2), measures to minimize the adverse effects of fishing on EFH (section 3.3), and measures to protect deep-sea corals from fishing impacts (section 3.4).

3.1 Essential Fish Habitat designations

Essential fish habitat (EFH) means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: ''Waters'' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; ''substrate'' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; ''necessary'' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and ''spawning, breeding, feeding, or growth to maturity'' covers a species' full life cycle.

According to the EFH Final Rule (50 CFR Part 600.815(a)(1)(i)), FMPs must consider and include the following components with respect to the designation of EFH:

1. 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.
2. 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.
3. 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.

To summarize the life history information necessary to understand the relationship of each species and life history stage to, or its dependence on, various habitats, using text, tables, and figures, as appropriate, the Council developed EFH text descriptions for each species and life stage. As part of the process of developing these descriptions, the Council created supplemental tables (provided in Appendix B) that include all the relevant habitat-related information that was compiled for each species and life stage. The tables summarize all available information on environmental and habitat variables that limit the distribution and abundance of each species and life stage, with some additional information on ecological factors affecting reproduction, growth, and survival. Sources of information are listed under each table in Appendix B: much of the information was derived from analyses of trawl survey data in the NMFS EFH Source Document series and in a number of recent revisions and update memos, and in various state trawl survey reports. Other information was obtained from publications such as

Colette and Klein-MacPhee's Fishes of the Gulf of Maine (2002). For those species and life stages with distributions that extend beyond the edge of the continental shelf (400 meters), the proposed EFH descriptions also refer to a maximum depth on the continental slope where there was evidence that the species and life stage in question is present (level 1 information).[1] EFH on the continental shelf and in inshore coastal areas was described using level 2 relative abundance information available in the EFH source documents and the other publications identified in Appendix B. Supplementary information on primary prey consumed by each species and life stage is also presented in Appendix B, but was not included in the proposed text descriptions.[2]

In addition to the text descriptions, FMPs must include maps that display, within the constraints of available information, the geographic boundaries within which EFH for each species and life stage is defined. These maps help users to distinguish EFH from non-EFH areas. The Council followed the guidance provided by the NEFSC Habitat Evaluation Review Committee (July 2005) in the development of methods to map EFH to the extent possible. In following this guidance, EFH map alternatives developed for this amendment were primarily generated using relative abundance GIS data from fishery-independent surveys, and, for most benthic life stages, fall and spring habitat "layers" defined by depth and bottom temperature.[3] Additional EFH areas were added to the maps for some deep-water species on the continental slope based on available maximum depth data and geographic range information.

For the portion of the continental shelf surveyed by NMFS, maps for each species and life stage were based on four different percentiles (50, 75, 90 and 100) of the average catch rates (numbers per tow) for individual ten minute "squares" of latitude and longitude.[4] For the inshore coastal areas surveyed by the states, any ten minute square in which 10% or more of the tows made in that square caught at least one fish of that species and life stage was added to the map. Also included in the maps were certain coastal estuaries and embayments where a life stage of a managed species was identified as being "common" or "abundant" by NOAA's Estuarine Living Marine Resource (ELMR) Program.[5] All ELMR areas that were identified as EFH in the proposed

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[1] For purposes of this document, the edge of the continental shelf is defined as 400 meters because the NMFS trawl survey is mostly conducted in depths shallower than that depth.
[2] Information on prey and temperature and salinity ranges was included in the text descriptions for each alternative in the DEIS of this amendment, but removed in the FEIS.
[3] The original EFH maps for some species and life stages selected by the Council in the DEIS also included substrate data layers; these added very little useful information and were removed from the final maps.
[4] Each ten minute square covers approximately 75 square nautical miles; the actual area varies slightly according to latitude (larger near the equator and smaller near the poles).
[5] ELMR information was also included as a component in the status quo EFH designations maps; for a few species, areas where they were rare were also included.

designations were mapped using the original salinity zone boundaries, not according to the ten minute square representations that were used in the status quo maps and in the maps approved for inclusion in the DEIS.[6] A major distinguishing feature of all of the action alternatives considered by the Council was the use of a new data transformation to compute the average catch rates for the NMFS trawl and dredge surveys in each ten minute square.[7]

Three other important changes were made in processing the NMFS survey data: 1) tows made in poorly-sampled survey strata located south of Cape Hatteras and on the Scotian Shelf and Browns Bank (in Canada) were excluded from the analysis; 2) 1963-1967 fall survey data were removed in order to standardize the fall and spring survey data to a common time period (1968-2005); and 3) the survey data were re-defined to only include areas in Canada that were considered to be part of the Gulf of Maine, or areas which represented areas occupied by transboundary (U.S. and Canada) stocks (see Appendix A for details).[8]

To be clear, the EFH designations for a particular species include both a text description and a map representation. An area is only considered EFH if it matches the text description and is located within the mapped area. Thus, the two components of EFH must be used in conjunction with one another when applying EFH designations to fishery management, EFH consultation, or other questions. For a more detailed explanation of the methods employed in generating the EFH text descriptions and maps, refer to the EFH Designation Methods Appendix A.

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[6] The salinity zone boundaries used in the proposed EFH maps are the same as those shown in an appendix to the 1998 Omnibus EFH Amendment 1; the ten minute square versions were added as one component in the "master" EFH maps that are in the main document.
[7] Compared to the transformation used to create the status quo EFH maps, the new transformation further reduces the affect of occasional high catches on the average catch rate for a ten minute square and shifts squares into the "upper" end of the distribution, i.e., into higher percentiles where the average catch rates are lower. The new transformation was not applied to the historical MARMAP egg and larval data, i.e., no new egg and larval EFH maps were made.
[8] These are significant changes because the original data calculations included all the 1963-1997 fall and spring survey tow data, regardless of where the tows were made, and because the percentiles were originally calculated using all the data, then all ten minute squares, or portions thereof, in Canada were manually removed from the maps.

3.2 Habitat Areas of Particular Concern

The EFH Final Rule (50 CFR 600.815(8)) states that "*FMPs should identify specific habitat types or areas within EFH as habitat areas of particular concern based on one or more of the following considerations… (underlined text)"*. The corresponding text is a Council interpretation of the EFH Final Rule criteria.

- CRITERION 1A: Importance of *Historic* Ecological Function - The area or habitat feature proposed for HAPC designation at one time provided an important ecological function to a currently managed species, but no longer provides that function due to some form of degradation. An important ecological function could include, but is not limited to, protection from predation, increased food supply, appropriate spawning sites, egg beds, etc. The importance of the ecological function should be documented in scientific literature and based on either field studies, laboratory experiments, or a combination of the two.

- CRITERION 1B: Importance of *Current* Ecological Function - The area or habitat feature proposed for HAPC designation currently provides an important ecological function to a managed species. An important ecological function could include, but is not limited to, protection from predation, increased food supply, appropriate spawning sites, egg beds, etc. The importance of the ecological function should be documented in scientific literature and based on either field studies, laboratory experiments, or a combination of the two.

- CRITERION 2: Sensitivity to Anthropogenic Stresses – The area or habitat feature proposed for HAPC designation is particularly sensitive (either in absolute terms or relative to other areas and/or habitat features used by the target species) to the adverse effects associated with anthropogenic activities. These activities may be fishing or non-fishing related. The stress or activity must be a recognizable or perceived threat to the area of the proposed HAPC.

- CRITERION 3: Extent of Current or Future Development Stresses – The area or habitat feature proposed for HAPC designation faces either an existing and on-going development-related threat or a planned or foreseeable development-related threat. Development-related threats may result from, but are not limited to, activities such as sand mining for beach nourishment, gravel mining for construction or other purposes, the filling of wetlands, salt marsh, or tidal pools, shoreline alteration, channel dredging (but not including routine maintenance dredging), dock construction, marina construction, etc.

- CRITERION 4: Rarity of the Habitat Type – The habitat features proposed for HAPC designation are considered "rare" either at the scale of the New England region or at the scale of the range of at least one life history stage of one or more

> Council-managed species. A "rare" habitat feature is one that is considered to occur infrequently, is uncommon, unusual, or highly valued owing to its uniqueness. Rare habitats or features may be those that are spatially or temporally very limited in extent, but this description could also be applied to a unique combination of common features that occur only in a very few places.

Designation of habitat areas of particular concern (HAPCs) is intended to indicate which areas within EFH should receive more of the Council's and NMFS' attention when providing comments on federal and state actions, and in establishing higher standards to protect and/or restore such habitat. Habitats that are at greater risk from various sources of impacts, either individual or cumulative, including impacts from fishing, may be appropriate for this classification. Habitats that are limited in nature or those that provide critical refugia (such as sanctuaries or preserves) may also be appropriate. During the EFH consultation process, general concurrences (i.e. authorizations for groups of activities by an agency) may be granted for activities within habitat areas of particular concern; however, greater scrutiny is necessary prior to approval of the general concurrence.

It is important to note that while an area's status as a HAPC should lead to more careful evaluations of the impacts of fishing in that area, no management measures, such as gear restrictions, are associated with individual HAPCs. However, there are currently cases where HAPCs and a habitat/EFH closure areas overlap, such as on the northern edge of Georges Bank and in the Western Gulf of Maine Closed Area, and there may be other areas where such overlapping designations are appropriate. As the HAPC and closure/gear restricted area designations are separate, changing one designation does not affect the existence of the other designation. For example, it might be appropriate to consider a wider area for HAPC designation, and then choose a smaller area for a gear restricted area because the smaller area is more practicable given the value of the area to certain fisheries. Alternatively, there may be HAPCs for which non-fishing impacts are the primary concern, such that management measures intended to reduce fishing impacts would be neither appropriate nor useful.

The Atlantic Salmon HAPC and the Northern Edge Cod HAPC are currently in place. Other HAPCs were proposed during Phase 1 and approved by the Council in 2007. Between December 2004 and March 2005, the Council solicited HAPC proposals from the public for HAPCs that (in no particular order): (1) will improve the fisheries management in the EEZ, (2) include EFH designations for more than one Council-managed species in order to maximize the benefit of the designations, (3) include juvenile cod EFH, (4) meet more than one of the EFH Final Rule HAPC criteria. Nine complete proposals were received by the Council and reviewed by the Habitat Plan Development Team, Habitat Advisory Panel and Habitat Oversight Committee. The HAPCs approved by the Council during Phase 1 include the following:

- Inshore Juvenile Cod HAPC
- Great South Channel Juvenile Cod HAPC
- Cashes Ledge Area HAPC
- Jeffrey's Ledge/Stellwagen Bank HAPC
- Bear and Retriever Seamounts with identifiable EFH HAPC
- Heezen Canyon HAPC
- Lydonia/Gilbert/Oceanographers Canyons HAPC
- Hydrographer Canyon HAPC
- Veatch Canyon HAPC
- Alvin/Atlantis Canyon HAPC
- Hudson Canyon HAPC
- Hendrickson/Toms/Middle Toms Area HAPC
- Wilmington Canyon HAPC
- Baltimore Canyon HAPC
- Washington Canyon HAPC
- Norfolk Canyon HAPC

Because some of these areas as originally identified exceeded the depth of the proposed EFH designations, the boundaries of various seamount and canyon HAPCs were limited according to the depth of proposed EFH.

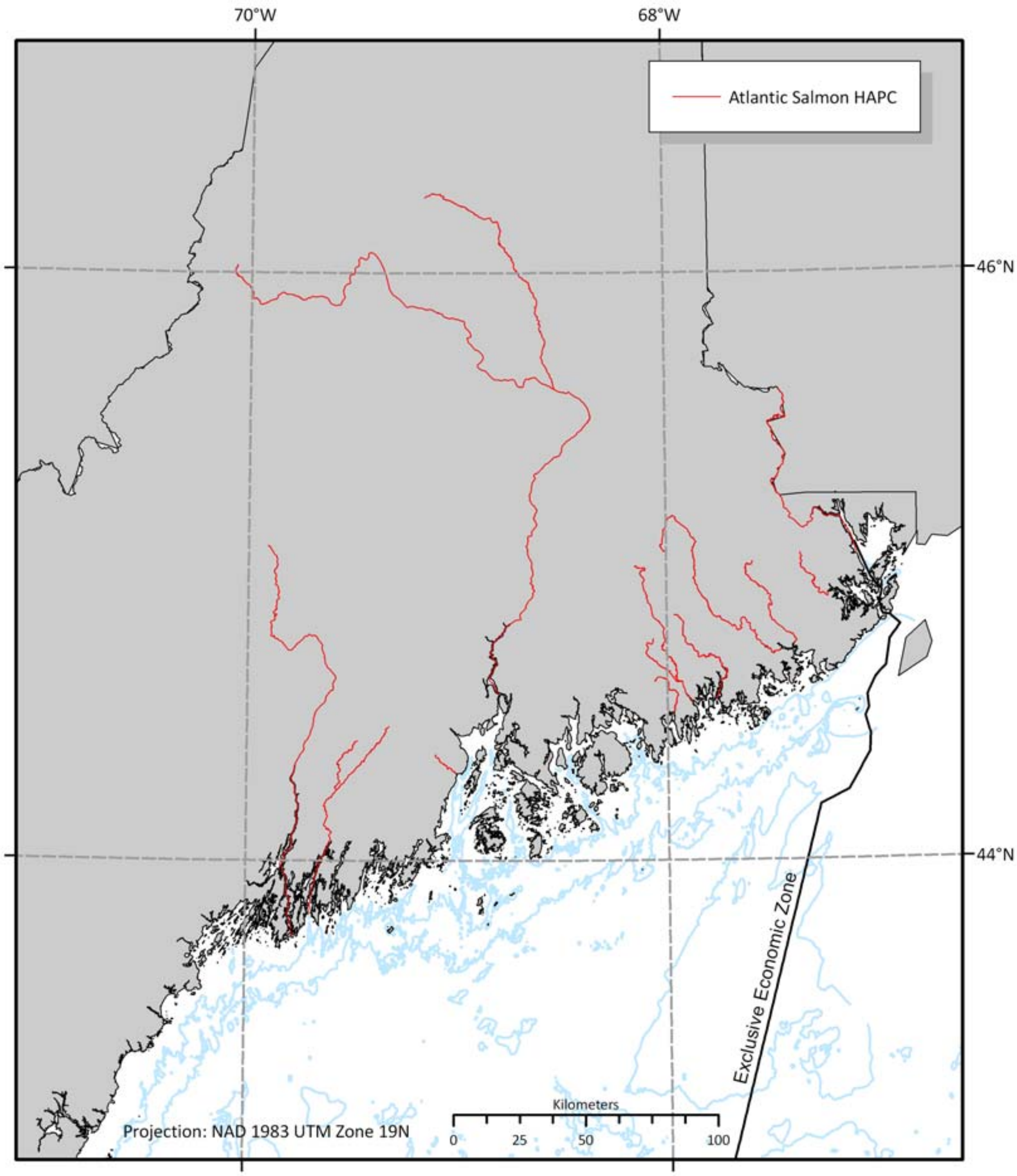
3.2.1 Atlantic salmon HAPC (status quo)

<u>Background and designation</u>

Seven small, coastal drainages located in the downeast and mid-coast sections of Maine hold the last remaining populations of native Atlantic salmon in the United States (USFWS 1996). These important rivers are the Dennys, Machias, East Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot. In 1998 (EFH Omnibus Amendment 1), the Council concluded that the designation of the following eleven rivers in Maine met at least two criteria for designation as habitat areas of particular concern for Atlantic salmon: Dennys, Machias, East Machias, Pleasant, Narraguagus, Ducktrap, Sheepscot, Kennebec, Penobscot, St. Croix, and Tunk Stream (Map 2).

The U.S. Fish and Wildlife Service (USFWS) and NMFS listed the U.S.A., ME, Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon as endangered on July 20, 2009. A DPS is a population of vertebrates that is discrete and ecologically significant. According to USFWS, *"the GOM DPS includes all anadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, and wherever these fish occur in the estuarine and marine environment. The following impassable falls delimit the upstream extent of the freshwater range: Rumford Falls in the town of Rumford on the Androscoggin River; Snow Falls in the town of West Paris on the Little Androscoggin River; Grand Falls in Township 3 Range 4 BKP WKR, on* *the Dead River in the Kennebec Basin; the un-named falls (impounded by Indian Pond Dam) immediately above the Kennebec River Gorge in the town of Indian Stream Township on the Kennebec River; Big Niagara Falls on Nesowadnehunk Stream in Township 3 Range 10 WELS in the Penobscot Basin; Grand Pitch on Webster Brook in Trout Brook Township in the Penobscot Basin; and Grand Falls on the Passadumkeag River in Grand Falls Township in the Penobscot Basin. The marine range of the GOM DPS extends from the Gulf of Maine, throughout the Northwest Atlantic Ocean, to the coast of Greenland. Included are all associated conservation hatchery populations used to supplement these natural populations; currently, such conservation hatchery populations are maintained at Green Lake National Fish Hatchery (GLNFH) and Craig Brook National Fish Hatchery (CBNFH). Excluded are landlocked salmon and those salmon raised in commercial hatcheries for aquaculture."*

Map 2 – Atlantic salmon HAPC



<u>Rationale</u>

<u>*Importance of Historic or Current Ecological Function*</u>

By supporting the only remaining U.S. populations of naturally spawning Atlantic salmon that have historic river-specific characteristics, these rivers provide an important ecological function. These river populations harbor an important genetic legacy that is vital to the persistence of these populations and to the continued existence of the species in the United States.

<u>*Sensitivity to Anthropogenic Stresses*</u>

The habitat of these rivers is susceptible to a variety of human-induced threats, from dam construction and hydropower operations to logging, agriculture, and aquaculture activities. Human activities can threaten the ability of Atlantic salmon to migrate upriver to the spawning habitat, the quality and quantity of the spawning and rearing habitat, and the genetic integrity of the native populations contained in the rivers.

Extent of Current or Future Development Stresses
This criterion was not used as a justification for the status quo Atlantic salmon HAPC in the 1998 EFH Omnibus Amendment #1.

Rarity of the Habitat Type
This criterion was not used as a justification for the status quo Atlantic salmon HAPC in the 1998 EFH Omnibus Amendment #1.

Table 4 –Atlantic Salmon HAPC: summary of alignment with HAPC criteria from both the EFH Final Rule and the Council

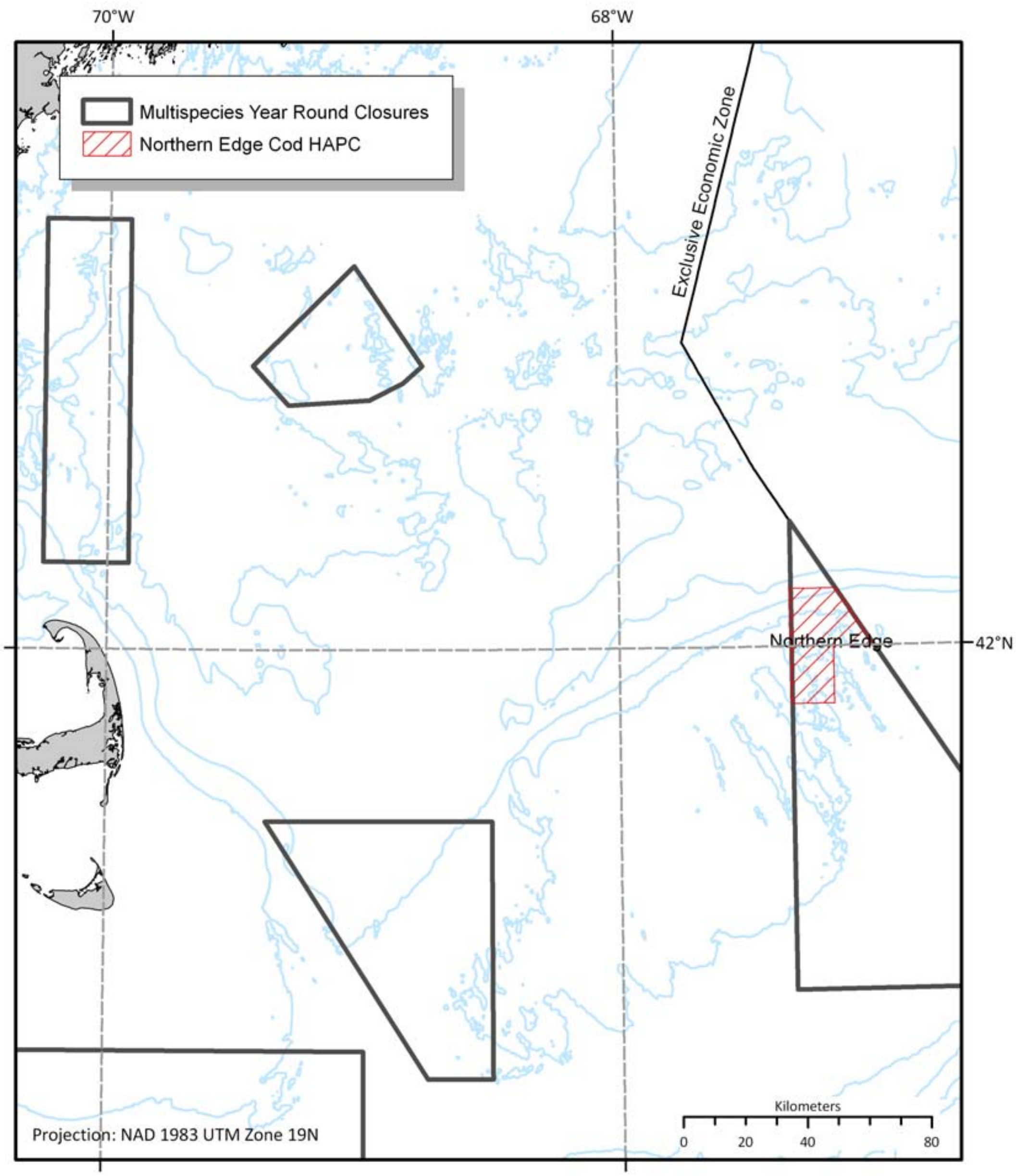
Source of criteria or preference	*HAPC criteria or preference*	*Criteria or preference met?*	*Discussion*
EFH Final Rule criteria	Importance of Historic or Current Ecological Function	Yes	Supports the only remaining U.S. populations of naturally spawning Atlantic salmon
EFH Final Rule criteria	Sensitivity to Anthropogenic Stresses	Yes	Habitat is susceptible to a variety of human-induced threats, from dam construction and hydropower operations to logging, agriculture, and aquaculture activities
EFH Final Rule criteria	Extent of Current or Future Development Stresses	No	N/A
EFH Final Rule criteria	Rarity of the Habitat Type	No	N/A
Council preference	Will improve the fisheries management in the EEZ	Yes	May assist in the rebuilding of the Atlantic salmon population, an ESA species.
Council preference	Include EFH designations for more than one Council-managed species	No	Salmon EFH only
Council preference	Include juvenile cod EFH	No	Salmon EFH only
Council preference	Meet more than one of the EFH Final Rule HAPC criteria	Yes	Ecological function and sensitivity to anthropogenic stress criteria

3.2.2 Northern Edge Juvenile Cod HAPC (status quo)

Background and designation

The 188-nm² Northern Edge Juvenile Cod HAPC was designated via EFH Omnibus Amendment 1 in 1998.

Map 3 – Northern Edge Juvenile Cod HAPC



<u>Rationale</u>

<u>Importance of Historic or Current Ecological Function</u>

Specific areas on the northern edge of Georges Bank have been extensively studied and identified as important areas for the survival of juvenile cod (Lough *et al.* 1989; Valentine and Lough 1991; Valentine and Schmuck 1995). These studies provide reliable information on the location of the areas most important to juvenile cod and the type of substrate found in those areas. Several sources document the importance of gravel/cobble substrate to the survival of newly settled juvenile cod (Lough *et al.* 1989; Valentine and Lough 1991; Gotceitas and Brown 1993; Tupper and Boutilier 1995; Valentine and Schmuck 1995). A substrate of gravel or cobble allows sufficient space for newly settled juvenile cod to find shelter and avoid predation (Lough *et al.* 1989; Valentine and Lough 1991; Gotceitas and Brown 1993; Tupper and Boutilier 1995; Valentine and Schmuck 1995). Particular life history stages or transitions are sometimes considered "ecological bottlenecks" if there are extremely high levels of mortality associated with the life history stage or transition. Extremely high mortality rates attendant to post-settlement juvenile cod are attributed to high levels of predation (Tupper and Boutilier 1995). Increasing the availability of suitable habitat for post-settlement juvenile cod could ease the bottleneck, increasing juvenile survivorship and recruitment into the fishery. Collie *et al.* (1997) describe the relative abundance of several other species such as shrimps, polychaetes, brittle stars, and mussels in unfished sites within the HAPC. These species are found in association with the emergent epifauna (bryozoans, hydroids, tube worms) prevalent in the area. Several studies of the food habits of juvenile cod identify these associated species as important prey items (Hacunda 1981; Lilly and Parsons 1991; Witman and Sebens 1992; Casas and Paz 1994; NEFSC 1998). Thus, the area provides two important ecological functions for post-settlement juvenile cod relative to other areas: increased survivability and readily available prey.

Sensitivity to Anthropogenic Stresses

Gravel/cobble areas on the northern edge of Georges Bank have been studied to determine the effects of bottom fishing on the benthic megafauna (Collie *et al.* 1996; Collie *et al.* 1997). Gravel/cobble substrates not subject to fishing pressure support thick colonies of emergent epifauna, but bottom fishing, especially scallop dredging, reduces habitat complexity and removes much of the emergent epifauna (Collie *et al.* 1996; Collie *et al.* 1997). While acknowledging that a single tow of a dredge across pristine habitat will have few long-term effects, Collie *et al.* (1997) focuses on the cumulative effects and intensity of trawling and dredging as responsible for potential long-term changes in benthic communities.

Extent of Current or Future Development Stresses

This criterion was not used as a justification for the status quo HAPC on George's Bank in the 1998 EFH Omnibus Amendment #1.

Rarity of the Habitat Type

This criterion was not used as a justification for the status quo HAPC on George's Bank in the 1998 EFH Omnibus Amendment #1.

Table 5 – Northern Edge Geoges Bank Juvenile Cod HAPC: summary of alignment with HAPC criteria from both the EFH Final Rule and the Council

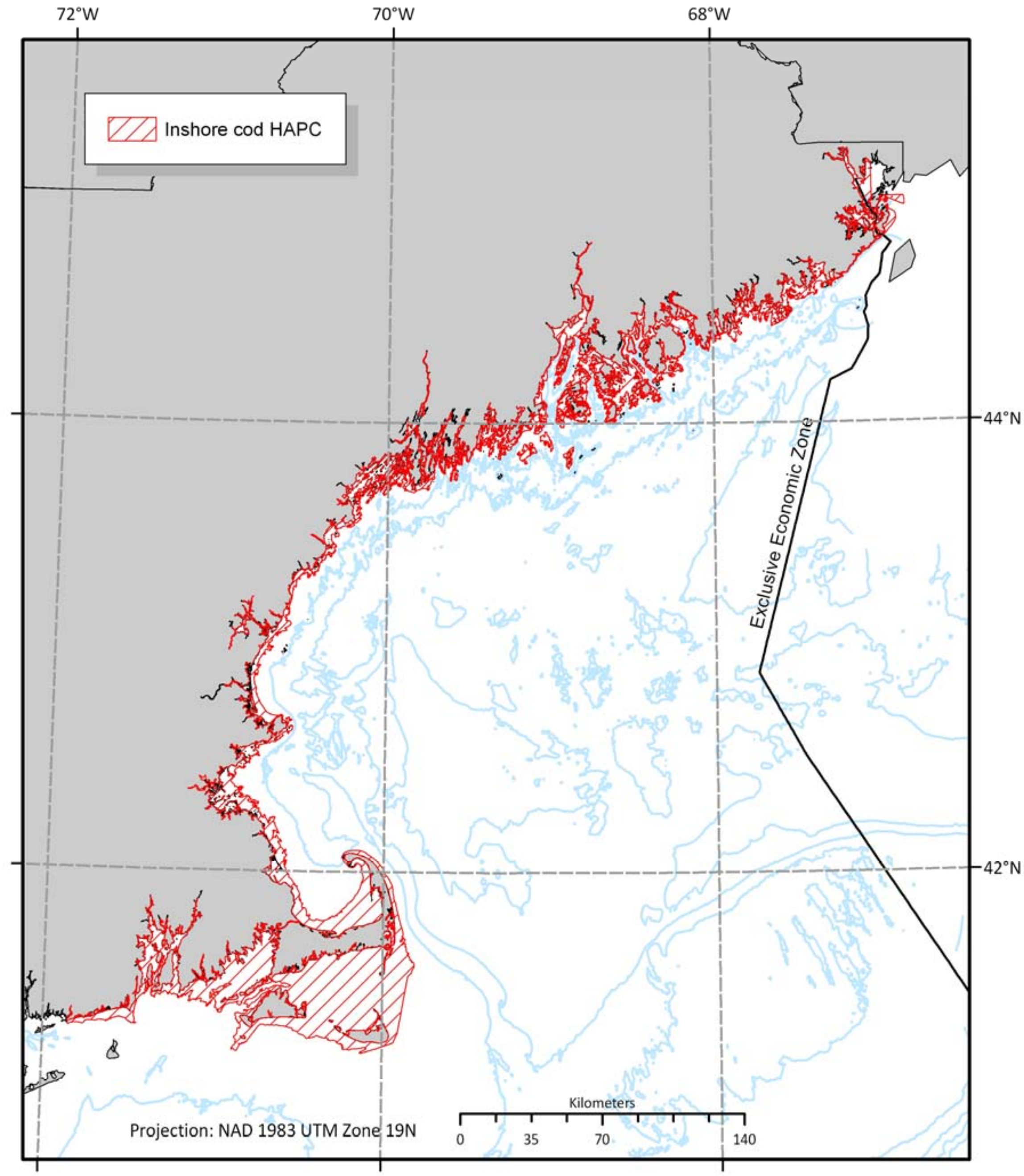
Source of criteria or preference	*HAPC criteria or preference*	*Criteria or preference met?*	*Discussion*
EFH Final Rule criteria	Importance of Historic or Current Ecological Function	Yes	Substrate of gravel or cobble found in the area allows sufficient space for newly settled juvenile cod to find shelter and avoid predation.
EFH Final Rule criteria	Sensitivity to Anthropogenic Stresses	Yes	Bottom fishing, especially scallop dredging and otter trawling, reduces habitat complexity and removes much of the emergent epifauna.
EFH Final Rule criteria	Extent of Current or Future Development Stresses	No	N/A
EFH Final Rule criteria	Rarity of the Habitat Type	No	N/A
Council preference	Will improve the fisheries management in the EEZ	Yes	Area provides two important ecological functions for post-settlement juvenile cod, an overfished species, relative to other areas: increased survivability and readily available prey.
Council preference	Include EFH designations for more than one Council-managed species	No	N/A
Council preference	Include juvenile cod EFH	Yes	HAPC designed specifically to capture juvenile cod habitats.
Council preference	Meet more than one of the EFH Final Rule HAPC criteria	Yes	Meets Criteria 1 and Criteria 2

3.2.3 Inshore Juvenile Cod HAPC (approved in Phase 1)

Background and designation

This approved HAPC includes the inshore areas of the Gulf of Maine and Southern New England. The purpose of this HAPC was to recognize the importance of inshore areas to juvenile Atlantic cod. In 1999, the Council voted to approve this alternative and include it in the next appropriate fishery management plan amendment. The Habitat Plan Development Team advised the Habitat Committeed to include two options for public comment in the Phase 1 DEIS: Option A: 0-10 meters Mean Lowest Low Water (MLLW), and Option B: 0-20 meters MLLW. The Council selected Option B, which covers 2,596 nm^2.

Map 4 – Inshore Juvenile Cod HAPC



Rationale

Importance of Historic or Current Ecological Function

These areas proposed for juvenile cod HAPC designation contain structurally complex rocky-bottom habitat that supports a wide variety of emergent epifauna and benthic invertebrates. This habitat type provides two key ecological functions for juvenile cod: increased survivorship and readily available prey.

Sensitivity to Anthropogenic Stresses

Due to their close proximity to human activities, inshore and nearshore areas are sensitive to anthropogenic stresses. Table 6 below describes eight types of potential chemical threats, 19 categories of potential physical threats and four types of potential biological threats to the four life history stages of Atlantic cod EFH, which are categorized as low, moderate or high threats (L, M and H, respectively) based on their geographic location (inshore and offshore). Some types and categories of potential chemical, physical and biological threats were unable to be characterized for this document and were assigned "U" (unknown). The categories were modified from a table in Amendment 13 to the Northeast Multispecies FMP developed by the New England Fishery Management Council (NEFMC 2003a). In general, the closer the proximity to the coast (i.e., close to pollution sources and habitat alterations) the greater the potential for impact.

Table 6 – Summary of potential inshore of various non-fishing activities to Atlantic cod EFH by lifestage. Key: H = high, M = moderate, L = low, and U = unknown.

Potential Threats	***Type***	***Eggs***	***Larvae***	***Juveniles***	***Adults***
PAH	Chemical	M	M	M	M
PCB	Chemical	M	M	M	M
Heavy Metals	Chemical	M	M	M	M
Nutrients	Chemical	M	M	M	M
Pesticides/Herbicides	Chemical	U	U	U	U
Acid	Chemical	M	M	M	L
Chlorine	Chemical	M	M	M	M
Greenhouse Gases	Chemical	U	U	U	U
Channel Dredging	Physical	M	M	M	M
Dredge and Fill	Physical	M	M	M	M
Dredge Material Disposal	Physical	H	M	M	M
Marina/Docks	Physical	M	M	M	L
Vessel Operation	Physical	M	L	L	L
Utility Lines/Pipelines	Physical	U	U	U	U
Oil/Gas Operations	Physical	M	M	M	M
Erosion/Flood Control Structures	Physical	U	U	U	U
Road Building/Maintenance	Physical	U	U	U	U
Dam Construction/Operation	Physical	U	U	U	U
Agriculture/Silviculture	Physical	U	U	U	U
Water Intake	Physical	M	M	L	L
Water Discharge	Physical	L	M	M	M
Sewage/Septic Discharge	Physical	M	M	M	M
Marine Mining	Physical	M	L	L	L

Potential Threats	***Type***	***Eggs***	***Larvae***	***Juveniles***	***Adults***
Salinity	Physical	L	L	L	L
Suspended Particles	Physical	M	M	M	L
Thermal	Physical	M	M	M	L
Dissolved Oxygen	Physical	M	M	M	M
Exotic Species	Biological	U	U	U	U
Pathogens	Biological	U	U	U	U
Aquaculture Operations	Biological	U	U	U	U
Plankton Blooms	Biological	U	U	U	U

Extent of Current or Future Development Stresses

The area faces existing and on-going development-related threats and planned or foreseeable development-related threat. Development-related threats may result from, but are not limited to, chemical, physical and biological impacts from the anthropogenic sources listed in Table 6.

Rarity of the Habitat Type

This HAPC does not meet this criterion.

Table 7 – Summary of EFH Final Rule HAPC Criteria and Council Preferences for Inshore Juvenile Cod HAPC.

Source of criteria or preference	***HAPC Criteria or Preference***	***Criteria or Preference Met?***	***Discussion***
EFH Final Rule criteria	Importance of Historic or Current Ecological Function	Yes	The localized use of inshore habitat allows for food acquisition and predator avoidance for Age 0 cod and is highly utilized as nursery habitats both spatially and temporally. Age 1 cod rely on these habitats for seasonal, nocturnal feeding on benthic prey. Nearshore bottom habitat may become a potential bottleneck to year-class size particularly in areas where the availability of the most suitable habitat might be low.
EFH Final Rule criteria	Sensitivity to Anthropogenic Stresses	Yes	Inshore or nearshore habitats are particularly susceptible to the effects listed in Table 6.
EFH Final Rule criteria	Extent of Current or Future Development Stresses	Yes	Inshore or nearshore habitats are threatened by the effects from stressors listed in Table 6.
EFH Final Rule criteria	Rarity of the Habitat Type	No	N/A
Council preference	Will improve the fisheries management in the EEZ	Yes	Recognition of the importance of critical inshore habitats which provide habitat for cod from settlement through the first autumn of life and overlaps seasonal habitat of age-1 juvenile cod. The area also bounds the critical nursery zone for early benthic stages of

Source of criteria or preference	HAPC Criteria or Preference	Criteria or Preference Met?	Discussion
			important juvenile habitat for some other groundfish.
Council preference	Include EFH designations for more than one Council-managed species	Yes	
Council preference	Include juvenile cod EFH	Yes	Between 44% and 94% of the area includes juvenile cod depending on the option chosen and the EFH categories (no action or preferred alternative).
Council preference	Meet more than one of the EFH Final Rule HAPC criteria	Yes	Meets 3 of the criteria.

3.2.4 Great South Channel Juvenile Cod HAPC (approved in Phase 1)

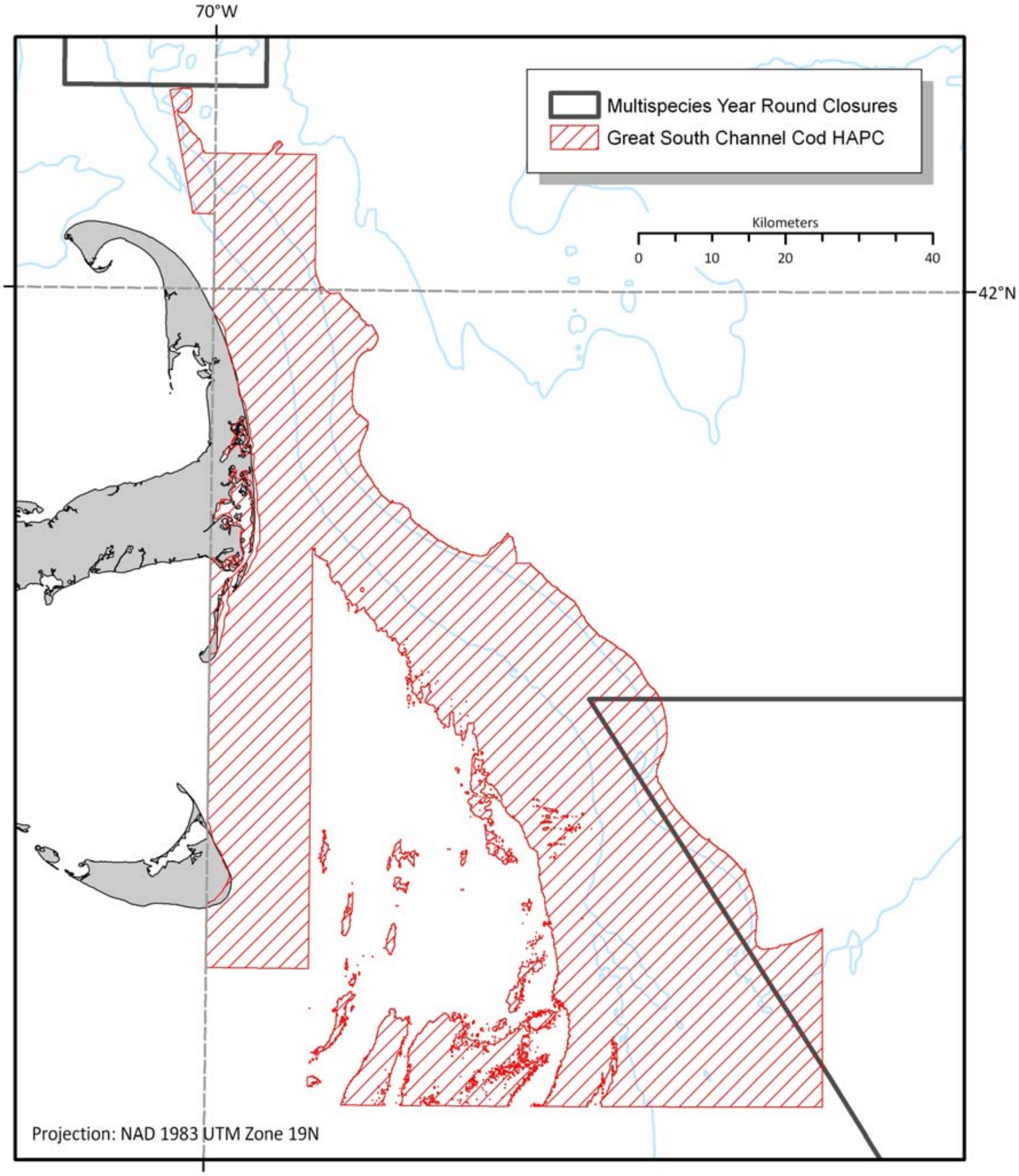
Background and designation

The Great South Channel is a large funnel-shaped bathymetric feature at the southern extreme of the Gulf of Maine between Georges Bank and Cape Cod, MA. The channel is bordered on the west by Cape Cod and Nantucket Shoals, and on the east by Georges Bank. The channel is generally deeper to the north and shallower to the south, where it narrows and rises to the continental shelf edge. To the north, the channel opens into several deepwater basins of the Gulf of Maine. The V-shaped 100-m isobath effectively delineates the steep drop-off from Nantucket Shoals and Georges Bank to the deeper basins.

The Great South Channel separates the main part of Georges Bank from Nantucket Shoals. Sediments in this region include gravel pavement and mounds, some scattered boulders, sand with storm generated ripples, scattered shell and mussel beds. Tidal and storm currents may range from moderate to strong, depending upon location and storm activity. The area west of the Great South Channel, known as Nantucket shoals is similar in nature to the central region of the bank. Currents in these areas are strongest where water depth is shallower than 50 m. The channel separates the western part of Georges Bank from Nantucket Shoals and is a region of high productivity due to an oceanic frontal system formed by the interaction of the Gulf of Maine and continental shelf waters and strong tidal currents.

The purpose of this HAPC is to recognize the importance of the area for its high benthic productivity and hard bottom habitats, which provide structured benthic habitat and food resources for cod and other demersal-managed species. The proposed designation is 4,537 nm^2 in area.

Map 5 – Great South Channel Juvenile Cod HAPC



<u>Rationale</u>

<u>Importance of Historic or Current Ecological Function</u>

This area contains structurally complex gravel, cobble, and boulder habitat, which supports a wide array of emergent epifauna that juvenile cod rely on for food and shelter from predation. Within the area, many different types of habitats exist that are important to juvenile cod. Deep-water locations (45 - 75 fathoms) have hard bottom with glacially deposited boulders that are fished for groundfish and include a greater diversity of species than shallow areas. Common fishing area names in this region include: (1) East Southeast Ridge; (2) Figs; (3) Jim Dwyers Ridge; (4) The Sixty-sixes; and (5) Pimple Ridges. Shallower-water locations (15 - 40 fathoms) have rock and gravel with benthic organisms such as horse mussels, tunicates, and sponges. Common fishing area names in this area include: (1) Lemons and (2) Mussels; (3) Crushed Shells; (4) East of Pollock Hole; (5) Codfish Grounds; (6) Big Mussels Cove; (7) Middle Rip; and (8) Pumpkins.

Sensitivity to Anthropogenic Stresses
The area contains habitat features that are particularly sensitive to the adverse effects associated with bottom trawling and scallop dredging.

Extent of Current or Future Development Stresses
The area faces threats from bottom trawling and scallop dredging, both of which occur throughout the area. Bottom trawling is also extensive throughout juvenile cod EFH in areas west of the Great South Channel and in gravel habitats on Georges Bank.

Rarity of the Habitat Type
Meets criteria?

Table 8- Summary of HAPC Final Rule Criteria and Council Preferences as applied to Great South Channel Juvenile Cod HAPC

Source of criteria or preference	*HAPC criteria or Council preference*	*Criteria or preference met?*	*Discussion*
EFH Final Rule criteria	Importance of Historic or Current Ecological Function	Yes	Contains structurally complex gravel, cobble, and boulder habitat, which supports a wide array of emergent epifauna that juvenile cod rely on for food and shelter from predation
EFH Final Rule criteria	Sensitivity to Anthropogenic Stresses	Yes	Contains habitat features that are particularly sensitive, to the adverse effects associated with bottom trawling and scallop dredging
EFH Final Rule criteria	Extent of Current or Future Development Stresses	Yes	Faces threats from bottom trawling and scallop dredging.
EFH Final Rule criteria	Rarity of the Habitat Type	Yes	Habitat type is rare in NE
Council preference	Will improve the fisheries management in the EEZ	Yes	Could improve understanding of importance of structurally complex areas for future fishery produvity.
Council preference	Include EFH designations for more than one Council-managed species	Yes	Includes 80 life stages under the status quo EFH and 64 life stages under the preferred alternative EFH.

Source of criteria or preference	*HAPC criteria or Council preference*	*Criteria or preference met?*	*Discussion*
Council preference	Include juvenile cod EFH	Yes	63% of the area is EFH for juvenile cod under status quo EFH and 47% of the areas is designated EFH for juvenile cod under the preferred alternative EFH. 90% of the area is EFH under adult cod under status quo EFH and 53% of the areas is designated EFH for adult cod under preferred alternative EFH.
Council preference	Meet more than one of the EFH Final Rule HAPC criteria	Yes	Meets all criteria.

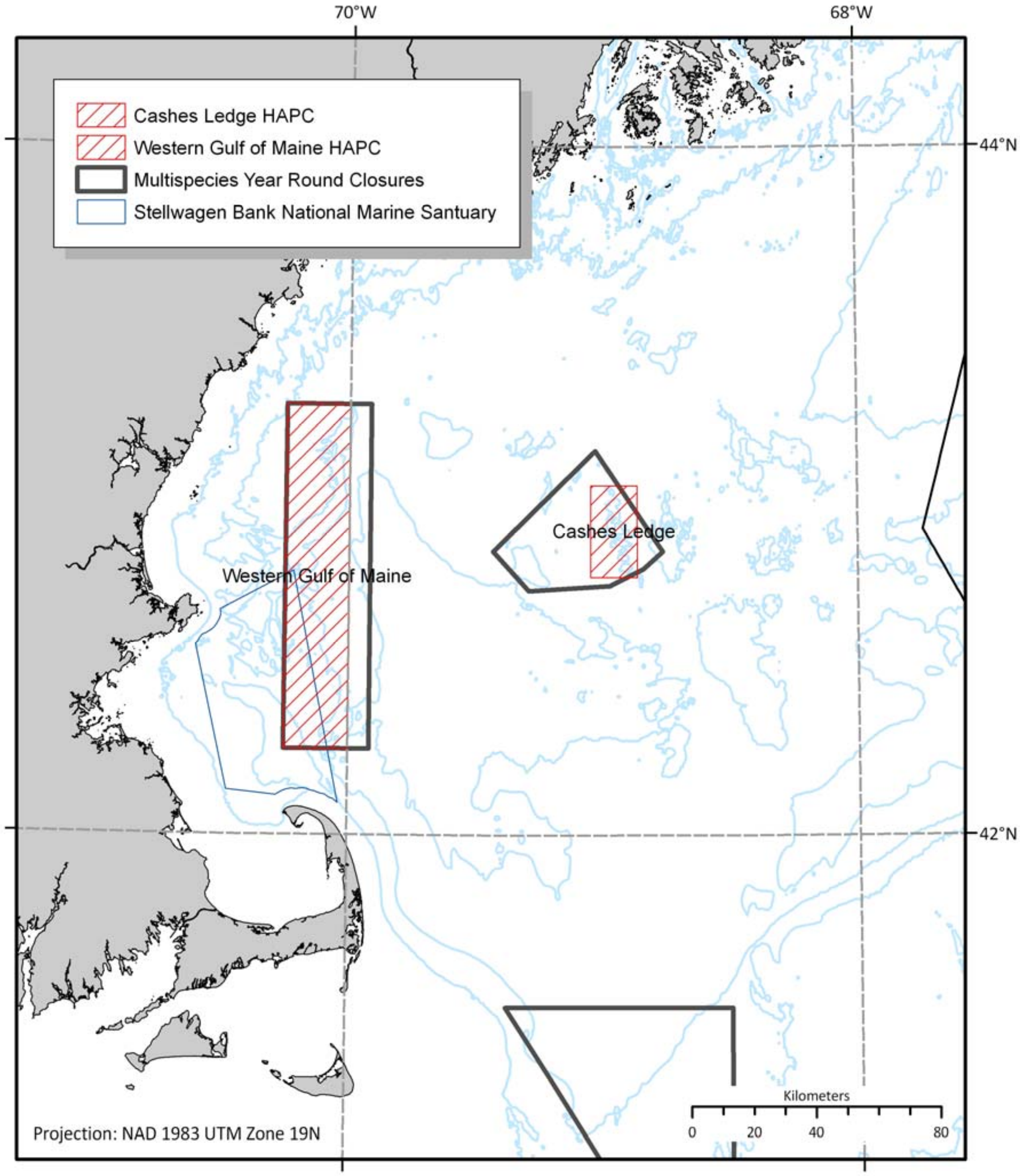
3.2.5 Cashes Ledge Area HAPC (approved in Phase 1)

Background and designation

Cashes Ledge is a granitic ridge located in the central Gulf of Maine which, including Ammen Rock Pinnacle, rises to within 26 meters of the ocean surface. The top of Cashes Ledge is primarily a steeply sided granitic outcrop that grades to boulder-talus-ledge, then cobble-sand and small outcrops, and finally sand-gravel as depth increases beyond approximately 75 m.

The 652-nm^2 Cashes Ledge HAPC encompasses areas outside of the Cashes Ledge Habitat Closed Area in order to include deeper water habitats and ridges associated with Cashes Ledge.

Map 6 – Gulf of Maine HAPCs, including Cashes Ledge HAPC and Jeffrey's Ledge/Stellwagen Bank HAPC



Rationale

Importance of Historic or Current Ecological Function

Several unique features contribute to the ecological importance of the Cashes Ledge area. Productivity in the Cashes Ledge area is noteworthy because the area generates and receives internal waves that drive thick, plankton-rich layers down to the ledge

(Witman et al. 1993). Dense aggregations of habitat forming invertebrates such as horse mussels, sea anemones, and sponges thrive on the productivity of the area and flourish along many of the peaks that distinguish the area (Witman and Sebens 1988, Lesser et al. 1994, Genovese and Witman, 1999, Hill et al. 2002) while burrowing anemones are abundant in the sand-gravel matrix beyond the base (Witman and Sebens 1988). Further, production of benthic macroalgae on Ammen Rock Pinnacle occurs at a record 63 m depth. The Cashes Ledge area continues to support a high abundance of large bodied predators such as cod, wolf fish, pollock, and sharks (Steneck 1997, Steneck and Carlton 2001, Steneck et al 2002, Witman and Sebens 1992) that are generally absent from rocky habitats along the coast of the Gulf of Maine. Fish may aggregate or have higher survival after settlement in the Cashes Ledge area due to increased availability of shelter (e.g., kelp forests, structure forming invertebrates) and abundant prey mediated by high water flow from nutrient-rich internal waves and other strong-current producing forces (Witman et al. 1993, Leichter and Witman 1997, Genovese and Witman 1999).

Sensitivity to Anthropogenic Stresses
To be completed

Extent of Current or Future Development Stresses
The greatest potential threat to the unique habitat features contained in the proposed Cashes Ledge HAPC is impacts caused by fishing gear. Currently, a portion of the area is designated as a habitat closed area, which prohibits the use of bottom-tending mobile gear. However, the designation does not prohibit the use of a wide array of other fishing gears, including but not limited to: 1) herring and tuna purse seines, 2) herring mid-water trawls, 3) bottom gillnets, 4) lobster pots, and 5) bottom longlines.

Rarity of the Habitat Type
The Cashes Ledge Area is a series of rocky pinnacles jutting up from the deep basins in the middle of the Gulf of Maine. Upwelling and internal waves deliver fish and invertebrate larvae to these pinnacles where settlement occurs. The combination of sunlight and nutrient-rich waters fuels the growth of these larvae creating a productive area that supports one of the largest kelp forests and deepest seaweed communities in the world, as well as abundant populations of large predatory fish including cod, pollock, wolf fish, and sharks. These unique conditions are found nowhere else in the greater Gulf of Maine/Georges Bank ecosystem, clearly making the Cashes Ledge area a rare habitat type.

Table 9 – Suitability of proposed Cashes Ledge HAPC

EFH Final Rule criteria or Council preference?	*Criteria or preference*	*Criteria Met?*	*Discussion*
Final rule	Importance of Historic or Current	Yes	Several unique features contribute to the ecological importance: productivity, dense

EFH Final Rule criteria or Council preference?	Criteria or preference	Criteria Met?	Discussion
	Ecological Function		aggregations of habitat forming invertebrates, production of benthic macroalgae at depths, high abundance of large bodied predators and higher fish survival after settlement due to the availability of shelter.
Final rule	Sensitivity to Anthropogenic Stresses	Yes	Benthic habitat features are sensitive to anthropogenic stresses, including impacts caused by fishing gear
Final rule	Extent of Current or Future Development Stresses	Yes	Areas adjacent to Cashes Ledge Habitat Closed Area are fished.
Final rule	Rarity of the Habitat Type	Yes	One of the largest and deepest continuous kelp beds in GOM
Council	Will improve the fisheries management in the EEZ	Yes	
Council	Include EFH designations for more than one Council-managed species	Yes	
Council	Include juvenile cod EFH	No	Includes adult cod.
Council	Meet more than one of the EFH Final Rule HAPC criteria	Yes	Meets all four criteria.

3.2.6 Jeffrey's Ledge/Stellwagen Bank HAPC (approved in Phase 1)

Background and designation

Three options were proposed during Phase 1 to designate an HAPC in and around Jeffrey's Ledge/Stellwagen Bank. The alternative chosen by the Council (see Map 6) is the same as the Western Gulf of Maine Habitat Closure Area designated in Amendment 13 to the Multispecies FMP.

Rationale

Importance of Historic or Current Ecological Function

The important ecological functions known to occur with the area have been recognized for over a century. Captain Henry Stellwagen first described the Stellwagen Bank area in 1854 as a 15 fathom bank characterized by a rocky substrate on the northern flank, sand features in the middle and southern end, and deeper mud basins just inshore of the bank itself. After the turn of the century, the report entitled *Fishing Grounds of the Gulf of Maine* identified both Jeffreys Ledge and Stellwagen Bank (or Middle Bank) as key fishing grounds. Jeffreys was known to contain rocky bottom in the shoaler water with gravel and pebbles along the edges. It was considered one of the best fishing grounds in the Gulf of Maine with cod, haddock, pollock, cusk, hake, flounder, herring, and mackerel all found in the area. Stellwagen and Tillies Banks were also identified as important fishing grounds with cod, haddock, pollock, cusk, and hake all present during times of the year (Rich, 1929). Additionally, the area has been recognized as a preferred habitat for several marine mammal species and seabirds for decades.

Jeffreys Ledge and Stellwagen Bank are shallow, glacially formed features that include a diversity of habitat types, including gravel/cobble substrates, boulder reefs, sand plains, and deep mud basins in a complex matrix. Oceanographic currents driven by the Gulf of Maine Coastal Current as well as from the impingement of internal waves deliver nutrient-rich waters to the area and the topographic features of the area result in upwelling that drives production. The complex matrix of sedimentary habitats supports a wide diversity of structure forming invertebrates including frilled anemones, burrowing anemones, sponges, bryozoans, ascidians, cold water corals (Auster et al. 1998, Grannis 2001). Such habitats are important areas for recruitment and survival of species such as cod, haddock, cusk, Acadian redfish, silver hake and a diversity of flounders (e.g., Auster et al. 2001, 2003a and 2003b). Further, the Jeffreys Ledge-Stellwagen Bank area supports a high diversity of fishes compared to many other areas in the Gulf (Auster 2002).

Sensitivity to Anthropogenic Stresses

To be completed – sensitivity to fishing impacts.

The unique habitat features and ecological processes within the area re also vulnerable to a number of other anthropogenic stresses, including but not limited to: 1) alteration of ecological processes resulting from nutrient and chemical pollution caused by cruise ships and cargo vessel discharges, sewage discharges from coastal communities including the city of Boston's municipal wastewater discharge, and terrestrial non-point source pollution, and 2) habitat alteration and disturbance of benthic communities caused by future sand and gravel mining operations, waste disposal, construction of fiber-optic cable and pipelines, and potential new industrial uses of the coastal waters and the seabed including offshore aquaculture facilities, wind energy, LNG facilities, and other energy-related infrastructure.

Extent of Current or Future Development Stresses

To be completed.

Rarity of the Habitat Type

Unique aspects of the habitats contained within the area include their extreme depth range, which bathes these features in Maine Surface and Intermediate Waters, as well as the fact that they represent the wide diversity of habitat types in the Gulf of Maine in a discrete location.

Table 10 – Summary of EFH Final Rule Criteria and Council preferences for the Stellwagen Bank-Jeffrey's Ledge proposed HAPC

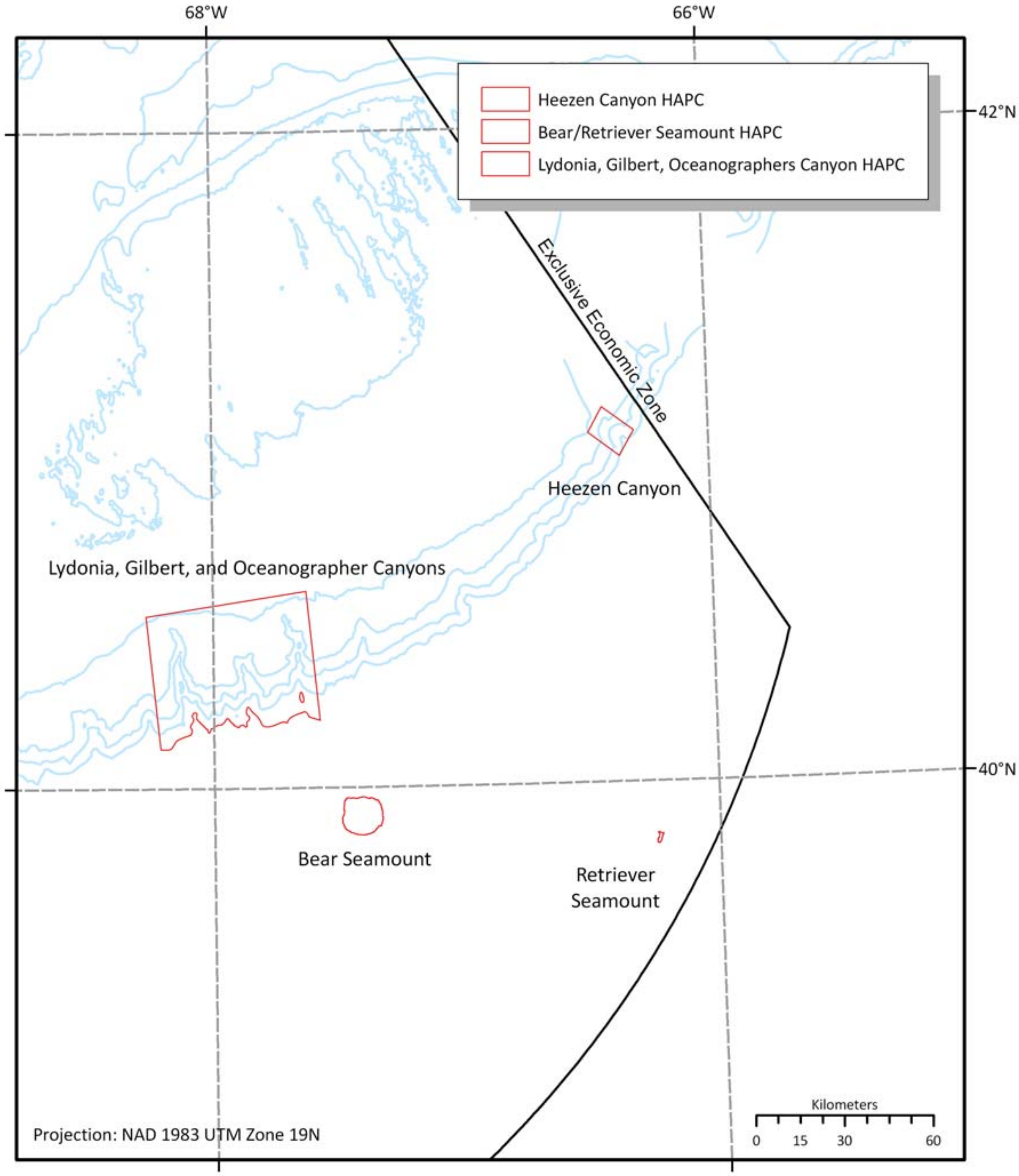
Source	Criteria or preference	Criteria Met?	Discussion
EFH Final Rule criteria	Importance of Historic or Current Ecological Function	Yes	Over 100 years ago the area was considered one of the best fishing grounds in the Gulf of Maine. Currently, the area supports a high diversity of fishes compared to many other areas in the Gulf complex and the matrix of sedimentary habitats supports a wide diversity of structure forming invertebrates.
EFH Final Rule criteria	Sensitivity to Anthropogenic Stresses	Yes	Potential fishing impacts from bottom gear and fishing pressure on both forage species (herring and sand lance) and predatory fish (cod, haddock, tuna, etc.).
EFH Final Rule criteria	Extent of Current or Future Development Stresses	Yes	Fishing threats: considerable commercial and recreational fishing effort in the proposed area. Non-fishing threats: 1) vessel discharges (ballast and gray water) from cruise ships and cargo vessels, 2) future sand and gravel mining operations, 3) sewage discharges from coastal communities including the city of Boston's municipal wastewater discharge, 4) terrestrial non-point source pollution, 5) other waste disposal operations, 6) fiber-optic cable and pipeline construction, and 7) potential new industrial uses of the coastal waters and seabed including offshore aquaculture facilities, wind energy, LNG facilities, and other energy-related infrastructure.
EFH Final Rule criteria	Rarity of the Habitat Type	Yes	Extreme depth range, which bathes these features in main surface and intermediate waters, as well as the fact that they represent the wide diversity of habitat types in the Gulf of Maine in a discrete location.
Council preference	Will improve the fisheries management in the EEZ	Yes	Recognition of habitats that are 1.) important areas for recruitment and survival of species such as cod, haddock, cusk, Acadian redfish, silver hake and a diversity of flounders and 2.) support a high diversity of fishes compared to many other areas in the Gulf of Maine.
Council preference	Include EFH designations for more than one Council-managed species	Yes	Includes EFH for between 40 and 67 life stages depending on the option chosen and the EFH categories (no action or preferred alternative)
Council	Include juvenile cod	Yes	Between 55% and 100% of the area includes juvenile cod

Source	Criteria or preference	Criteria Met?	Discussion
preference	EFH		depending on the option chosen and the EFH categories (no action or preferred alternative).
Council preference	Meet more than one of the EFH Final Rule HAPC criteria	Yes	Meets all of the criteria.

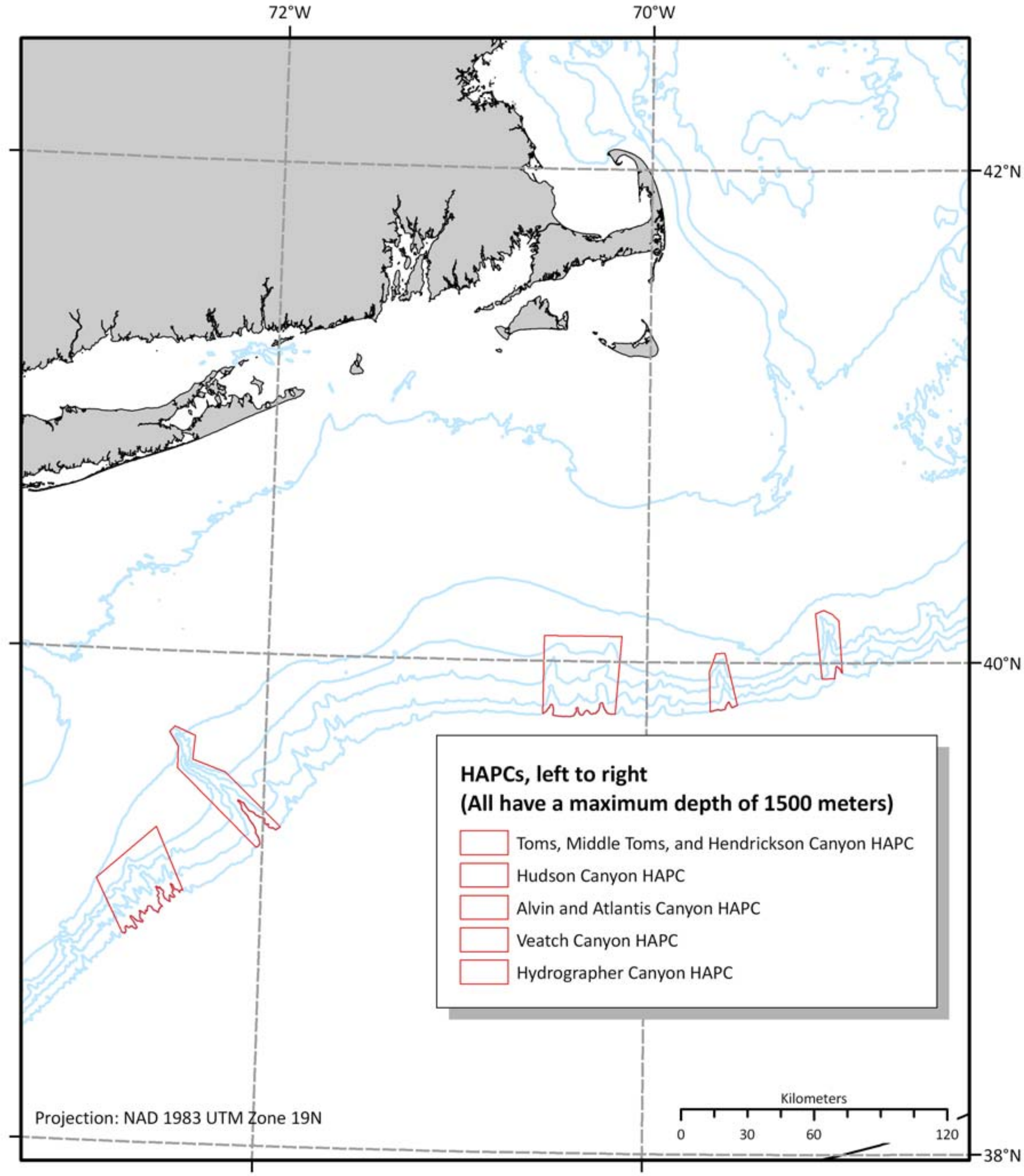
3.2.7 Deepwater canyon and seamount HAPCs (approved in Phase 1)

Various deepwater areas in the EEZ were proposed as candidates for HAPC designation in Phase 1, and a number of these proposals were subsequently approved by the Council. The boundaries of the selected HAPCs are illustrated on Map 7, Map 8, and Map 9.

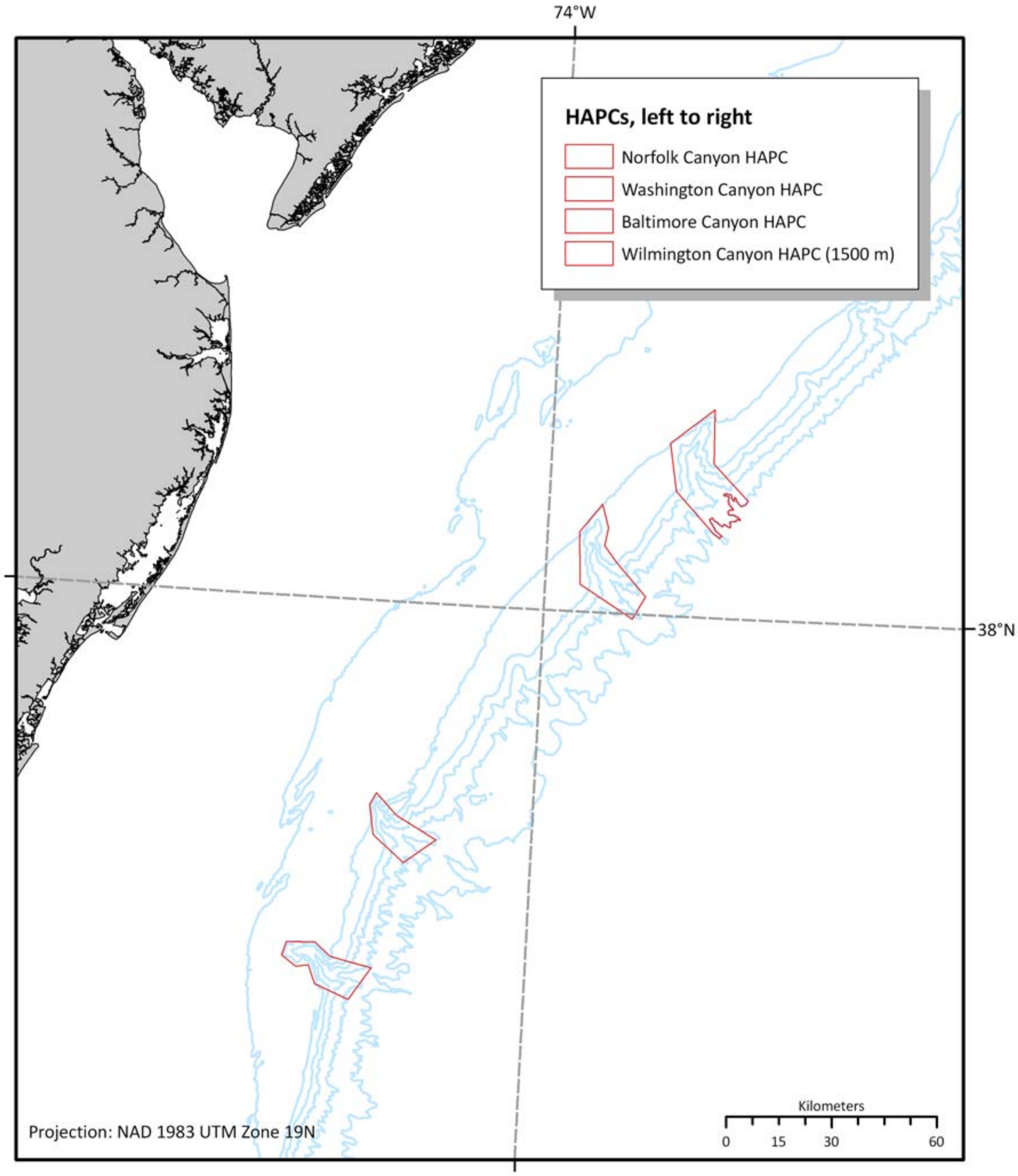
Map 7 – Georges Bank area HAPCs, including Bear and Retriever Seamounts with identifiable EFH HAPC, Heezen Canyon HAPC, Lydonia/Gilbert/Oceanographers Canyon HAPC



Map 8 – Toms/Middle Toms, and Hendrickson Canyon HAPC; Hudson Canyon HAPC; Alvin and Atlantis Canyon HAPC; Veatch Canyon HAPC; and Hydrographer Canyon HAPC



Map 9 – Norfolk Canyon HAPC, Washington Canyon HAPC, Baltimore Canyon HAPC, and Wilmington Canyon HAPC



3.2.7.1 Bear and Retriever Seamounts with identifiable EFH HAPC (approved in Phase 1)

<u>Background and designation</u>

The New England Seamount chain is a line of extinct volcanoes running from the southern side of Georges Bank to a point midway across the western Atlantic. The New England Seamount Chain, the Corner Rise Seamounts, the mid-Atlantic Ridge, and the deep sides of the Azores constitute a nearly continuous series of hard substrate "islands" in a sea of abyssal mud extending across the North Atlantic Ocean. These islands are therefore rare habitats within the context of the whole North Atlantic basin. The most westerly seamounts (i.e., Bear, Physalia, Retriever, and Mytilus) are within the boundary of the United States Exclusive Economic Zone.

Although these seamounts are further offshore than the shelf edge and slope, and are not within areas traditionally managed by current FMPs, they are within the EEZ and deep-sea red crab have been document in the areas. Areas of Bear and Retriever seamounts that overlapped spatially with the proposed EFH designation for deep-sea red crab were approved as an HAPC (see Map 7). These include areas of the seamounts shallower than 2000 m.

Rationale

Importance of Historic or Current Ecological Function
Seamounts support ecological communities with a high level of biodiversity that includes deep-sea corals and a wide array of ocean species that rely on them.

Sensitivity to Anthropogenic Stresses
The seamount habitats, which contain structure-forming organisms such as deep-sea corals, are extremely sensitive to disturbance and likely have recovery periods on the order of centuries. However, these seamounts are not currently fished.

Extent of Current or Future Development Stresses
No development is currently occurring on the New England Seamount Chain and it is unknown whether any will take place in the future. As such, the HAPC alternative does not meet this criterion.

Rarity of the Habitat Type
Seamounts have steep and complex topography, impinging currents with topographically induced upwellings, wide depth ranges, are dominated by hard substrates, are geographically isolated from continental platforms, and are dominated by invertebrate suspension feeders. Seamount faunas generally exhibit a high degree of endemism, owing to their isolation as well as the high degree of landscape variation at small and large spatial scales.

Table 11 – Suitability of Bear and Retriever Seamounts with indentifiable EFH proposed HAPC

Source	*Criteria or prefernce*	*Criteria Met?*	*Discussion*
EFH Final Rule criteria	Importance of Historic or Current Ecological Function	Yes	May provide "stepping stones" for dispersal and maintenance of populations of deepwater demersal fishes across ocean basins where their vertical distributions are restricted to slope depths
EFH Final Rule criteria	Sensitivity to Anthropogenic Stresses	Yes	Extremely sensitive to disturbance and, with low recruitment and growth rates, require extremely long periods of time to recover from any damage
EFH Final Rule criteria	Extent of Current or Future Development Stresses	No	N/A
EFH Final Rule criteria	Rarity of the Habitat Type	Yes	Rare habitats within the context of the whole North Atlantic basin and contain species endemism.
Council preference	Will improve the fisheries management in the EEZ	Yes	An opportunity to recognize sensitive coral communities with no impact to current economic investments by the fishing industry.
Council preference	Include EFH designations for more than one Council-managed species	No	N/A
Council preference	Include juvenile cod EFH	No	N/A
Council preference	Meet more than one of the EFH Final Rule HAPC criteria	Yes	

3.2.7.2 Canyon HAPCs (approved in Phase 1)

<u>Background and proposed designations</u>

The continental slope extends from the continental shelf break (at depths between 60 m and 200 m) eastward to a depth of 2000 m. The width of the slope varies from 10-50 km, with an average gradient of 3-6°; however, local gradients can be nearly vertical. The base of the slope, where the continental rise begins, is defined by a marked decrease in seafloor gradient. Occasional boulders occur on the slope as a result of glacial rafting, and coarse sediments and rock outcrops are found locally on and near canyon walls. Sand deposits may also be formed as a result of downslope movements. A "mud line" occurs on the slope at a depth of 250 m – 300 m, below which fine silt and clay size particles predominate over sand. Gravity-induced downslope movement is the dominant sedimentary process on the slope, and includes slumps, slides, debris flows, and turbidity currents, which range from thick cohesive movement to relatively non-viscous flow. Slumps are localized blocks of sediment that may involve short downslope movement. However, turbidity currents can transport sediments thousands of kilometers.

The continental slope is cut by more than 20 large canyons between Georges Bank and Cape Hatteras and numerous smaller canyons and gullies, many of which may feed into the larger canyon systems. The main purpose of the individual canyon HAPC alternatives is to designate as HAPC deep-sea canyons in the northeastern U.S. that contain or are believed to contain habitat-forming organisms including, but not limited to, stony corals (Sceractinians), black corals (Anthipitharians), cerianthid anemones, soft corals, sea pens and sponges. Recognizing the importance of these species and their communities will be a first step towards maintaining the vital functions they provide for managed fish species, of which there is some evidence but also a clear need for further research.

The following HAPCs were approved during Phase 1. The boundaries of the selected HAPCs are illustrated on Map 7, Map 8, and Map 9.

- Lydonia/Gilbert/Oceanographers Canyons HAPC
- Hydrographer Canyon HAPC
- Veatch Canyon HAPC
- Alvin/Atlantis Canyon HAPC
- Hudson Canyon HAPC
- Hendrickson/Toms/Middle Toms Area HAPC
- Wilmington Canyon HAPC
- Baltimore Canyon HAPC
- Washington Canyon HAPC
- Norfolk Canyon HAPC

Rationale:

Importance of Historic or Current Ecological Function
With respect to fisheries management and habitat protection, at least eight invertebrate groups found in deep-sea canyon environments contain species that potentially provide structures that form habitats for other marine organisms in deep water off the northeast coast of the United States.

The largest and most studied Georges Bank canyon is Oceanographer Canyon, and its surficial geology is generally similar to that in the other major canyons. The canyons present a spectrum of habitat types to the megabenthic and epibenthic fauna (crabs, lobster, shrimp, flounders, hake, tilefish, among others), and these habitats closely influence community structure. It is largely the diversity in substrate types that makes canyons richer biologically than the adjacent shelf and slope. This effect of substrate diversity may be aided by an abundance of nutrients introduced by the relatively strong currents in the canyons (Hecker, Blechschmidt, and Gibson, 1980).

The Georges Bank canyons apparently serve as nurseries for a number of bottom animals, including such commercially valuable species as lobster, Jonah crab, red crab, tilefish, and several kinds of hake. The young of such animals have been observed both in naturally occurring and in excavated shelters in the bottom, in both the semi-consolidated sandy silts (which look like clay) and in boulder fields. Such substrates are common in the canyons (Cooper and Uzmann, 1980 a,b). Concentrations of lobsters (juvenile and adult), for example, are substantially greater in submarine canyons than in areas nearby (Cooper and Uzmann, 1980b); lobsters seen inside the canyons are usually juveniles, while those nearby but outside the canyons are usually adults.

In general, assemblages of animals in the heads of various Georges Bank canyons are similar. Within these assemblages, groups that favor shallow and middle depths can be distinguished. The distinction is most clearly seen in the relative abundance of red crabs, portunid crabs, lobsters, witch flounder, ocean pout, conger eels, tilefish, squirrel hake, common grenadier, slime eels, long-nosed eels, and black-bellied rosefish. An outer shelf/upper slope faunal zone (113-299m) and a mid-slope zone (300-1099m) were found by Haedrich, Rowe, and Polloni (1975) in Alvin Canyon and by Valentine, Uzmann, and Cooper (1980a) in Oceanographer Canyon. Further evidence for this zonation in Oceanographer and Lydonia Canyon has come from Hecker (pers. comm.).

Faunal diversity and, to some extent faunal abundance, in the canyon heads appear to be closely tied to the presence of cobbles and boulders on the ocean floor and to exposures of the consolidated sandy silt into which various animals tunnel and burrow.

Georges Bank canyons exhibit a range of habitat types, as follows:

- Type I habitat (Cooper et al. 1982) which occurs on the canyon rim and walls, is a featureless bottom of sand or semi-consolidated silt (claylike in consistency) with less than 5% gravel cover; a burrowing anemone characterizes this habitat.

- Type II habitat is also a generally featureless bottom, of gravelly sand with at least 5% gravel cover overlying a silt substratum on the canyon rim and walls. The burrowing anemone is again characteristic – a key member of what is probably the most common association of animals in the Georges Bank canyons in depths shoaler than 400m. The tubes frequently become refuges for a variety of associated fauna, including Jonah crabs, portunid crabs, lobsters, pandalid shrimp, black-bellied rosefish, redfish, and red and silver hake. The surface of the projecting tubes also provides a consolidated surface for settlement and attachment of suspension feeders, contributing to an increased species diversity and abundance (Shepard et al. 1986).

- Type III habitat refers to featured, three-dimensional, very rough bottom, with siltstone outcrops and talus blocks of boulder size. These conditions are found on the rim and upper walls at the head of Oceanographer Canyon and farther down the canyon in several places at the base of the wall. White hake and ocean pout are found coexisting in surprising large numbers in this habitat. Other animals closely associated here are rock anemones, starfish, Jonah crab, and tilefish.

- Type IV habitat is a featured bottom of densely burrowed, semi-consolidated silt; it occurs chiefly on the upper-to-middle canyon walls. Jonah crabs, lobsters, and tilefish predominate in this habitat. Their association is perhaps the most distinctive in the canyons; Cooper and Uzmann (1977, 1980a,b) have called it the "pueblo village" community. Type IV habitat has been found at depths of 150-1000m on the canyon walls, but is most evident at shoaler depths (150-300m). Pueblo villages deeper than 300 m are occupied primarily by red crab, Jonah crab, white hake, and ocean pout. The apex predator of the villages is the tilefish. Pueblo villages appear to be the prime habitat and "home ground" of offshore lobsters. Some 20-50% of the adult population migrates onshore from the villages in the spring and early summer (Uzmann, Cooper, and Pecci, 1977; Cooper and Uzmann, 1980a,b), returning in the late summer and fall.

- Type V habitat refers to duned sand on the canyon floor. This has been found only in Oceanographer Canyon, from the very northern end south to a depth of at least 700m.

Sensitivity to Anthropogenic Stresses

The steep slopes of the canyon walls are generally inaccessible to mobile fishing gear, such as dredges and otter trawls, and except for seasonal trapping, canyon inhabitants are not targets of a fishery. Thus, the canyons serve as refuges for bottom species that are sought commercially elsewhere and for species that are disturbed or destroyed incidentally in the course of dredging and dragging. However, the upper slopes and less steep parts of the canyon system are accessible to fishing for species such as monkfish, offshore hake, red crab and others .

Extent of Current or Future Development Stresses

In recent years, energy companies have suggested the use of the upper slope of the canyons as transmission lines for energy resources and products, such as natural gas, as a connection line between sources on the Scotian Shelf and the major U.S. metropolitan areas. Other examples of fture development stress may exist.

Rarity of the Habitat Type

The canyons may be regarded as highly modified areas of the continental slope that exhibit to varying degrees a more diverse fauna, topography, and hydrography than the intervening slope areas. Alternating erosional and depositional episodes over geologic time have shaped and modified these rare canyon systems into specialized habitats distinct from the classically defined slope province.

Table 12 – Summary of Alternative 3 Suitability: HAPC Criteria and Council Preferences

Source	***Criteria or preference***	***Criteria or preference met?***	***Discussion***
EFH Final Rule criteria	*Importance of Historic or Current Ecological Function*	Yes.	Ecologically distinct and important.
EFH Final Rule criteria	*Sensitivity to Anthropogenic Stresses*	Yes	Accessible to fishing for species such as monkfish, offshore hake, red crab and others
EFH Final Rule criteria	*Extent of Current or Future Development Stresses*	Yes	Reasonable to assume that development stresses in these canyons will increase in the future
EFH Final Rule criteria	*Rarity of the Habitat Type*	Yes	Erosional and depositional episodes over geologic time have shaped and modified these rare habitats.
Council preference	*Will improve the fisheries management in the EEZ*	Yes	May reduce the development of these areas for fishing or non-fishing purposes and allow the natural processes to remain.
Council preference	*Include EFH designations for more than one Council-managed species*	Yes	Many species designated under status quo and preferred alternative EFH
Council preference	*Include juvenile cod EFH*	Yes	Very small amount in Lydonia, Oceanographer, Gilbert and Heezen Canyons.
Council preference	*Meet more than one of the EFH Final Rule HAPC criteria*	Yes	Meets all four criteria.

3.3 Alternatives to integrate and optimize measures to minimize the adverse impacts to EFH across all Council managed FMPs

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires fishery management plans to minimize to the extent practicable the adverse effects of fishing on fish habitats. To meet this requirement, fishery managers would ideally be able to quantify such effects and visualize their distributions across space and time. The Swept Area Seabed Impact (SASI) model provides such a framework, enabling managers to better understand: (1) the nature of fishing gear impacts on benthic habitats, (2) the spatial distribution of benthic habitat vulnerability to particular fishing gears, and (3) the spatial and temporal distribution of realized adverse effects from fishing activities on benthic habitats.

The model combines fishing effort data with substrate data and benthic boundary water flow estimates in a geo-referenced, GIS-compatible environment. Contact and vulnerability-adjusted area swept, a proxy for the degree of adverse effect, is calculated by conditioning a nominal area swept value, indexed across units of fishing effort and primary gear types, by the nature of the fishing gear impact, the susceptibility of benthic habitats likely to be impacted, and the time required for those habitats to return to their pre-impact functional value. The SASI model was developed by the New England Fishery Management Council's (NEFMC) Habitat Plan Development Team.

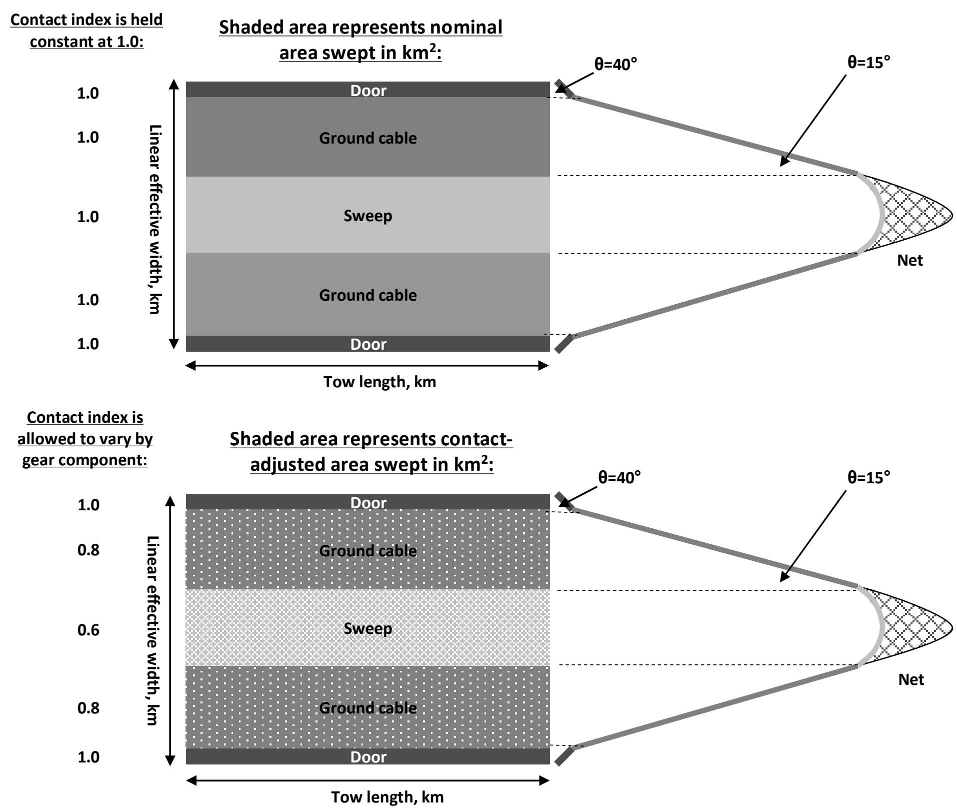
The SASI model can be updated and improved as new sources of fishing effort or habitat data become available, or as underlying assumptions are refined based on emerging research. Looking beyond the Omnibus EFH Amendment, the SASI model is intended for long-term use in evaluating the impacts of future management actions on fish habitats. A detailed description of the SASI model, including data sources and results, is provided in Appendix D.

Fishing effort estimation

In order to compare habitat impacts resulting from various types of fishing gears, all fishing effort in the SASI model is represented using a common area swept currency. The first step was to classify effort into nine major bottom-tending gear types: generic/groundfish trawls, shrimp trawls, squid trawls, raised footrope trawls, New Bedford-style scallop dredges, surf clam and ocean quahog hydraulic dredges, lobster and deep-sea red crab traps, bottom gill nets, and bottom longlines. These gear types are commonly used in areas designated as EFH for NEFMC-managed species, to target species managed by the NEFMC and/or Mid-Atlantic Fishery Management Council (MAFMC).

By gear type, assumptions were made regarding the angle of attack of each gear component in order to calculate a linear effective width for each gear component individually and then for the gear as a whole. This linear effective width was then multiplied by the length of the tow to generate nominal area swept. Next, assumptions about the contact of each gear component with the seabed were used to convert nominal area swept to contact-adjusted area swept. These contact indices are expressed as proportions, ranging from zero to one, such that contact adjusted area swept is always less than or equal to nominal area swept. A schematic of this calculation for trawl gears is shown in Figure 1. Although the area swept for each tow is calculated separately, resulting contact adjusted area swept values in km^2 may be summed by trip, year, gear type, etc.

Figure 1 – Area swept schematic (top down view). The upper portion shows nominal area swept, and the lower portion shows contact adjusted area swept.



Vulnerability Assessment

The purpose of the vulnerability assessment was to estimate the magnitude of the impacts that result from the physical interaction of fish habitats and fishing gears. The vulnerability information is then used to condition area swept via a series of susceptibility and recovery parameters. It is important to recognize that the vulnerability assessment only considers (a) adverse (vs. positive) effects and (b) habitat associated with the seabed (vs. the seabed and the water column). For ease in evaluating impacts, fish habitat was divided into components, geological and biological (non-living and living, respectively), which were further subdivided into features. Structural features identified include bedforms, biogenic burrows, sponges, macroalgae, etc. These may either provide shelter for managed species directly, or provide shelter for their prey.

The vulnerability assessment used a series of matrices to organize and present qualitative estimates of susceptibility and recovery for each feature by fishing gear type. While both components (geological, biological) were assumed to occur in every habitat type, the presence or absence of particular features was assumed to vary based on substrate type and natural disturbance (energy) regime. Thus, habitat types in the vulnerability assessment were distinguished by dominant substrate, level of natural disturbance, and the presence or absence of various features.

Susceptibility was defined as the percentage by which a feature is reduced in functional value due to the impact of a particular fishing gear, and recovery was defined as the amount of time it would take for the functional value of the diminished habitat feature to be restored following the cessation of impact. Recovery was evaluated separately for high and low energy environments. Both susceptibility and recovery were scored from 0-3. Values are assigned using knowledge of the fishing gears and habitat features combined with results from the scientific literature on gear impacts. As an example, the otter trawl/mud matrix with its component features is shown in Figure 2.

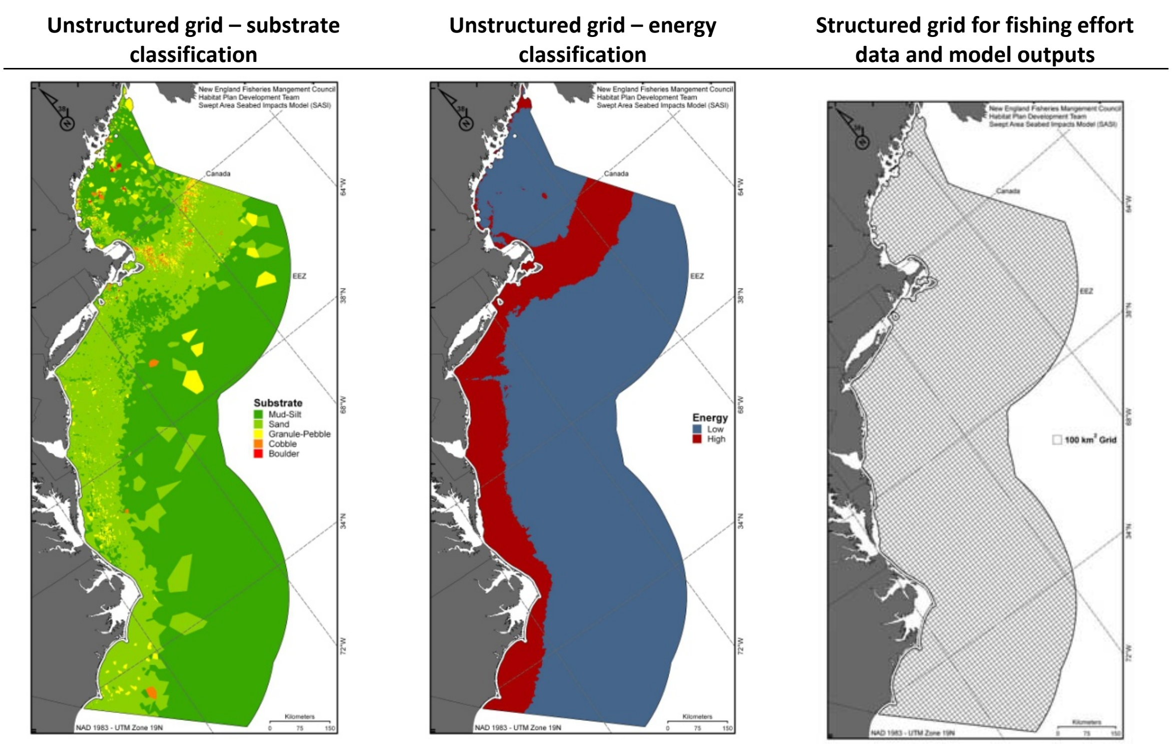
Figure 2 – Sample matrix for generic trawl gears in mud substrates.

Gear: Trawl							
Substrate: Mud							
Feature	**Gear effects**	**Literature high**	**Literature low**	**S High**	**S Low**	**R High**	**R Low**
Amphipods, tube-dwelling	crushing	34, 113, 119, 211, 228, 292, 334, 408, 409, 599, 658	89, 80, 97, 113, 149, 320, 575	1	1	0	0
Anemones, cerianthid burrowing	breaking, crushing, dislodging, displacing	none	none	2	2	2	2
Biogenic burrows	filling, crushing	334, 408, 409	101, 313, 333, 336, 407	2	2	0	0
Biogenic depressions	filling	236, 408, 409	101, 247, 336	2	2	0	0
Corals, sea pens	breaking, crushing, dislodging, displacing	none	101, 164	2	2	2	2
Hydroids	breaking, crushing, dislodging, displacing	408, 409	368	2	2	1	1
Mollusks, epifaunal bivalve, *Modiolus modiolus*	breaking, crushing, dislodging, displacing	21, 34, 368, 408, 409	89, 203, 368	2	2	3	3
Sediments, unfeatured surface	resuspension, compression, geochem	88, 92, 211, 236, 330, 334, 406, 408, 409, 599	88, 211, 247, 277, 283, 313, 320, 333, 335, 336, 338, 372, 407, 414	3	3	0	0

Model grid

To be useful for spatially explicit management strategies, SASI outputs must be spatially referenced. A substrate-based model grid was developed to provide a surface on which to combine area swept fishing effort data and vulnerability information. Two sources of substrate data, usSEABED and University of Massachusetts Dartmouth School for Marine Science and Technology (SMAST) video survey, were used to generate the grid. Across both data sets, substrates were classed based on particle size (using the Wentworth scale) into mud, sand, granule/pebble, cobble, and boulder. An unstructured grid was generated from the raw substrate data using a Voronoi tessellation procedure. Depending on the arrangement of samples in space, the grid cells vary in shape and may be larger or smaller, as shown below. Next, each of these grid cells was classified as having a high or low natural disturbance (energy) regime using critical shear stress and depth-based criteria. Finally, a 100 km^2 grid was overlaid on the unstructured grid, and the substrate composition of each 100 km^2 grid cell was calculated based on the attributes of the typically smaller unstructured cells.

Figure 3 – SASI model grids. From left: Substrate, showing mud (green), sand (light green), granule-pebble (yellow), cobble (orange), and boulder (red); Energy, with low energy in blue and high in red; structured grid for fishing effort data, with 100 km^2 cells.



Combining fishing effort, feature vulnerability, and spatial grids

The SASI model combines contact-adjusted area swept estimates with the substrate and energy surfaces and the assigned susceptibility and recovery scores for each of the seabed features to calculate the vulnerability-adjusted area swept (measured in km^2), represented by the letter Z. This value is the estimate of the adverse effects from fishing on fish habitat. The model can be used to estimate adverse effects based either on a simulated hypothetical amount of fishing area swept (Z_∞ outputs), or the realized area swept estimated from fishery-dependant data ($Z_{realized}$ outputs). The former estimate is intended to represent underlying habitat vulnerability, while the latter can be used to understand change in adverse effects over time. The latter approach can also be used to forecast the impacts of future management actions, given assumptions about shifts in the location and magnitude of area swept. These outputs are generated at the structured (100 km^2) grid cells level.

Z can be represented using the following equation:

$$Z_{t+1} = Z_t + \left[\sum_{i=1}^{9} \sum_{j=1}^{n} \sum_{k=1}^{5} \sum_{l=1}^{2} \sum_{m=1}^{27} \left[\left(\lambda \left(\mathrm{A}_{i,j} \omega_{k,l} \right)_{t_0} \Delta t \right) - \left(\mathrm{A}_{i,j} \omega_{k,l} \right)_t \right] \right].$$

In this equation, **A** represents the nominal area swept by one unit of fishing effort and **ω** represents susceptibility, which in this case is a quality adjustment based on the vulnerability of habitats to fishing gears. The parameter **λ** represents the decay rate and is calculated as **1/τ**, where **τ** is the total number of time steps over which the adverse effects of fishing will decay (i.e. the recovery paremeter estimate). t_0 is the initial time unit that the affect enters the model and Δt is the contemporary time step, such that $\Delta t = t - t_0$ where t is the year for which the calculation is being made. The model is indexed across all units of fishing effort (***j***) by nine fishing gear types (***i***) and a matrix of habitat types determined by combinations of five substrates (***k***), two energy environments (***l***) and 27 individual habitat features (***m***).

Spatial clustering analysis (LISA)

One way in which Z_∞ (adverse effect) estimates were evaluated was through formal spatial analysis. The objectives of the SASI spatial clustering analysis were to (explore the spatial structure of the asymptotic area swept (Z_∞), and to define clusters of high and low Z_∞ for each gear type. The analysis was intended to focus the Habitat Committee and Council's attention on areas with clusters of high vulnerability grid cells, as one starting point for developing spatially based alternatives to minimize adverse effect. Local Indicators of Spatial Association (LISA) statistics developed by Anselin (1995), which are designed to test individual sites for membership in clusters, were used.

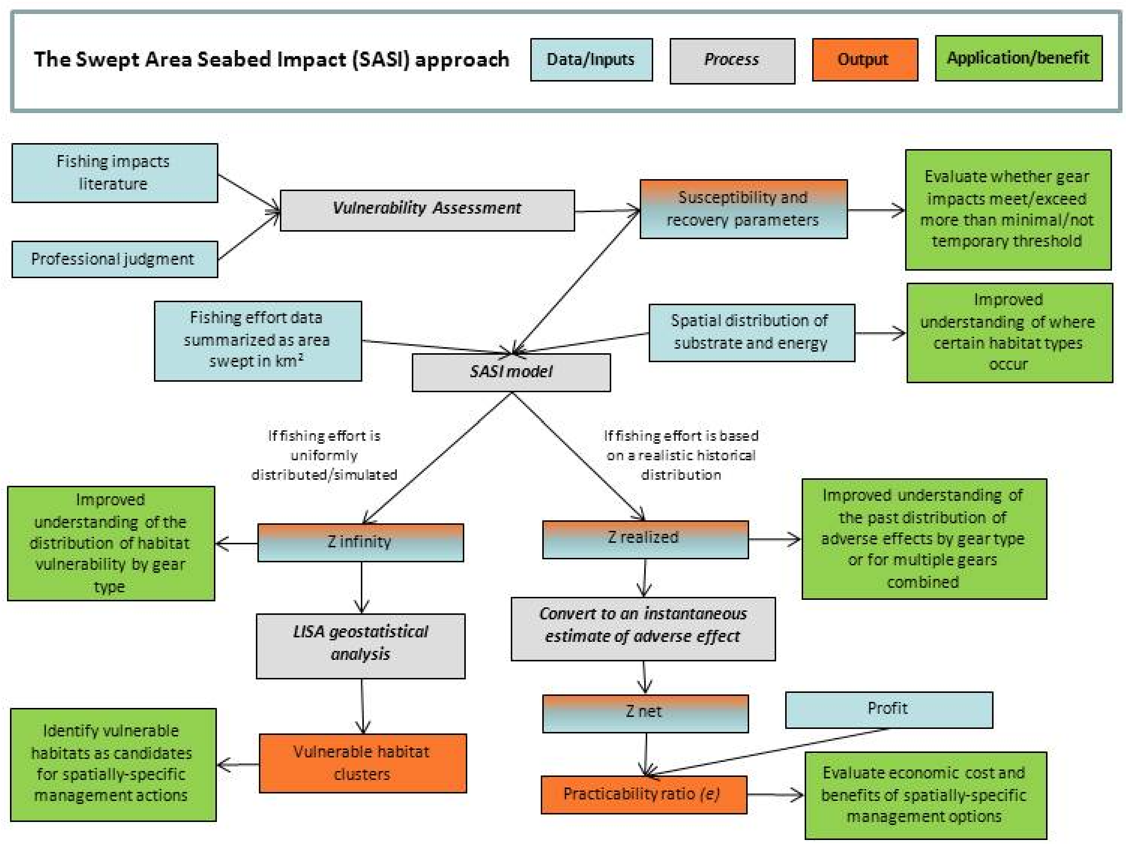
Practicability analysis (Z_{net}, *e*)

Z_{net} is an instantaneous variant of $Z_{realized}$ that can be compared with trip level revenue estimates to generate a practicability ratio, *e*. For gears with high habitat impact relative to revenue, the *e* ratio is large, while for gears with a low habitat impact relative to revenue, the *e* ratio is small, approaching zero for some gear types. Z_{net} and *e* were developed for evaluating the relative practicabilty of management alternatives, as the Council has expressed interest in optimizing its adverse effects minimization strategy across different gear types, fisheries, and areas.

Summary

The various model components, including fishing effort, the various grids, and habitat feature vulnerability, are combined as described in Figure 4.

Figure 4 – SASI model flowchart



The following management options were developed at the October 28, 2010 joint Habitat Committee/PDT meeting based on SASI model outputs and other sources of information. The sections below explain each option, provide a brief rationale, and summarize analyses conducted by the PDT to date to evaluate the option based on benefits to EFH. These analyses will be reviewed by the Committee in January 2011 and then individual options will be packaged into alternatives for further evaluation. Individual area-based options are likely to have synergistic effects on the total magnitude of adverse effects across one or more gear types/fisheries, because restrictions on fishing in one location will affect the magnitude of fishing in other locations. Thus, the PDT recommends that alternatives be developed that consist of a suite of individual area-based gear restriction and/or gear modification options. Further analyses of these alternatives will summarize and compare likely changes in adverse effects across all the options that comprise each alternative.

3.3.1 Measures for Georges Bank habitat closed areas

These habitat closed areas were implemented via Amendment 13 to the Multispecies FMP. Areas with the same boundaries will be written into the scallop regulations as habitat closed areas once Amendment 15 to the Atlantic Sea Scallop FMP is implemented, which is expected in mid-2011. Currently, the areas are closed to all mobile, bottom-tending gear on a year round basis. Note that with the exception of portions of the the NLCA habitat closed area, the boundaries of these closures lie within year-round multispecies mortality closures. The following options consider elimination of three of these closed areas from both the multispecies and scallop FMPs.

The analytical approach would be the same for all three areas, and is described in detail in a separate document. Briefly, for each area-based simulation, fishing effort would be allowed to occur in an area approximately the size of the habitat closed area being analyzed. The amount of fishing effort that goes into the reopened habitat closed area would be based on a redistribution of fishing effort from grid cells proximate to the area being evaluated. Note that the areas boundaries for the parcels evaluated in this analysis are not exactly those of the habitat closed areas. Nonetheless, the rough magnitude and direction of habitat benefits/impacts are expected to hold, given acceptance of the assumptions of the SASI model and the Z_{net} analysis. Results are presented on a gear-by-gear basis.

In the tables presented below, the total, global magnitude of the adverse effects of fishing on habitat for a gear type can be understood by examining the magnitude of the Z_{net} values themselves. To be clear, Z_{net} values appear in each table even if fishing with that gear type does not occur in a particular area because they are the global Znet estimates for that gear. These Z_{net} values can be compared between gear types, given the various underlying assumptions of the SASI model. For a single gear type, the change in adverse effects that results from reopening a particular parcel is best understood using the % change in Z_{net} values.

Also, note that if these options were implemented, if another overlapping closure prohibits fishing by certain gear types in the area, those prohibitions would hold. Specifically, restrictions associated with the mortality closures (no fishing by gear capable of catching groundfish) would remain. However, eliminating one or more of these habitat closed areas would open the door to reasonably forseeable future actions, including expansion or addition of sea scallop access areas, or of groundfish Special Access Program (SAP) fisheries. Thus, the results of the analysis as discussed below show potential habitat impacts/benefits that are contingent upon additional action on the part of the Council’s species committees.

3.3.1.1 Eliminate CAII habitat closed area

Rationale for this option: EAP analysis of generic otter trawl gear SASI model Z_{∞} outputs indicated that the grid cells overlapping the CAII habitat closure rank relatively high in terms of habitat vulnerability in comparison with other areas throughout the model domain of the same size. However, results of the LISA cluster analysis for trawl gear outputs indicate that the most vulnerable structural habitats in that region are centered slightly to the west (area known as cluster 5/Georges Shoal cluster). Therefore, this option would eliminate the current closed area, and a new habitat area might potentially be implemented via a separate option.

The following table shows Z_{net} simulation results for the CA2 north parcel, which is slightly larger than the CAII habitat closed area. Note that the global magnitude of adverse effect varies across gear types. Also, for gear types with no fishing activity in the vicinity of CAII, as would be expected, there is no change in global Z_{net} when fishing is allowed in the area. This is the case for raised footrope, shrimp, and squid trawls, as well as general category scallop dredges. For the other gear types, the percent decrease in Z_{net} after opening the CA2 North parcel ranges from 3% to 101% of the original global Z_{net} for that gear type.

Table 13 – Habitat impacts/benefits of eliminating CAII habitat closed area, based on Closed Area 2 North simulation results.

Gear	Sum of Z_{net} before opening	Sum of Z_{net} after opening	% change in Z_{net}	Habitat impact/benefit due to opening area
Generic otter trawl	125,932.90	110,050.90	-12.60%	Decrease in adverse effects
Raised footrope trawl	165	165	0.00%	No change
Shrimp trawl	5,390.30	5,390.30	0.00%	No change
Squid trawl	12,150.20	12,150.20	0.00%	No change
General category scallop dredge	1,055.00	1,055.00	0.00%	No change
Limited access scallop dredge	13,659.50	11,428.70	-16.30%	Decrease in adverse effects
Gillnet	61.4	51	-17.00%	Decrease in adverse effects
Longline	122.2	-1.7	-101.00%	Decrease in adverse effects
Pot/Trap	345.4	335.1	-3.00%	Decrease in adverse effects

3.3.1.2 Eliminate CAI habitat closed area(s)

Note that the CAI habitat closed area is comprised of two non-contiguous areas, CAI-N and CAI-S, and that this option as written would eliminate both areas.

Rationale for this option: EAP analyses of trawl gear type SASI model outputs indicated that the grid cells overlapping the CAI-N and CAI-S habitat closures rank relatively low in terms of habitat vulnerability in comparison with other areas throughout the model domain of the same size.

The following table shows Z_{net} simulation results for the three CA1 parcels, east, west, and north. Results are grouped by gear type. Again, note that the global magnitude of adverse effect varies across gear types, and for gear types with no fishing activity in the vicinity of CAI, as would be expected, there is no change in global Z_{net} when fishing is allowed in the area. This is the case for raised footrope, shrimp, and squid trawls. For the other gear types, the percent decrease in Z_{net} after opening the one of the CA1 parcels ranges from 0.1% to 80% of the original global Z_{net} for that gear type.

Table 14 – Habitat impacts/benefits of eliminating CAI habitat closed area, based on Closed Area 1 East, North, and West simulation results.

Area	Gear	Sum of Z_{net} before opening	Sum of Z_{net} after opening	% change in Z_{net}	Habitat impact/benefit due to opening area
CA1 E	Generic otter trawl	125,932.90	110,319.50	-12.40%	Decrease in adverse effect
CA1 N	Generic otter trawl	125,932.90	117,598.20	-6.60%	Decrease in adverse effect
CAI W	Generic otter trawl	125,932.90	108,994.30	-13.50%	Decrease in adverse effect
CA1 E	Raised footrope trawl	165	165	0.00%	No change
CA1 N	Raised footrope trawl	165	165	0.00%	No change
CAI W	Raised footrope trawl	165	165	0.00%	No change
CA1 E	Shrimp trawl	5,390.30	5,390.30	0.00%	No change
CA1 N	Shrimp trawl	5,390.30	5,390.30	0.00%	No change
CAI W	Shrimp trawl	5,390.30	5,390.30	0.00%	No change
CA1 E	Squid trawl	12,150.20	12,150.20	0.00%	No change
CA1 N	Squid trawl	12,150.20	12,150.20	0.00%	No change
CAI W	Squid trawl	12,150.20	12,150.20	0.00%	No change
CA1 E	General category scallop dredge	1,055.00	779.1	-26.20%	Decrease in adverse effect
CA1 N	General category scallop dredge	1,055.00	1,055.10	0.00%	No change
CAI W	General category scallop dredge	1,055.00	787.7	-25.30%	Decrease in adverse effect
CA1 E	Limited access scallop dredge	13,659.50	11,719.80	-14.20%	Decrease in adverse effect
CA1 N	Limited access scallop dredge	3,659.50	13,647.90	-0.10%	Decrease in adverse effect
CAI W	Limited access scallop dredge	13,659.50	11,380.10	-16.70%	Decrease in adverse effect
CA1 E	Gillnet	61.4	54.7	-10.90%	Decrease in adverse effect
CA1 N	Gillnet	61.4	59	-4.00%	Decrease in adverse effect
CAI W	Gillnet	61.4	52.9	-13.80%	Decrease in adverse effect
CA1 E	Longline	122.2	63	-48.40%	Decrease in adverse effect
CA1 N	Longline	122.2	82.6	-32.40%	Decrease in adverse effect
CAI W	Longline	122.2	24.7	-79.80%	Decrease in adverse effect
CA1 E	Pot/Trap	345.4	345.2	-0.10%	Decrease in adverse effect
CA1 N	Pot/Trap	345.4	340.7	-1.40%	Decrease in adverse effect
CAI W	Pot/Trap	345.4	339.1	-1.80%	Decrease in adverse effect

3.3.1.3 Eliminate NLCA habitat closed area

Rationale for this option: EAP analyses of trawl gear type SASI model outputs indicated that the grid cells overlapping the NLCA habitat closure rank relatively low in terms of habitat vulnerability in comparison with other areas throughout the model domain of the same size.

The following table shows Z_{net} simulation results for the NLCA west parcel. Again, note that the global magnitude of adverse effect varies across gear types, and for gear types with no fishing activity in the vicinity of NLCA west, as would be expected, there is no change in global Z_{net} when fishing is allowed in the area. This is the case for raised footrope, shrimp, and squid trawls, as well as for general category scallop dredges. For the other gear types, the percent decrease in Z_{net} after opening the NLCA west parcel ranges from 0.3% to 60% of the original global Z_{net} for that gear type.

Table 15 - Habitat impacts/benefits of eliminating NLCA habitat closed area, based on NLCA West simulation results.

Gear	Sum of Z_{net} before opening	Sum of Z_{net} after opening	% change in Z_{net}	Habitat impact/benefit due to opening area
Generic otter trawl	125,932.90	108,100.50	-14.20%	Decrease in adverse effect
Raised footrope trawl	165	165	0.00%	No change
Shrimp trawl	5,390.30	5,390.30	0.00%	No change
Squid trawl	12,150.20	12,150.20	0.00%	No change
General category scallop dredge	1,055.00	1,055.00	0.00%	No change
Limited access scallop dredge	13,659.50	13,618.10	-0.30%	Decrease in adverse effect
Gillnet	61.4	37.2	-39.50%	Decrease in adverse effect
Longline	122.2	49	-59.90%	Decrease in adverse effect
Pot/Trap	345.4	222.3	-35.60%	Decrease in adverse effect

3.3.2 Measures for the WGOM habitat closed area

These options would either eliminate the WGOM habitat closure or change the regulations associated with that closure, depending on the sub-option selected. The WGOM habitat closure was implemented via Amendment 13 to the Multispecies FMP, and a habitat closure area with the same boundaries will be written into the scallop regulations once Amendment 15 to the Atlantic Sea Scallop FMP is implemented, which is expected in mid-2011.

3.3.2.1 Eliminate WGOM habitat closed area

This option would eliminate the WGOM habitat closure from both the multispecies and scallop FMPs. The analytical approach for this area is the same as that described for the three habitat closures on Georges Bank, described above.

The following table shows Z_{net} simulation results for the WGOM parcel. Again, note that the global magnitude of adverse effect varies across gear types, and for gear types with no fishing activity in the vicinity of the WGOM (raised footrope and squid trawl) there is no change in global Z_{net} when fishing is allowed in the area. For the other gear types, the percent decrease in Z_{net} after opening the NLCA west parcel ranges from 0.3% to 73% of the original global Z_{net} for that gear type.

Gear	Sum of Z_{net} before opening	Sum of Z_{net} after opening	% change in Z_{net}	Habitat impact/benefit due to opening area
Generic otter trawl	125,932.90	125,604.30	-0.30%	decrease in adverse effect
Raised footrope trawl	165	165	0.00%	no change
Shrimp trawl	5,390.30	1,463.70	-72.80%	decrease in adverse effect
Squid trawl	12,150.20	12,150.20	0.00%	no change
General category scallop dredge	1,055.00	676.1	-35.90%	decrease in adverse effect
Limited access scallop dredge	13,659.50	12,713.50	-6.90%	decrease in adverse effect
Gillnet	61.4	56.8	-7.40%	decrease in adverse effect
Longline	122.2	65.7	-46.20%	decrease in adverse effect
Pot/Trap	345.4	341.3	-1.20%	decrease in adverse effect

3.3.2.2 Change gear restrictions in WGOM habitat closed area

Currently, mobile bottom-tending gears (i.e. trawls and dredges) are excluded from the WGOM habitat closure. This includes trawl vessels targeting northern shrimp. One possible management option would be to allow shrimping in the WGOM habitat closed area, or a portion of it. As of Amendment 13 to the Multispecies FMP, shrimping is already allowed within the WGOM groundfish mortality closure, which overlaps the WGOM habitat closed area. This exemption was made for the mortality closure because bycatch of managed groundfish is generally low in shrimp trawls due to the requirement for a fish-excluding Nordmore grate. However, shrimping is precluded in most of the WGOM due to the existence of the habitat closure. Due to the distribution of shrimp, shrimping effort is minimal in the eastern portion of the WGOM mortality closure that does not overlap with the habitat closure (M. Raymond, personal communication). From an industry perspective, the most desirable area for shrimp fishery access would be the northern portion of the WGOM habitat closure (M. Raymond, personal communication).

Figure 5 shows the location of shrimp trawl effort before and after implementation of the WGOM habitat closure for two years with similar overall landings, 1997 and 2007. Table 16 summarizes 1996-2009 (calendar year) adverse effect ($Z_{realized}$) and area swept for the shaded cells in the figure. As expected, there has been a shift in area swept and adverse effect away from the shaded cells. However, this trend was evident prior to the May 2004 implementation of the habitat closed area.

Figure 5 – Comparison of 1997 (upper left panel) and 2007 (lower left panel) effort in the shrimp trawl fishery near the WGOM habitat and mortality closures. The northern part of the WGOM habitat closure that would be preferred for access by the shrimp industry is outlined in purple. SASI 100 km² grid cells most closely associated with this area are shaded grey in the right hand panel; numbers correspond to those in the table below.

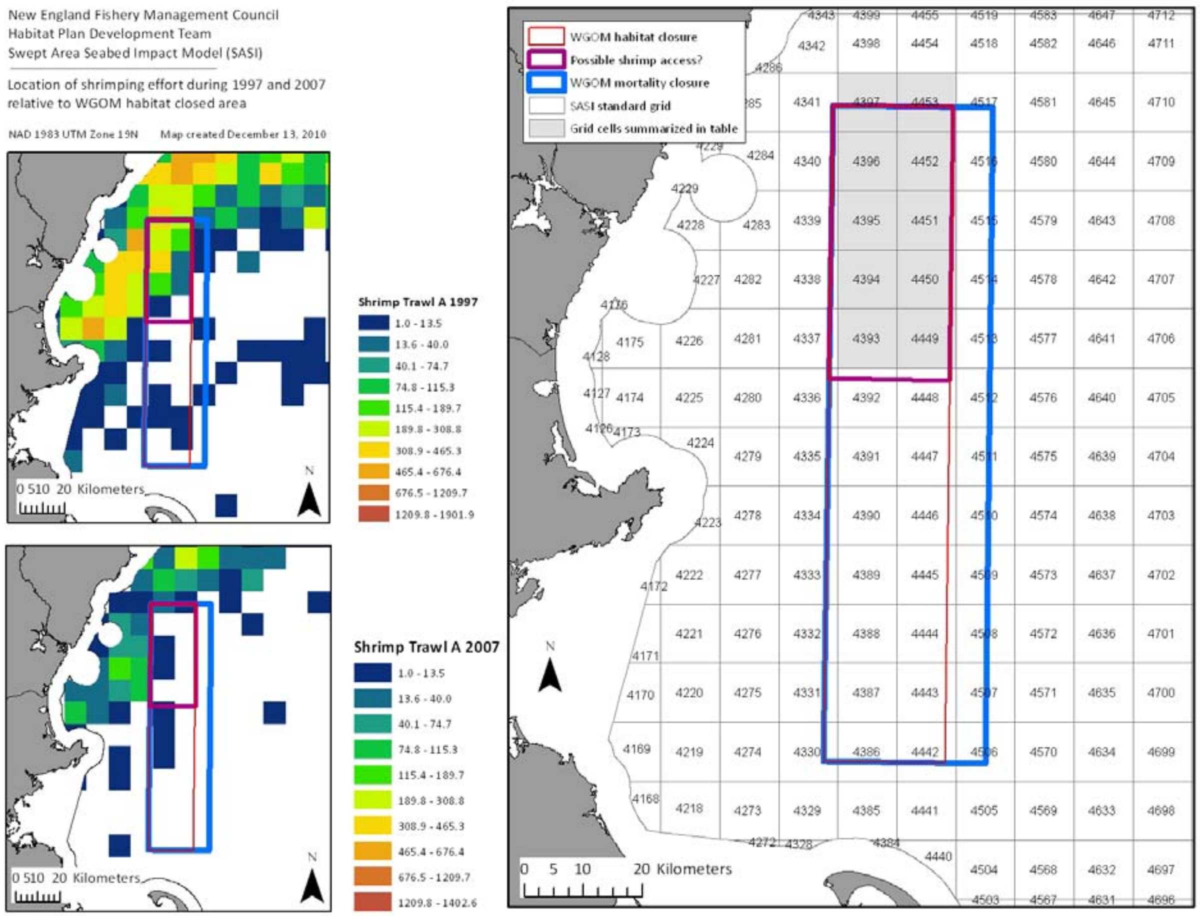


Table 16 – Shrimp trawl adverse effect and area swept for selected grid cells in and around northern portion of WGOM habitat closed area (shaded in figure above) by calendar year from 1996-2009. Note that the total for entire fishery includes all shrimp effort in GOM and off Carolina coast.

$Z_{realized}$ (Adverse effect, absolute value) km^2														
100km_ID	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
4393	7	6	2	15	4	2	1	1	0	0	0	0	1	0
4394	126	86	111	72	29	17	10	5	3	2	5	3	14	5
4395	248	195	120	74	34	19	10	5	3	2	2	2	1	1
4396	157	142	83	40	21	11	6	3	2	1	0	0	0	0
4397	95	141	81	42	22	27	10	6	5	3	6	9	8	3
4449	4	2	1	1	0	0	1	0	0	0	0	0	0	0
4450	7	9	6	3	2	1	1	0	0	0	0	0	0	0
4451	48	29	27	18	9	5	3	2	1	1	0	0	0	0
4452	152	122	78	45	30	18	10	6	4	2	9	4	2	1
4453	173	123	62	38	20	10	5	3	12	4	2	3	1	3
Total for cells in area	**1018**	**854**	**572**	**349**	**172**	**111**	**57**	**33**	**29**	**14**	**24**	**22**	**27**	**13**
Total for entire fishery	**13517**	**13802**	**11612**	**10817**	**10147**	**7837**	**5763**	**4232**	**3910**	**3049**	**2677**	**4274**	**4816**	**3408**
% of total adverse effect	**8%**	**6%**	**5%**	**3%**	**2%**	**1%**	**1%**	**1%**	**1%**	**0%**	**1%**	**1%**	**1%**	**0%**

Area swept km^2														
100km_ID	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
4393	14	11	0	45	0	0	0	0	0	0	0	0	4	0
4394	265	138	243	113	2	3	0	0	0	0	13	6	40	4
4395	519	348	150	71	0	4	0	0	0	0	3	6	0	3
4396	334	283	102	13	0	0	0	0	0	0	0	0	0	0
4397	195	340	118	28	0	42	0	3	3	0	14	25	18	0
4449	9	0	0	0	0	0	3	0	0	0	0	0	0	0
4450	13	18	8	2	0	0	0	0	0	0	0	0	0	0
4451	88	25	41	15	0	0	0	3	0	0	0	0	0	0
4452	252	151	42	0	8	0	0	0	0	0	29	0	0	0
4453	367	199	42	23	3	0	0	0	32	2	0	6	1	8
Total for cells in area	**2056**	**1513**	**748**	**310**	**12**	**50**	**3**	**5**	**36**	**2**	**59**	**43**	**62**	**14**
Total for entire fishery	**26879**	**27721**	**20637**	**19963**	**19145**	**12623**	**8340**	**5659**	**6547**	**4679**	**4438**	**10219**	**10878**	**5639**
% of total area swept	**8%**	**5%**	**4%**	**2%**	**0%**	**0%**	**0%**	**0%**	**1%**	**0%**	**1%**	**0%**	**1%**	**0%**

3.3.2.3 Amend boundaries of WGOM habitat closed area

The Habitat Committee asked the PDT to look at other options for the WGOM area. The PDT discussed modifying the closed area boundaries to better encompass habitats identified as vulnerable by the SASI model, but has not had the opportunity to consider specific boundary changes as yet.

3.3.3 Measures for Georges Bank LISA clusters 5, 6, and 7

These options would establish new habitat areas in one or more locations centered around LISA trawl clusters 5 (Georges Shoals), 6 (Great South Channel), and/or 7 (Brown's Ledge). Depending on the sub-option selected, the areas would either restrict fishing by all mobile-tending bottom gear (i.e. all types of trawls and dredges), or trawls only.

The analytical approach would be the same for all three areas, and is similar to the Znet analyses conducted for the habitat closed areas in CAI, CAII, NLCA, and WGOM, except that results are presented for generic otter trawl and limited access scallop dredge only. Note that the Z_{net} values in the tables below are for inside the parcel only, and also that the percentages are shown as percent decrease, such that the signs indicate the opposite effect on adverse effects as compared to the previous Z_{net} tables.

To more accurately reflect current fishing practices we use parcel level mean profit and Z_{net} data from 2007 – 2009 only. For each closure scenario, we simply sum the amount of profit and Z_{net} that is found inside the proposed closure area, redistribute the 'missing' profits proportional to the observed spatial distribution of fishing effort, assign the corresponding Z_{net} estimate to the profits now generated outside the proposed area closure, and calculate the change in aggregate Z_{net}. Unlike the area opening analysis, no assumptions are made here regarding catch rates and profits for the redistributed fishing effort post-closure. Redistributed fishing effort will almost always result in lower profits and proportionally higher Z_{net}, and for this reason the estimates provided in this analysis are highly likely to overstate reductions in aggregate Z_{net}. Data for only the Georges Bank and Gulf of Maine regions are used to better reflect where displaced effort will likely fish. We focused our efforts for these analyses on the two most affected gear types – generic otter trawl and limited access scallop dredge.

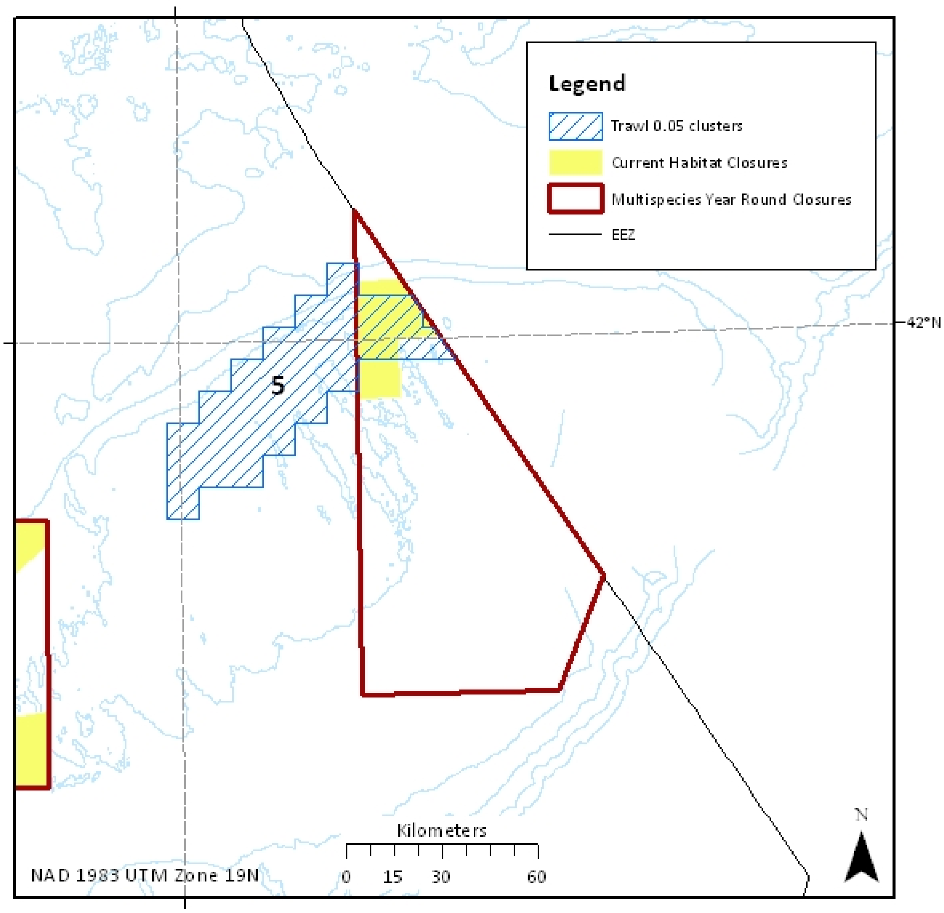
Area closure options for clusters 5 and 6 appear to potentially affect between $5-7.5 million of profits for these two gear types, representing less than 5% of their total aggregate profits from the Georges Bank and Gulf of Maine regions (see "profit at risk" in the tables below). However, the redistribution of these profits is estimated to have relatively minimal effects on aggregate Z_{net}. As with all adverse effects options, the largest net gains are to be had by regulating the otter trawl gear type, with Z_{net} reductions on the order of 1,000 km^2 for Cluster's 5 and 6. Closure of Cluster 5 is estimated to slightly increase adverse effects for the limited entry scallop dredge fishery.

Cluster 7 is estimated to have the smallest impact, both on industry profits and adverse effects minimization.

3.3.3.1 Cluster 5 (Georges Shoals)

These sub-options evaluate two levels of gear restrictions in cluster 5 (Map 10).

Map 10 – Cluster 5 (Georges Shoals). Based on trawl gear Z∞ SASI outputs evaluated using LISA analysis with probability criteria of 0.05.



3.3.3.1.1 Close to all mobile bottom-tending gear

This option would close an area based on cluster 5 to all trawl and dredge gears. For generic trawl gear, this option would result in a slight decrease in adverse effects, while for limited access scallop dredge gear, this option would result in a slight increase in adverse effects.

Table 17 – Closure option for Cluster 5 (Georges Shoal), change in Z_{net} (2007-2009 VTR, profits in 1,000 dollars)

Gear	Pre-closure profit	Profit at risk	Pre-closure Z_{net}	Closure Z_{net}	% reduction in Z_{net}	Habitat benefits/impacts as a result of closure
Generic otter trawl	$57,076	$2,921	37,816	36,946	2.3%	Decrease in adverse effects
Limited access scallop dredge	$105,998	$4,483	6,526	6,592	-1.0%	Increase in adverse effects

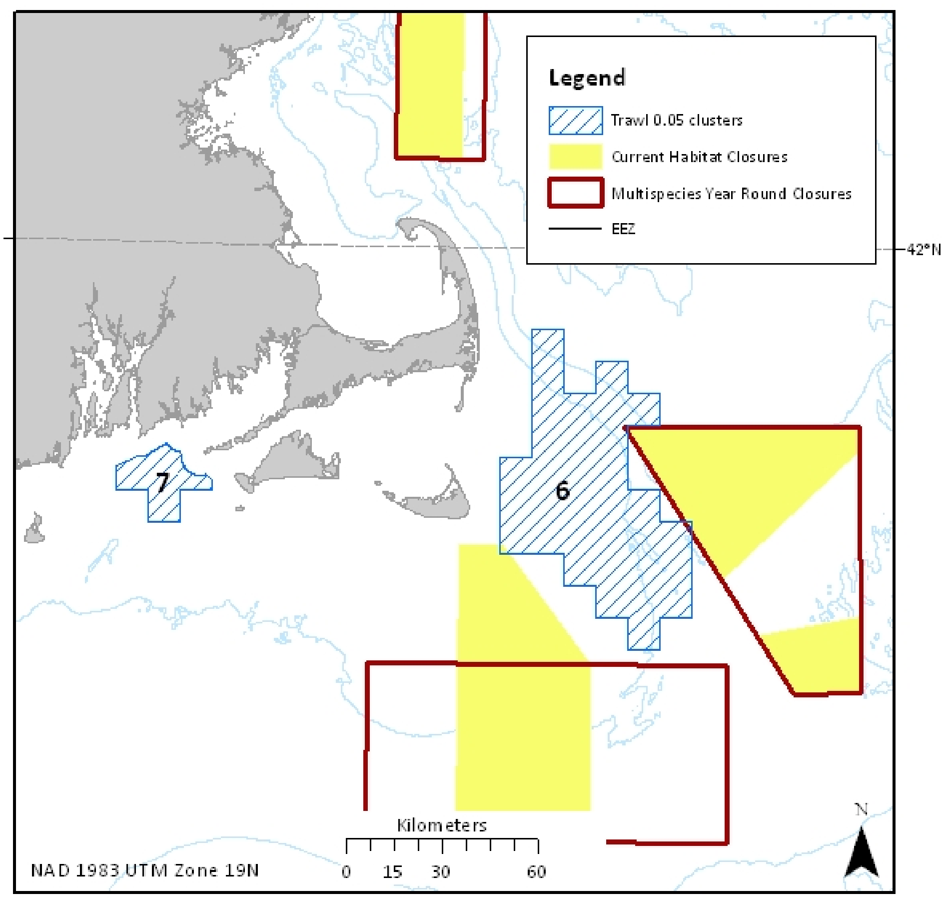
3.3.3.1.2 Close to all trawl gear

This option would close an area based on cluster 5 to all trawl gears. As noted above, for generic trawl gear, this option would result in a slight decrease in adverse effects.

3.3.3.2 Cluster 6 (Great South Channel)

These sub-options evaluate two levels of gear restrictions in cluster 6 (Map 11).

Map 11 – Clusters 6 (Great South Channel) and 7 (Brown's Ledge). Based on trawl gear Z∞ SASI outputs evaluated using LISA analysis with probability criteria of 0.05.



3.3.3.2.1 Close to all mobile bottom-tending gear

This option would close an area based on cluster 6 to all trawl and dredge gears. As shown below, this option would result in a decrease in adverse effects across both gear types.

Table 18 – Closure option for Cluster 6 (Great South Channel), change in Z_{net} (2007-2009 VTR, profits in 1,000 dollars)

Gear	Pre-closure profit	Profit at risk	Pre-closure Z_{net}	Closure Z_{net}	% reduction in Z_{net}	Habitat benefits/impacts as a result of closure
Generic otter trawl	$57,076	$1,996	37,816	36,695	3.0%	Decrease in adverse effects
Limited access scallop dredge	$105,998	$3,048	6,526	6,071	7.0%	Decrease in adverse effects

3.3.3.2.2 Close to all trawl gear

This option would close an area based on cluster 6 to all trawl gears. As noted above, adoption of this option is expected to result in a decrease in adverse effects from fishing with the generic trawl gear type.

3.3.3.3 Cluster 7 (Brown's Ledge)

These sub-options evaluate two levels of gear restrictions in cluster 7 (Map 11).

3.3.3.3.1 Close to all mobile bottom-tending gear

This option would close an area based on cluster 7 to all trawl and dredge gears. Based on the simulation, a slight increase in adverse effects resulting from the use of generic otter trawl gear would be expected following closure of the cluster, while the closure is expected to have no effect on scallop dredge adverse effects.

Table 19 – Closure option for Cluster 7 (Brown's Ledge), change in Z_{net} (2007-2009 VTR, profits in 1,000 dollars)

Gear	Pre-closure profit	Profit at risk	Pre-closure Z_{net}	Closure Z_{net}	% reduction in Z_{net}	Habitat benefits/impacts as a result of closure
Generic otter trawl	$57,076	$310	37,816	37,862	-0.1%	Slight increase in adverse effects
Limited access scallop dredge	$105,998	$-	6,526	6,526	0.0%	No change.

3.3.3.3.2 Close to all trawl gear

This option would close an area based on cluster 7 to all trawl gears. As noted above, a slight increase in adverse effects resulting from the use of generic otter trawl gear would be expected following closure of the cluster.

3.3.4 Gear restriction/closure measures for SBNMS

These options would implement gear restrictions or closures within the boundaries of SBNMS. They need to be further developed and analyzed by the PDT.

3.3.4.1 Closed to all bottom-tending gear

This option would close all/part of SBNMS to all bottom-tending gears, including trawls, dredges, and fixed gears.

3.3.4.2 Closed to all mobile bottom-tending gear

This option would close all/part of SBNMS to all mobile bottom-tending gears.

3.3.4.3 Closed to selected mobile-bottom tending gear

This option would close all/part of SBNMS to some mobile bottom-tending gears, such as some or all types of trawls, and/or some types of dredges.

3.3.5 Measures for the Georges Bank mortality closures

These options would modify the Georges Bank mortality closures, while maintaining some level of spawning closures (either year-round or seasonal) depending on the sub-option selected.

3.3.5.1 No action – all current areas remain closed

This option would maintain the current mortality closures on Georges Bank (NLCA, CAI, CAII).

3.3.5.2 Open non-spawning areas within mortality closures to fishing year round

This option would demonstrate the EFH benefits/impacts of opening portions of the mortality closures on a year-round basis. Spawning areas would be excluded and would remain closed to gears capable of catching groundfish. These spawning areas would be identified in collaboration with the groundfish committee/PDT. **Because the Council at their November 2010 meeting voted not to consider removal of groundfish mortality closures as a 2011 management priority, this option will not be evaluated further as collaboration to identify specific seasonal spawning closures was not supported.**

3.3.5.3 Open mortality closures year round, with specific seasonal spawning closures

This option would demonstrate the EFH benefits/impacts of the mortality closures on a year-round basis. Spawning areas would remain closed seasonally to gears capable of catching groundfish. These spawning areas would be identified in collaboration with the groundfish committee/PDT. **Because the Council at their November 2010 meeting voted not to consider removal of groundfish mortality closures as a 2011 management priority, this option will not be evaluated further as collaboration to identify specific seasonal spawning closures was not supported.**

3.3.6 Measures to reduce adverse effects via gear restrictions

Two types of gear restriction options are described and evaluated in the following sections, including a maximum ground gear size and a maximum ground cable size.

3.3.6.1 Implement ground gear maximum sizes in cluster areas 1, 3, and 4

Ground gear is defined as attachments to the bottom portion of the net to allow the net to be fished on certain bottom types, or to adjust selectivity for certain species. **These options would place an upper limit on ground gear size in one or more of the GOM cluster areas 1, 3, and 4.**

Rationale: The Committee discussed that closure of these areas to various gears was not a reasonable option, given data limitations for these three cluster areas. Restrictions on trawl gear configurations were discussed as an option that would continue to allow fishing in the areas, while hopefully achieving benefits in terms of minimizing impacts to EFH. Specifically, restricting the use of roller gears to smaller sizes would be expected to make it more difficult to fish in areas dominated by large gravel substrate.

Background: Different ground gear materials and ground gear sizes/compositions are used for various applications. For example, when fishing for certain species over smooth bottom, a chain sweep may be used consisting of loops of chain suspended from a steel cable, with only a few links of each loop contacting the seabed. At this time it is unclear how extensive this gear is or what species are targeted. An alternative is a sweep comprising a single length of chain in a raised footrope trawl. The chain contacts the seabed along its entire length. Another alternative is to use a cookie sweep, consisting of a wire (or chain) passed through rubber disks (cookies). Each cookie is similar in diameter (4 – 5 in) and usually tightly fitted (compressed) against one another to ensure no space between adjacent cookies. They do not usually roll when in seabed contact.

Rockhopper gear is possibly the most commonly used sweep design in the groundfish fishery. This gear is often constructed from rubber disks compressed together with larger diameter disks fitted at regular intervals. The disks are generally punched out truck or car tires. The 'classic' rockhopper sweep has a wire passing through each roller to prevent rolling and facilitate their passage over large obstacles (Classic rockhopper sweep, Figure 6), although not all fishermen use this additional wire (Classic rockhopper sweep – without additional wire, Figure 6). The diameter of the large disks may decrease in towards the wingends of the trawl. This gear allows the trawl to pass over rough substrates, and only the larger diameter disks contact the seabed.

Rockhopper gear can also be used on smooth seabed and the space between individual rollers can allow the escapement of bottom dwelling animals. For example, there are reports of some groundfish fishermen using this sweep to reduce the capture of skates. An additional modification to this gear is to fit thin rubber disks at intervals between the large disks to prevent escapement of flatfish. The thin disks are the same diameter as the larger disks, so these too contact the seabed (Classic rockhopper sweep with thin disks, Figure 6).

Roller gear is another variation sometimes used. It consists of large diameter, wide (thick) rubber disks or bead-like rollers designed to roll over the seabed (Roller gear images, Figure 6). Along the wings of the trawl, the rollers are often replaced with cookies compressed together or a rockhopper-style ground gear without wire passing through each disk (Wings of roller sweep, Figure 6). The curvature of the sweep allows only the middle rollers to rotate; those located along the shoulders of the trawl are dragged laterally over the seabed.

As a general rule, ground gear type and construction reflects expected rugosity of the seabed and escape behavior of target species. The diameter of cookies may measure from 10 to 41 cm (4 to 16 in). Rubber disk diameter may measure around 15 cm (6 in) and the larger disks 45 to 90 cm (18 to 36 in).

It is unlikely that fishermen finesse their gear sufficiently to add/remove weight of ground gear unless under exceptional circumstances. The sweep is not frequently altered, particularly at sea, and it is often preferred to use another net with modified sweep attached, rather than exchanging sweeps between nets. Also noteworthy is that the weight of ground gear does not change substantially with depth. A change in volume is required for this to occur, and compressive forces on ground gear components do not significantly alter volume between depths. Towing speed, rigging, or use of materials with different specific weight (density) will have a greater impact on ground gear weight in water and degree of seabed contact. Also, note that rubber disks lose about 70% of their weight in air as soon as they are submerged (and at greater depths the change is relatively minor because there is little further compression/change in volume that occurs).

Figure 6 – Ground gear configurations.

Classic rockhopper sweep

Classic rockhopper sweep – without additional wire

Classic rockhopper sweep with thin disks

Roller gear

Roller gear

Roller gear

Wings of roller sweep

3.3.6.1.1 12 inch maximum diameter

Analysis to be completed.

3.3.6.1.2 20 inch maximum diameter

Analysis to be completed.

3.3.6.1.3 28 inch maximum diameter

Analysis to be completed.

3.3.6.2 Implement ground cable length maximum sizes in cluster areas 1, 3, and 4

Ground cables are defined as wires extending along the seabed between the trawl doors and the bridles or net; for the purpose of herding fish and increasing the area of seabed fished (swept) by the trawl gear. Ground cable diameter can be increased be passing the wires through rubber disks (cookies) or rollers; this modification is designed to assist passage of the ground cables over the seabed. T**hese options would place an upper limit on ground cable length in one or more of the GOM cluster areas 1, 3, and 4.**

Rationale: The Committee discussed that closure of these areas to various gears was not a reasonable option, given data limitations for these three cluster areas. Restrictions on trawl gear configurations were discussed as an option that would continue to allow fishing in the areas, while hopefully achieving benefits in terms of minimizing impacts to EFH. Specifically, restricting the ground cable size would reduce area swept for each tow, and thus reduce overall seabed contact and therefore habitat impacts.

Background: Ground cables are typically constructed from steel wire rope (twisted), often with small diameter rubber disks (cookies) compressed together along the entire cable length (Figure 7). There are some reports that a few fishermen use chain as an alternative to wire rope. Cable diameter ranges from 9/16 in to ¾ in, with 1¾ to 3 in diameter cookies (2 in to 2 3/8 in cookies are commonly used).

Ground cable length varies between boats and typically is 30-80 ftm (55-146 m) although some larger boats may use up to 120 ftm (219 m). Generally, longer lengths are used on smooth seabeds, when the risk of hooking up on obstacles is small, and/or when targeting flatfish. Inshore boats (which also tend to be smaller) tend to use shorter ground cables (30 – 50 ftm, 55-91 m) so they can maneuver the trawl gear around rocky outcrops and other potential hook up sites.

Some fishermen do not vary ground cable length much under different circumstances as it affects the herding angle of the cables and catch rates. Others have been known to add or remove substantial lengths to their ground cables; however it is not known if this is a regular or infrequent activity, or the circumstances that result in such a change. It appears that there is little variation cable/cookie in composition when targeting ground fish, although a small number of fishermen may change ground cables when changing nets.

Figure 7 - Ground cable with cookies

3.3.6.2.1 90 m (50 ftm)

Analysis to be completed.

3.3.6.2.2 150 m (80 ftm)

Analysis to be completed.

3.3.6.2.3 225 m (120 ftm)

Analysis to be completed.

3.3.7 Measures to designate Dedicated Habitat Research Areas

3.3.7.1 Create a DHRA in SBNMS

This option would establish a DHRA in and around Jeffreys Ledge/SBNMS/WGOM Closed Area. Note that an option to create a DHRA in SBNMS is being developed by SBNMS staff/stakeholders and will be evaluated by the PDT at a later time. The following information, which is focused on Jeffreys Ledge, was compiled by the Habitat PDT.

Rationale: The Omnibus/SASI development process has identified a variety of habitat research needs. Addressing these needs may be best accomplished by designating a DHRA with specific goals and regulations associated with it.

Habitat types and ecology: The largest closure in the GoM is the Western Gulf of Maine Closed Area (WGOM) which covers 2,962 km^2 of seascape. The WGOM encompasses parts of Stellwagen Bank, Jeffrey's Ledge and Wildcat Knoll. Within the WGOM, there are several habitat types such as mud, gravel, cobble, exposed rock ledge and a mix of biogenic structures that are potentially used by groundfish. These shallow waters were historically productive fishing and nursery grounds (Ames 1997, Kurlansky 1997), especially for cod.

Previous research in the area: Jeffreys Bank in particular has served as a hotbed for research on groundfish habitat and the effects of closures on habitat recovery and groundfish populations in the Gulf of Maine. The effects of fishing on habitat were examined in the northern section of the Gulf of Maine (Knight et al. 2008). Grabowski et al. (2006) determined that the proximity of habitat was more important than closure status for several groundfish species in the northern section of the Gulf of Maine. A network of scientists used a multi-pronged approach to studying the central portion of Jeffreys Bank where they developed and groundtruthed high resolution habitat maps using multibeam backscatter data and examined the effects of fishing on habitat recovery (Grizzle et al. 2009). They also determined that groundfish are inversely related to spiny dogfish abundances inside the reserve, and that individuals tend to be larger in the reserve (Grizzle et al. 2009). Witman and Sebens (1992) determined that adult groundfish populations and predation pressure on macro-invertebrates were much higher on offshore ledges including the southern portion of Jeffreys Ledge in the 1980's than in coastal waters of the Gulf of Maine. Grabowski et al. (unpublished data) has also examined the season and spatial patterns of juvenile cod use of habitat on Jeffreys Ledge.

Possible DHRA boundaries: Because the WGOM closed area is rather extensive, a DHRA could be created in each of the northern, central and southern sections of the existing closure. If only one was selected, the central/western portion makes sense given that detailed habitat maps that have been groundtruthed exist for this part of the WGOM/Jeffreys Bank.

Why would this area be a good DHRA? Jeffrey's Ledge would be a productive location for a DHRA for the following reasons: (1) Jeffrey's Ledge has been noted as important habitat for an array of commercially valuable fish species. (2) The high resolution maps of the central/western portion provides the opportunity to examine fish/habitat associations and determine which habitats provide essential fish habitat for key life-history stages of cod and other groundfish species.

What are key research goals for area? (1) Use DHRA to examine groundfish habitat associations/essential fish habitat criteria. (2) Use DHRA to study impacts of fishing gear impacts on habitat susceptibility and recovery.

Note that as the area is already closed to fishing, it is unclear whether any additional regulations associated with the DHRA would be necessary. In addition, is is not clear whether a sunset date for the DHRA would be appropriate, given that there are no sunset dates associated with the WGOM Habitat Closure or the WGOM Mortality Closure.

3.3.7.2 Create a DHRA on Cashes Ledge (Ammen Rock)

This option (from 6/10/10 meeting) would establish a DHRA around Ammen Rock on Cashes Ledge. Note that removal of the Cashes Ledge habitat closed area and the Cashes Ledge mortality closure are not being considered in this amendment, such that fishing would be restricted in some or all of the proposed DHRA.

Rationale: The Omnibus/SASI development process has identified a variety of habitat research needs. Addressing these needs may be best accomplished by designating a DHRA with specific goals and regulations associated with it.

Habitat types and ecology: The Gulf of Maine consists of a series of basins that occupy approximately 30% of the Gulf, with ledges and banks accounting for the remaining 70% (Uchupi and Bolmer, 2008). Cashes Ledge is one of the most prominent examples of these ledges and banks, and extends roughly 57 km long and 8-10 km wide. Cashes Ledge rises from local depths of 200 m to a depth of 9 m (Ammen Rock Pinnacle), and consists of Ordovician granite that is rugged and heavily fissured on the summit. Many of the recesses towards the top of the Ledge have been filled with reworked glacial deposits (Uchupi and Bolmer, 2008). Ammen Rock Pinnacle is covered by a thick expanse of *Laminaria laminaria* that extends to roughly 30 m (Vadas and Steneck, 1988) and encompasses a volume of 2.12-2.45 x 10^6 m^3 (McGonigle et al. 2011). This *Laminaria* kelp zone transitions to an *Agarum cribrosum* kelp zone that extends from ~20 m to 40 m water depth. These kelp areas are noted as important juvenile cod and other groundfish habitat (Witman and Sebens 1992, Steneck 1996).

Previous research in the area: Vadas and Steneck (1988) examined the extent of kelp on Cashes Ledge in the 1980's. McGonigle et al. (2011) estimated the volumetric extent of and mapped the kelp habitat on Cashes Ledge using high resolution multibeam acoustic backscatter data. McGonigle et al. (unpublished data) are working on developing a groundtruthed habitat map of the other habitats on Cashes Ledge. Witman and Sebens (1992) and Steneck (1996) determined that adult groundfish populations and predation pressure on macro-invertebrates were much higher on Cashes Ledge in the 1980's than in coastal waters of the Gulf of Maine. Grabowski et al. (unpublished data) have reexamined these processes over the past 5 years and found similar trends especially in offshore closed areas. Offshore open areas such as Platts Bank resemble inshore areas with groundfish stocks that are largely considered to be depleted. Grabowski et al. (unpublished data) have also examined the season and spatial patterns of juvenile cod use of habitat on Cashes Ledge, and interactions between cod and spiny dogfish.

Possible DHRA boundaries: An area that encompasses up to half of the kelp zone and the surrounding rock and sand habitats would be useful.

Why would this area be a good DHRA? Cashes Ledge would be a productive location for a DHRA for the following reasons: (1) Cashes Ledge has been noted as important habitat for an array of commercially valuable fish species. (2) The kelp habitat on Cashes Ledge is unique to the offshore waters of the Gulf of Maine, and is important nursery habitat for juvenile cod and other economically and ecologically important species. (3) The high resolution maps of the kelp habitat at Cashes Ledge provide the opportunity to examine fish habitat associations and determine which habitats provide essential fish habitat for key life-history stages of cod and other groundfish species. (4) Resident cod likely exist at Cashes Ledge, which suggests that this area is particularly important for cod, and also provides an in situ laboratory to examine fish biology research questions.

What are key research goals for area? (1) Use DHRA to examine groundfish habitat associations/essential fish habitat criteria. (2) Use DHRA to study impacts of fishing gear impacts on habitat susceptibility and recovery

Note that as the area is already closed to fishing, it is unclear whether any additional regulations associated with the DHRA would be necessary. In addition, is is not clear whether a sunset date for the DHRA would be appropriate, given that there are no sunset dates associated with the Cashes Ledge Habitat Closure or the Cashes Ledge Mortality Closure.

3.3.7.3 Create a DHRA on Jeffreys Bank (trawl LISA cluster 2)

This option would establish a DHRA in and around Jeffreys Bank/trawl cluster 2. Note that removal of the Jeffreys Bank habitat closed area is not being considered in this amendment, such that fishing would be restricted in some of the proposed DHRA, depending on the boundaries selected.

Rationale: The Omnibus/SASI development process has indentified a variety of habitat research needs. Addressing these needs may be best accomplished by designated a DHRA with specific goals and regulations associated with it.

Upon preliminary review, the PDT recommends that areas such as Cashes Ledge and Jeffreys Ledge be prioritized for designations as DHRAs over Jeffreys Bank. Historically, less research has been conducted on Jeffreys Bank as compared to either Jeffreys Ledge or Cashes Ledge. The area is more remote as compared to Jeffreys Ledge, and the water depths are greater (mean depth for p=0.05 cluster cells is 125.6 m), which makes it less conducive to future study.

3.3.8 Alternatives to minimize the adverse effects of fishing on EFH

Individual area-based options are likely to have synergistic effects on the total magnitude of adverse effects across one or more gear types/fisheries, because restrictions on fishing in one location will affect the magnitude of fishing in other locations. Thus, the PDT recommends that alternatives be developed that consist of a suite of individual area-based gear restriction and/or gear modification options. Further analyses of these alternatives will summarize and compare likely changes in adverse effects across all the options that comprise each alternative.

3.3.8.1 No action alternative (status quo)

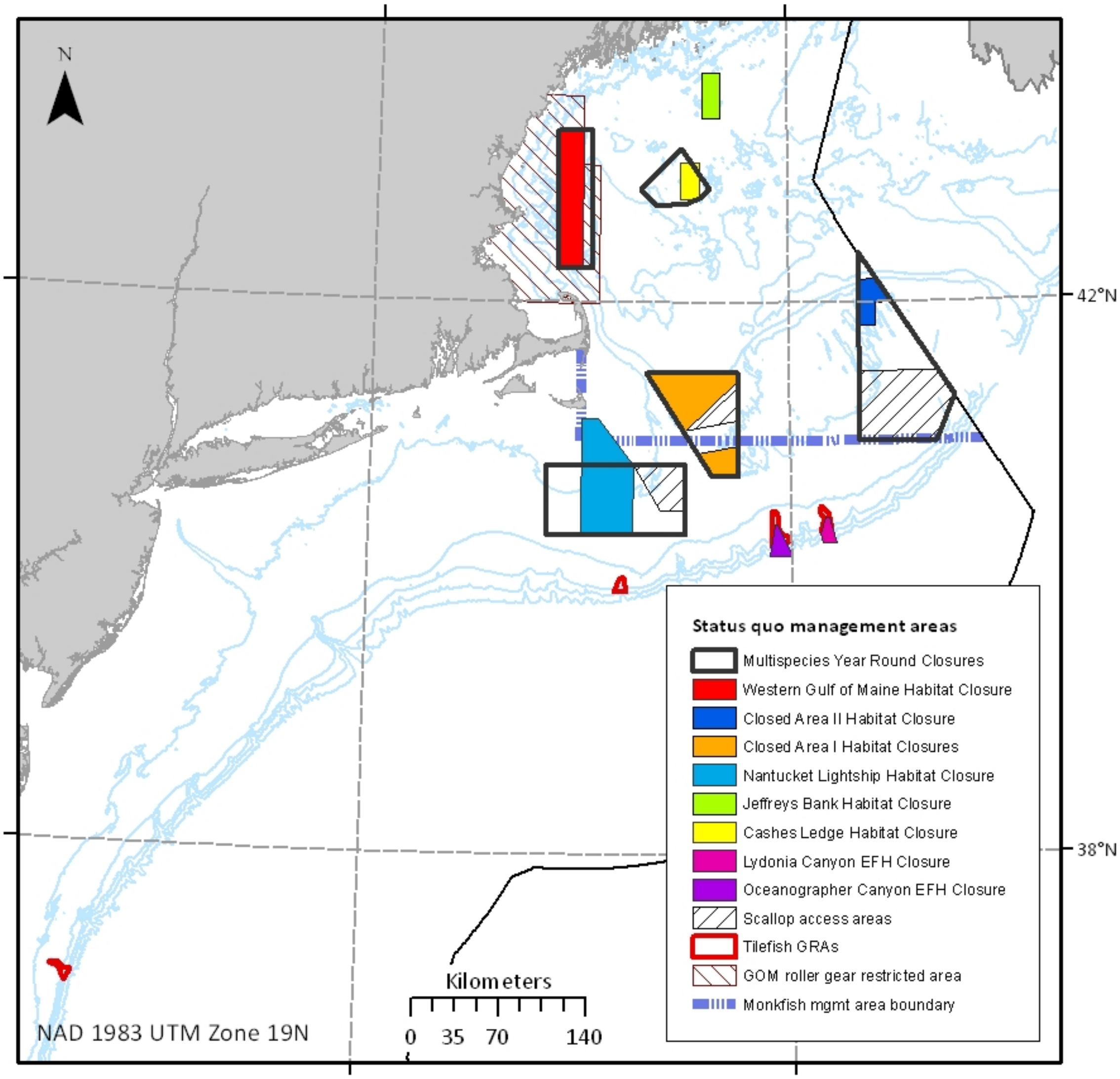
This alternative would maintain current EFH closed areas and gear restrictions, including the following (Figure 8):

- Habitat closed areas: Nantucket Lightship, Closed Area I, Closed Area II, Western Gulf of Maine, Cashes Ledge, Jeffreys Bank, Lydonia Canyon, Oceanographer Canyon - closed to all mobile bottom tending gear
- Inshore GOM 12 inch roller gear restriction
- Roller gear restriction for vessels fishing on a monkfish DAS in the southern monkfish management area
- Tilefish gear restricted areas (GRAs)

Mortality closed areas, including Nantucket Lightship, Closed Area I, Closed Area II, Western Gulf of Maine, and Cashes Ledge are also shown on the figure for reference. These are closed to all gear capable of catching groundfish, with some exemptions (e.g. scallop access areas, groundfish SAPs).

Analysis of this alternative will be completed at a later time once other alternatives have been developed.

Figure 8 - Status quo management areas



3.3.8.2 Alternative 1

To be developed as a combination of preferred individual options.

3.3.8.3 Alternative 2

To be developed as a combination of preferred individual options.

3.3.8.4 Alternative 3

To be developed as a combination of preferred individual options.

3.4 Alternatives to protect deep-sea corals

Cold-water or deep-sea corals in the northwest Atlantic are a diverse assortment of Anthozoa that include the subclass Hexacorallia (Zoantharia), which includes the **hard or stony corals** (order Scleractinia) and **black and thorny corals** (order Antipatharia); and subclass Octocorallia (Alcyonaria or octocorals), which includes the **true soft corals** (order Alcyonacea), **gorgonians** (sea fans, sea whips, order Gorgonacea), and **sea pens** (order Pennatulacea). Worldwide, deep-sea corals can build reef-like structures or occur as thickets, isolated colonies, or solitary individuals, and often are significant components of deep-sea ecosystems, providing habitat (substrate, refugia) for a diversity of other organisms, including many commercially important fish and invertebrate species. They are suspension feeders, but unlike most tropical and subtropical corals, do not require sunlight and do not have symbiotic algae (zooxanthellae) to meet their energy needs. Deep-sea corals can be found from near the surface to 6000 m depth, but most commonly occur between **50-1000 m** on hard substrate (Puglise and Brock 2003), hence their "deep-sea" appellation. Descriptions of species found in the Northeast region, including information about their vulnerability to fishing, can be found in section 5.2 the Swept Area Seabed Impact (SASI) model document.

Authority and guidance

Corals may be protected under the EFH authority in the MSA as a component of essential fish habitat, in the context of minimizing, to the extent practicable, the effects of fishing on EFH (see section 305(b)). Of course, any action taken under the EFH authority must occur within areas that are designated as EFH. In the Northeast region, this authority has been used in Monkfish FMP Amendment 2 to protect deep-sea corals and associated habitat features in two offshore canyons, Lydonia and Oceanographer, from fishing activity occurring under a monkfish day at sea. Options for minimizing the adverse effects of fishing on EFH include fishing equipment restrictions, time/area closures, and harvest limits (in this case, direct harvest of corals).

A second mechanism by which to protect deep-sea corals is via the Section 303 discretionary provisions found in the 2007 reauthorization of the MSA:

> —Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, may—
> (A) designate zones where, and periods when, fishing shall be limited, or shall not be permitted, or shall be permitted only by specified types of fishing vessels or with specified types and quantities of fishing gear;
> (B) designate such zones in areas where deep sea corals are identified under section 408, to protect deep sea corals from physical damage from fishing gear or to prevent loss or damage to such fishing gear from interactions with deep sea corals, after considering long-term sustainable uses of fishery resources in such areas; and
> (C) with respect to any closure of an area under this Act that prohibits all fishing, ensure that such closure—

(i) is based on the best scientific information available;
(ii) includes criteria to assess the conservation benefit of the closed area;
(iii) establishes a timetable for review of the closed area's performance that is consistent with the purposes of the closed area; and
(iv) is based on an assessment of the benefits and impacts of the closure, including its size, in relation to other management measures (either alone or in combination with such measures), including the benefits and impacts of limiting access to: users of the area, overall fishing activity, fishery science, and fishery and marine conservation;

Section 408, referenced above, describes the deep-sea coral research and technology program:

(a) IN GENERAL. The Secretary, in consultation with appropriate regional fishery management councils and in coordination with other federal agencies and educational institutions, shall, subject to the availability of appropriations, establish a program—
    (1) to identify existing research on, and known locations of, deep sea corals and submit such information to the appropriate Councils;
    (2) to locate and map locations of deep sea corals and submit such information to the Councils;
    (3) to monitor activity in locations where deep sea corals are known or likely to occur, based on best scientific information available, including through underwater or remote sensing technologies and submit such information to the appropriate Councils;
    (4) to conduct research, including cooperative research with fishing industry participants, on deep sea corals and related species, and on survey methods;
    (5) to develop technologies or methods designed to assist fishing industry participants in reducing interactions between fishing gear and deep sea corals; and
    (6) to prioritize program activities in areas where deep sea corals are known to occur, and in areas where scientific modeling or other methods predict deep sea corals are likely to be present.
(b) REPORTING. Beginning 1 year after the date of enactment of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006, the Secretary, in consultation with the Councils, shall submit biennial reports to Congress and the public on steps taken by the Secretary to identify, monitor, and protect deep-sea coral areas, including summaries of the results of mapping, research, and data collection performed under the program.

In May 2010, the Council received guidance from NMFS NERO regarding implementation of the discretionary provisions. Important aspects of this guidance include:

- Coral areas must have a nexus to a fishery managed by the Council under an FMP. Councils need to show that the DSC areas are located within the geographical range of the fishery as described in the FMP.
- Coral zones can include additional area beyond the locations of deep-sea corals if necessary to ensure the effectiveness of protection measures, which may include the following:
    - Restrictions on time/location of fishing within zones,
    - Limiting fishing to specific vessel types or vessels fishing with specific gear types/quantities of gear, and

    - Closure of zones to fishing.
- Protective measures can apply to any MSA regulated fishing activity, even if that activity or gear type is not managed by the FMP that includes the measures.
- Long-term sustainable use of fishery resources must be considered prior to designating DSC protection zones.
- Action taken under the discretionary authority may be used to complement action taken under the EFH authority.
- Unlike the EFH authority, the discretionary authority does not carry a consultation requirement.
- Councils may adopt gear restrictions via an omnibus amendment that applies to several FMPs, and can include in such an amendment measures that apply to fisheries under the jurisdiction of other Councils. Environmental, economic, and social analyses must be conducted, and consultation with the other affected Council will almost certainly be required.
- For coral management provisions to apply to fisheries managed under the Atlantic Coastal Cooperative Fisheries Management Act (ACA), either the ASMFC must take complementary action in their FMP, or there must be a Council FMP for the same resource. The relevant example in our region is the offshore component of the American lobster fishery, which would not be subject to coral protection measures enacted in an MSA FMP.

Other sections of the MSA can also be interpreted as applying to deep-sea corals and associated ecosystems (NOAA 2010b, p 9):

- Section 301(a)(9) requires Councils to include conservation and management measures that, to the extent practicable, minimize bycatch.
- Section 303(b)(12), authorizes Councils to include management measures in FMPs to conserve target and non-target species and habitats.

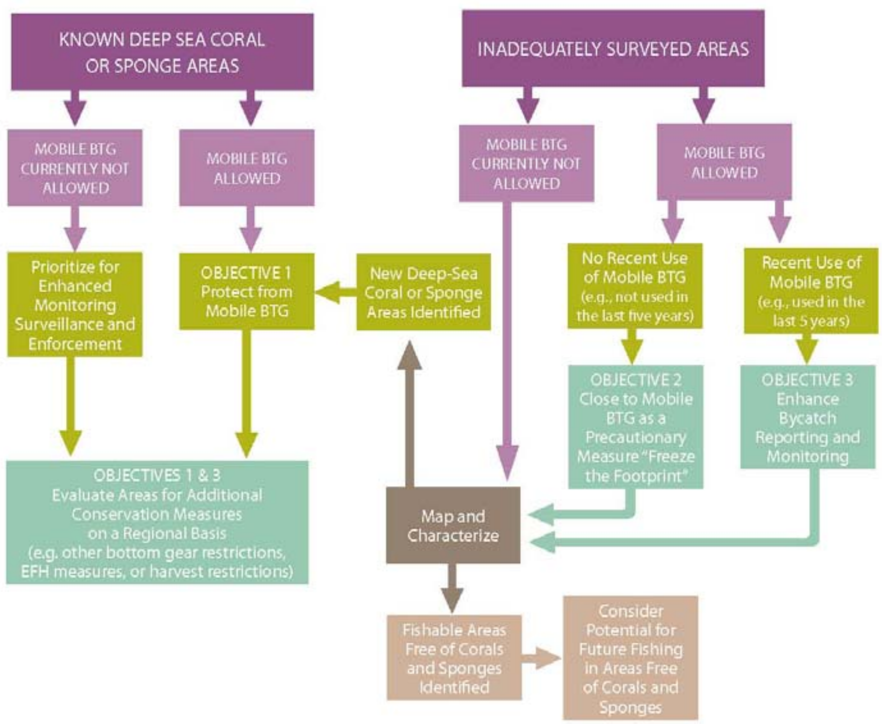
Additional NOAA guidance on coral conservation is provided in the NOAA Strategic Plan for Deep-Sea Coral and Sponge Ecosystems (NOAA 2010b). This plan has six conservation and management objectives; those in bold are most relevant to the Council's decisions. Objective 2 appears to be somewhat more precautionary than the regional guidance discussed above.

1. **Protect areas containing known deep-sea coral or sponge communities from impacts of bottom-tending fishing gear.**
2. **Protect areas that may support deep-sea coral and sponge communities where mobile bottom-tending fishing gear has not been used recently, as a precautionary measure.**
3. **Develop regional approaches to further reduce interactions between fishing gear and deep-sea corals and sponges.**

4. Enhance conservation of deep-sea coral and sponge ecosystems in National Marine Sanctuaries and Marine National Monuments.
5. **Assess and encourage avoidance or mitigation of adverse impacts of non-fishing activities on deep-sea coral and sponge ecosystems.**
6. Provide outreach and coordinated communications to enhance public understanding of these ecosystems.

Figure 9, which is reproduced from the Strategic Plan, depicts the agency's approach to managing the impacts of mobile bottom-tending gears on deep-sea corals and associated ecosystems.

Figure 9 – NOAA's precautionary approach to manage bottom-tending gear (BTG), especially mobile BTG and other adverse impacts of fishing on deep-sea coral and sponge ecosystems. Reproduced from NOAA 2010b.



3.4.1 Alternatives to define Deep-Sea Coral Zones

The following series of alternatives outline criteria for the designation of deep-sea coral zones. These zones or portions of them would then be subject to fishing restrictions as necessary (see section 3.4.2) to protect the corals therein. Some of these alternatives could be combined; the various options are listed in the flowchart below in order from most general to most specific.

<u>Types of corals considered</u>

The alternatives were developed primarily to protect hard corals, gorgonians, and soft corals. The PDT recommends that the Habitat Committee may wish to exclude sea pens from explicit management consideration at this stage for the following reasons:

- The two most common sea pen species are widely distributed in soft sediments throughout the region. *P. aculeata* (common sea pen) is common in the Gulf of Maine (Langton et al. 1990), and there are numerous records of *Pennatula* sp. on the outer continental shelf as far south as the Carolinas in the Theroux and Wigley database. *S. elegans* (white sea pen) is abundant on the Mid-Atlantic coast outer shelf (Theroux and Wigley 1998). Unlike other types of corals, these species are not dependent on hard bottom habitats, which are relatively rare in the deep ocean. Other known sea pen taxa in the region are found in soft sediments at continental slope depths (200-4300 m).
- Because the two species listed above are relatively common, sea pen vulnerability to fishing gears was considered as part of the Vulnerability Assessment for the SASI model.

<u>Distribution of deep-sea corals off the northeastern U.S.</u>

The deep corals of the continental margin and several canyons off the northeastern U.S. were surveyed in the 1980s via submersible and towed camera sled (Hecker et al. 1980, 1983). Corals were denser and more diverse in the canyons, and some species, such as those restricted to hard substrates, were found only in canyons while the soft substrate types were found both in canyons and on the continental slope (Hecker and Blechschmidt 1980). They appear to be mostly restricted to hard substrates on the shelf.

A variety of data sets are available that document locations of the various deep-sea coral species (Table 20). Generally, these data sets show presence of corals only, vs. presence/absence and/or presence/absence with abundance information. The records vary in age from the 1850s through present. Unlike the more widely known trawl surveys, which provide broad spatial coverage, the various coral surveys tend to be narrowly focused/of limited spatial extent. These datasets were compiled and audited by the US Geological Survey and NOAA's Deep-Sea Coral Research and Technology Program (DSCRTP), with the assistance of NEFSC and others (the compiled database is referred to as the USGS Cold-Water Coral Geographic Database (CoWCoG)).

Table 20 – Deep-sea coral data sources for the Northeast Region

Data set	Citation
Deichmann, 1936	Deichmann, Elisabeth, 1936, The Alcyonaria of the western part of the Atlantic Ocean: Memoirs of the Museum of Comparative Zoology at Harvard College, v. 53, 317 p.
Hecker et al., 1980	Hecker, Barbara, Blechschmidt, Gretchen, and Gibson, Patricia, 1980, Epifaunal zonation and community structure in three mid- and north Atlantic canyons—final report for the canyon assessment study in the mid- and north Atlantic areas of the U.S. outer continental shelf: U.S. Department of the Interior,

	Bureau of Land Management Monograph, 139 p.
NEFSC HUDMAP[1]	Records from 2001, 2002, and 2004 video samples taken near the head of Hudson Canyon between 100-200 m depth. Corals sampled include sea pens and the stony coral *Dasmosmilia lymani*.
NEFSC Sea Pens[1]	Records of sea pens compiled from various sources, including submersible surveys, trawl surveys, and towed camera surveys. Data collected between 1956 and 1984.
NES CR Dives	These data summarize dives locations of samples collected during NOAA Ocean Explorer "Mountains in the Sea" cruises to the New England seamounts during 2003 and 2004.
Smithsonian	Records off all coral types from various research vessel surveys conducted from 1873 through present. Surveys conducted in GOM as well as along shelf/slope break on Georges Bank and in Mid-Atlantic Bight.
Theroux and Wigley	Theroux, Roger B. and Wigley, Roland L., 1998, Quantitative composition and distribution of the macrobenthic invertebrate fauna of the continental shelf ecosystems of the northeastern United States
US Fish Commission	Records for *Dasmosmilia lymani* off NJ/VA
VIMS for BLM/MMS	Mostly *Dasmosmilia lymani* records; fewer records of *Stylatula elegans, Isozoanthus* sp.
Watling and Auster, 2005	Watling, L., and Auster, P. J., 2005, Distribution of deepwater Alcyonacea off the northeast coast of the United States, *in* Freiwald, Andre, and Roberts, J. M., eds., 2005, Cold-water corals and ecosystems:ß Springer-Verlag, Berlin, p. 279-296.
Watling et al, 2003	Watling, L., Auster, P.J., Babb, I., Skinder, C., and Hecker, B., 2003, A geographic database of deepwater alcyonaceans of the northeastern U.S. continental shelf and slope: Groton, National Undersea Research Center, University of Connecticut, Version 1.0 CD-ROM.
Yale University Peabody Museum Collection	Yale University Peabody Museum Collection, Yale Invertebrate Zoology—Online Catalog: accessed July 2007 at http://peabody.research.yale.edu/COLLECTIONS/iz/

NOAA's DSCRTP has identified the following areas as containing deep-sea corals (Table 21).

Table 21 – Deep-sea coral areas and current management status. Adapted from NOAA 2010a.

Identified areas with deep-sea corals	Current status	Reference
Bear seamount	NEFMC proposed HAPC	Packer et al. 2007; NEFMC 2007
Retriever seamount	NEFMC proposed HAPC	Packer et al. 2007; NEFMC 2007
Heezen Canyon	NEFMC proposed HAPC	Hecker and Belchschmidt 1980; Watling et al. 2003; Packer et al. 2007; NEFMC 2007

Identified areas with deep-sea corals	Current status	Reference
Lydonia Canyon	NE & MAFMC monkfish bottom-trawl & gill net closure; MAFMC squid, mackerel, & butterfish bottom-trawl closure; MAFMC closed to bottom-trawling to protect tilefish EFH; NEFMC Proposed HAPC	Watling et al. 2003; Packer et al. 2007; MAFMC 2008a; MAFMC 2008b (final rule effective 2009); NEFMC 2007
Oceanographer Canyon	NE & MAFMC monkfish bottom-trawl & gill net closure; MAFMC squid, mackerel, & butterfish bottom-trawl closure; MAFMC closed to bottom-trawling to protect tilefish EFH; NEFMC Proposed HAPC	Watling et al. 2003; Packer et al. 2007; MAFMC 2008a; MAFMC 2008b (final rule effective 2009); NEFMC 2007
Veatch Canyon	MAFMC closed to bottom-trawling to protect tilefish EFH, NEFMC proposed HAPC	Hecker and Belchschmidt 1980; Hecker et al. 1983; Watling et al. 2003; Packer et al. 2007; MAFMC 2008b (final rule effective 2009); NEFMC 2007
Slope near Alvin Canyon	NEFMC proposed HAPC	Hecker and Belchschmidt 1980; Watling et al. 2003; Packer et al. 2007; NEFMC 2007
Toms/Cartaret Canyon	NEFMC proposed HAPC	Hecker and Belchschmidt 1980; Watling et al. 2003; Packer et al. 2007; NEFMC 2007
Hendrickson Canyon	NEFMC proposed HAPC	Watling et al. 2003; Packer et al. 2007; NEFMC 2007
Baltimore Canyon	NEFMC proposed HAPC	Watling et al. 2003; Packer et al. 2007; NEFMC 2007
Norfolk Canyon	MAFMC closed to bottom-trawling to protect tilefish EFH; NEFMC Proposed HAPC	Watling et al. 2003; Packer et al. 2007; MAFMC 2008; NEFMC 2007
Western Jordan Basin	No special protections	Auster 2005 and Watling et al. 2003; Auster (unpublished)
Mount Desert Rock Area	No special protections	Auster 2005 and Watling et al. 2003
Georges Tower off the Northern Edge of Georges Bank	No special protections	Watling and Auster 2005

Distributions of individual coral types (hard/stony coral, black corals, and soft and gorgonian corals, are further described below), with additional details given in the SASI document.

Hard (stony) corals (Order Scleractinia)

Cairns and Chapman (2001) list 16 species of stony corals from the Gulf of Maine and Georges Bank to Cape Hatteras (see also Cairns 1981). Most of the stony corals in this region are **solitary organisms** and one species, *Astrangia poculata*, can occur in very shallow water, at depths of only a few meters. Theroux and Wigley (1998) described the distribution of deep corals in the northwest Atlantic, based on samples taken from 1956-1965. There appears to be a general lack of stony corals on Georges Bank, but they are present **along the continental margin**. They are found mostly on **hard substrates**. Moore *et al*. (2003, 2004) reported several species of solitary and colonial stony corals on Bear Seamount; one notable solitary species, *Vaughanella margaritata*, represents the first record of this species since its original description over 100 years ago, and is endemic to the northwest Atlantic (Cairns and Chapman 2001). Other recent expeditions to the New England and Corner Rise Seamounts have also found stony corals (Adkins *et al*. 2006; Watling *et al*. 2005, Shank *et al*. 2006).

Black Corals (Class Anthozoa, Order Antipatharia)
Antipatharians are predominantly tropical, but some species are known to occur in the northwest Atlantic. Watling et al. (2005) collected at least 8 species of black coral from the **seamounts** during their 2004 expedition; Brugler and France (2006) observed and collected 15 species of black coral during their 2005 expedition to the New England and Corner Rise Seamounts, including 7 species that they did not previously observe on the seamounts.

Gorgonians (Order Gorgonacea) and true soft corals (Order Alcyonacea)
Seventeen species in seven gorgonian families were recorded for the northeastern U.S. shelf and slope north of Cape Hatteras (Packer et al. 2007). These families (Acanthogorgiidae, Paramuriceidae, Anthothelidae, Paragorgiidae, Chrysogorgiidae, Primnoidae, and Isiddae) are the best documented because of their larger sizes, as well as being most abundant in the deeper waters of the continental slope (Watling and Auster 2005). Nine species of true soft corals in three families were recorded for the northeastern U.S. shelf and slope north of Cape Hatteras (Packer et al. 2007). Two species that are very numerous in nearshore records are the true soft corals *Gersemia rubiformis* and *Alcyonium* species (Watling and Auster 2005). It should be noted that, for a variety of reasons, there is uncertainty about the accuracy of the identifications of species from these two orders from the various historical surveys (Watling and Auster 2005), so these identifications and surveys should be interpreted with caution.

Theroux and Wigley (1998) found that both gorgonians and true soft corals were present along the **outer margin of the continental shelf and on the slope and rise, and were sparse and patchy in all areas**, particularly in the northern section. **They were not collected in samples taken at < 50 m in depth, and were most abundant between 200-500 m**. Gorgonians and true soft corals were collected from **gravel and rocky outcrops** (Theroux and Wigley 1998).

Watling and Auster (2005) noted two distinct distributional patterns for the gorgonians and true soft corals. **Most are deepwater species that occur at depths > 500 m**; these include species of gorgoninans in the genera *Acanthogorgia*, *Acanella*, *Anthothela*, *Lepidisis*, *Radicipes*, and *Swiftia*, and true soft corals in the genera *Anthomastus* and *Clavularia*. **Other species occur throughout shelf waters to the upper continental slope** and include the gorgonians *Paragorgia arborea*, *Primnoa resedaeformis*, and species in the genus *Paramuricea*. *Paragorgia arborea* was described by Wigley (1968) as a common component of the gravel fauna of the Gulf of Maine, while Theroux and Grosslein (1987) reported *Primnoa resedaeformis*, as well as *Paragorgia arborea*, to be common on the Northeast Peak of Georges Bank. Both species are widespread in the North Atlantic (Tendal 1992); *Primnoa resedaeformis* has been reported south to off Virginia Beach, Virginia (37°03'N) (Heikoop et al. 2002). The majority of records for *Acanthogorgia armata*, *Paragorgia arborea*, and *Primnoa resedaeformis* in the Watling et al (2003) database come from Lydonia, Oceanographer, and Baltimore canyons. In addition, *Primnoa resedaeformis* was found throughout the Gulf of Maine and on the Northeast Peak of Georges Bank, affirming Theroux and Grosslein's (1987) observations.

3.4.1.1 Shelf-slope area from 200 m (110 ftm) to the edge of the EEZ

This alternative would designate the entire shelf-slope area between 200 m (110 ftm) and the EEZ as a deep-sea coral zone. The specific northern and southern extents of this coral zone would need to be determined. This alternative was proposed at the 9/27/10 committee meeting. The rationale was that 200 m was deeper than much of the fishing effort, and that taking the boundary of the zone to the EEZ would be a precautionary approach that would protect areas that contain corals and currently contain little fishing.

According to data compiled for the SASI document, seven of the 16 regional stony coral species occur shallower than 200 m. Of the nine known soft coral species in the region, depth range information was available for seven. All of these have observed minimum depths greater than 200 m (depth ranges were not specified for *Gersemia rubiformis* or *Clavularia modesta*). Of the 21 gorgonian species known in the region, depth ranges were specified for 13. Of these, only one species, *Primnoa resedaeformis*, is known to occur shallower than 200 m. A minimum depth of 200 m is sufficiently shallow to protect most species known in the region, however, a variety of stony corals are known to occur between 100-200 m.

3.4.1.2 Shelf-slope area from 100 m to 2000 m (55 ftm to 1100 ftm)

This alternative would designate the entire shelf-slope area between depths of 100 and 2000 m (55 ftm to 1100 ftm) as a deep-sea coral zone. The specific northern and southern extents of this coral zone would need to be determined.

According to data compiled for the SASI document, only two of the 16 regional stony coral species occur shallower than 100 m. At the deep end of the depth range for this alternative, two stony coral species have observed depth ranges extending deeper than

2000 m, and one species is known exclusively from depths greater than 2000 m. Of the nine known soft coral species in the region, depth range information was available for seven, and none of them occurred shallower than 100 m (depth ranges were not specified for *Gersemia rubiformis* or *Clavularia modesta*). Only two species have documented occurrence below 2000 m (*Anthomastus grandiflorus*, *Gersemia fruticosa)*. Of the 21 gorgonian species known in the region, depth ranges were specified for 13. Of these, six have known occurrence below 2000 m, while only one species, *Primnoa resedaeformis*, has known occurrence shallower than 100 m. Thus, the maximum depth associated with this alternative may lead to a lack of protection for some species, especially some of the gorgonians. A minimum depth of 100 m is sufficiently shallow to protect all species known in the region.

3.4.1.3 All canyon and seamount HAPCs plus some inter-canyon areas

These alternatives would designate deep-sea coral zones in all the proposed canyon and seamount HAPCs from Phase 1: Heezen, Lydonia, Oceanographer, Hendrickson, Toms/Cartaret, Baltimore, Norfolk, Gilbert (between Lydonia and Oceanographer), Veatch, Alvin/Atlantis, Hudson, Hydrographer, Wilmington, and Washington Canyons, in addition to on Bear and Retriever Seamounts (see Map 12). In addition, this alternative would include some inter-canyon areas. The rationale for this is that inter-canyon areas may provide important habitat for some coral species. Canyons in close proximity where designation of inter-canyon areas might be appropriate were designated in combination as HAPCs during Phase 1. These include Lydonia/Gilbert/Oceanographer, Alvin/Atlantis, and Toms/Middle Toms/Hendrickson (Cartaret canyon is close to Toms Canyon).

Canyon areas are defined as those locations with steeper topography, while inter-canyon areas are defined as those areas between canyons with a more gradual slope. The figure below indicates the intended meanings of 'canyon' and 'inter-canyon', using Lydonia, Gilbert, and Oceanographers canyons as an example.

For this alternative, as well as for alternatives 3.4.1.4, 3.4.1.5, and 3.4.1.6, the proposed HAPC boundaries might be modified to best account for both fishing and coral distributions, as well as to accommodate enforcement considerations. For example, the shallow boundary of the Lydonia/Gilbert/Oceanographer HAPC runs roughly along the 100 m contour, which may be shallower than desired in terms of its overlap with fishing activities, and the deeper boundary is at the 1500 m contour, which is irregular and might present challenges from an enforcement perspective. For some HAPC designations, the 1500 m contour was used as the seaward boundary because it represents the maximum depth of EFH along the continental slope, but the footprint of EFH designations would not restrict the boundaries of coral zones designated under the discretionary authority.

Map 12 – All canyon and seamount HAPCs.

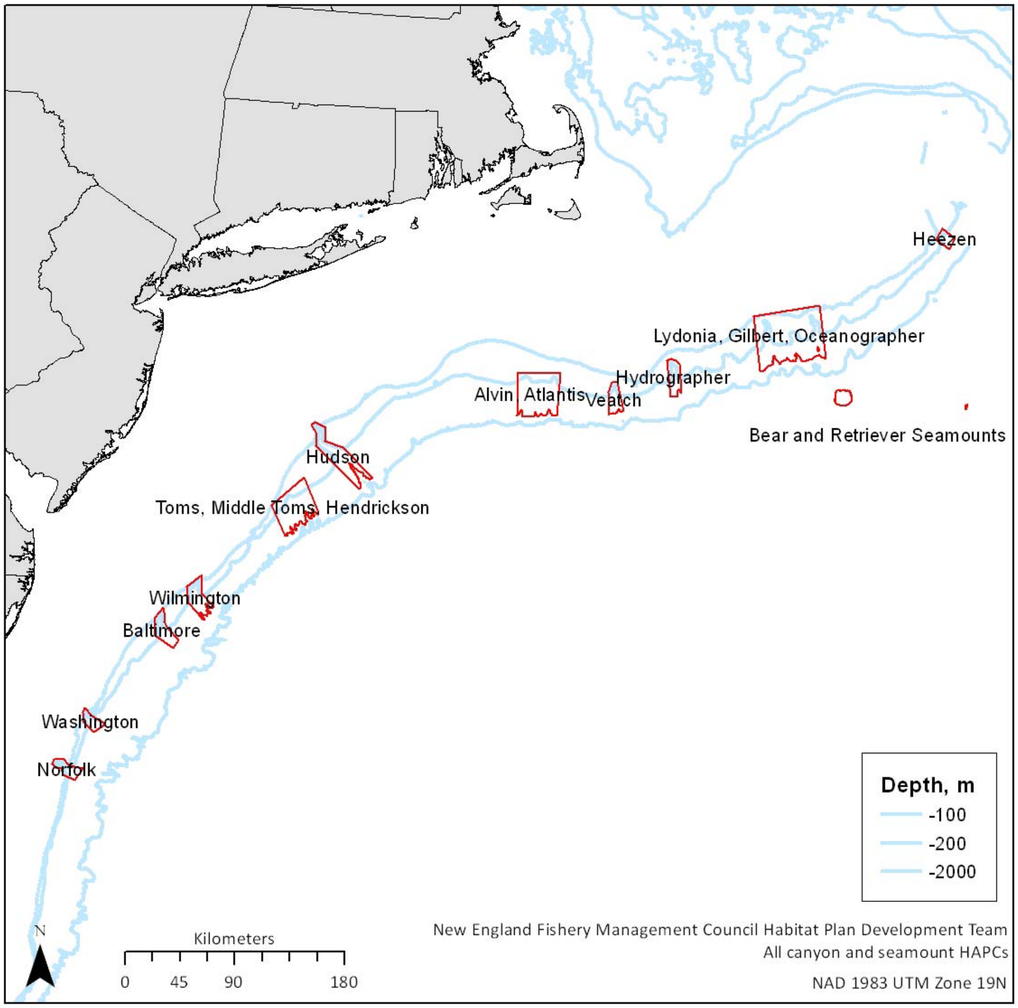
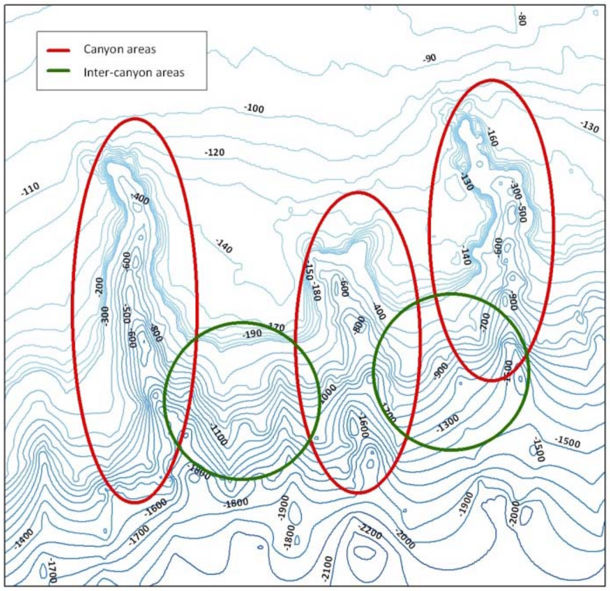


Figure 10 – Distinction between 'canyon areas' and 'inter-canyon areas', using the Lydonia/Gilbert/Oceanographer Canyon region as an example.



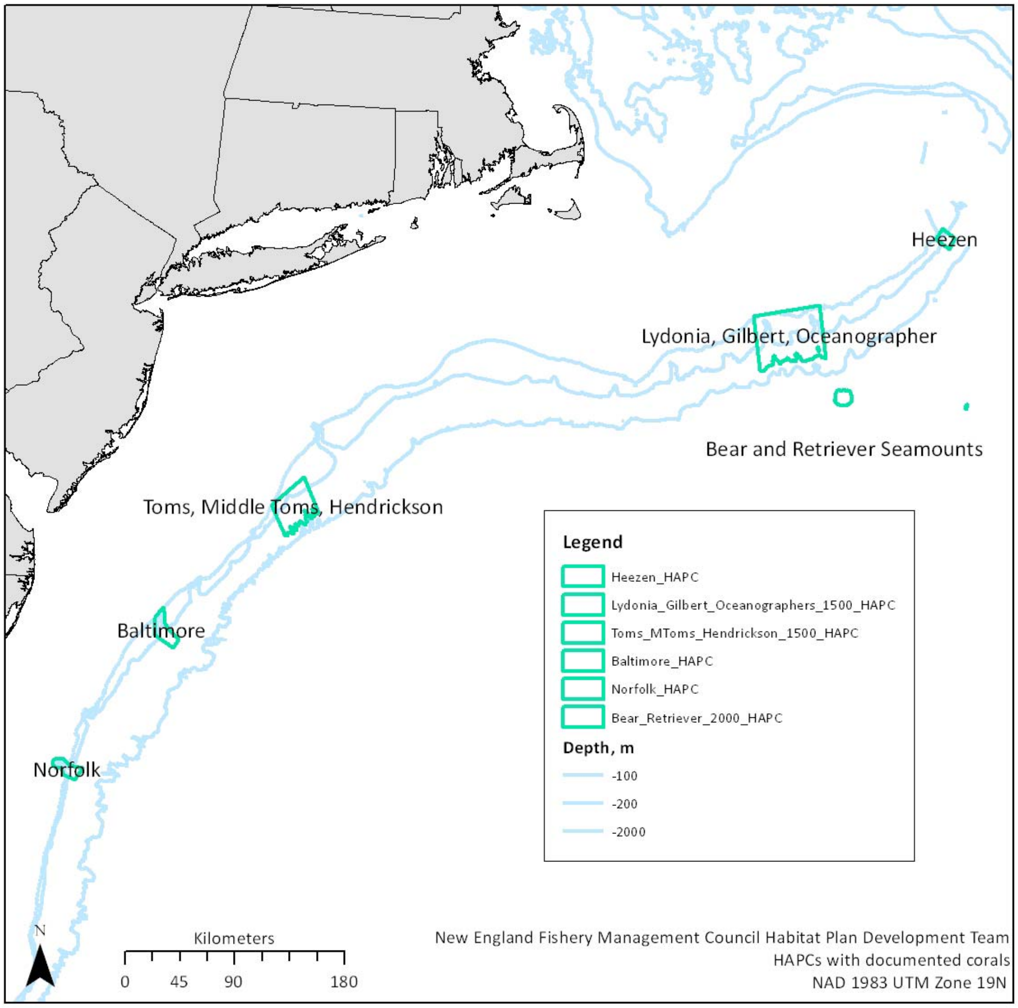
3.4.1.4 All canyon and seamount HAPCs

These alternatives would designate deep-sea coral zones based on the proposed canyon and seamount HAPCs from Phase 1: Heezen, Lydonia/Gilbert/Oceanographer, Toms/Middle Toms/Hendrickson, Baltimore, Norfolk, Gilbert (between Lydonia and Oceanographer), Veatch, Alvin/Atlantis, Hudson, Hydrographer, Wilmington, and Washington Canyons, in addition to on Bear and Retriever Seamounts (see Map 12). Note that there are additional named canyon areas in the Northeast Region that might warrant inclusion in this alternative. While the HAPC boundaries might be modified into coral zone boundaries according to fishing, coral distribution, and enforcement considerations, the intention of theis alternative was to focus on the deeper and steeper canyon areas.

3.4.1.5 Canyon and seamount HAPCs with known corals, and neighboring inter-canyon areas

This alternative would designate deep-sea coral zones based on the proposed canyon and seamount HAPCs with documented corals (good data support). These HAPCs include Heezen, Lydonia/Gilbert/Oceanographer, Toms/Middle Toms/Hendrickson (corals documented as heads of canyons – presence assumed in deeper areas), Baltimore, and Norfolk Canyons, in addition to Bear and Retriever Seamounts (see Map 13). This alternative would designate inter-canyon areas in addition to the canyons as deep-sea coral zones. The rationale for this is that inter-canyon areas may provide important habitat for some coral species. Canyons in close proximity where designation of inter-canyon areas might be appropriate were designated in combination as HAPCs during Phase 1. These include Lydonia/Gilbert/Oceanographer and Toms/Middle Toms/Hendrickson (note that Cartaret Canyon is close to Toms Canyon, and also has documented corals). The HAPC boundaries might be modified into coral zone boundaries according to fishing, coral distribution, and enforcement considerations.

Map 13 – Canyon and seamount HAPCs with known corals.



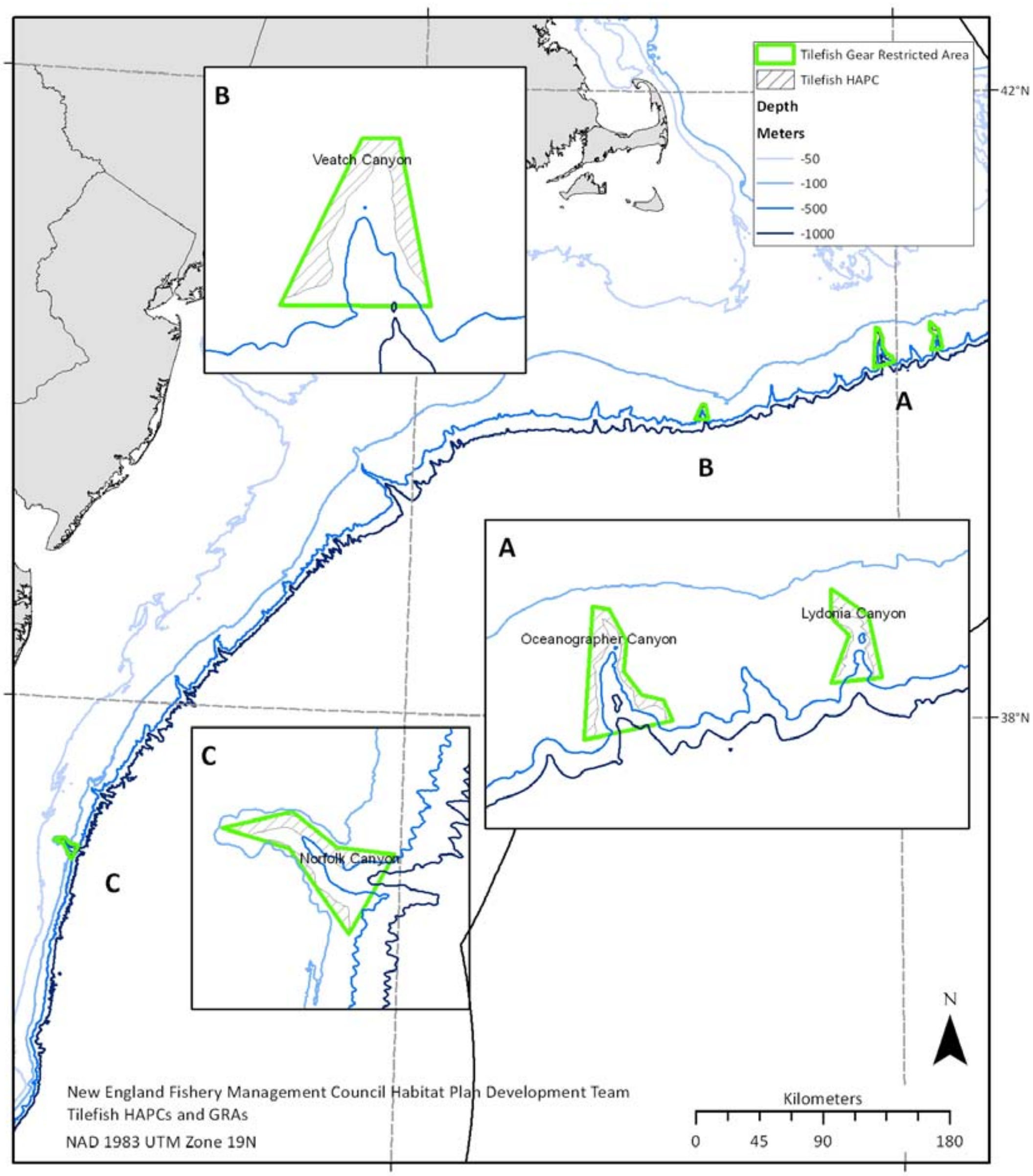
3.4.1.6 Canyon and seamount HAPCs with known corals

This alternative would designate deep-sea coral zones based on the proposed canyon and seamount HAPCs with documented corals (good data support). These include Heezen, Lydonia/Gilbert/Oceanographer, Toms/Middle Toms/Hendrickson (corals documented as heads of canyons – presence assumed in deeper areas), Baltimore, and Norfolk Canyons, in addition to on Bear and Retriever Seamounts (see Map 13). While the HAPC boundaries might be modified into coral zone boundaries according to fishing, coral distribution, and enforcement considerations, the intention of theis alternative was to focus on the deeper and steeper canyon areas.

3.4.1.7 Existing tilefish GRAs

This alternative would designate the four existing Tilefish Amendment 1 Gear Restricted Areas as deep-sea coral zones. The rationale for this alternative is that these areas are already exisiting, and are already closed to all mobile bottom tending gear types. Three of the tilefish GRAs (Lydonia Canyon, Oceanographer Canyon, and Norfolk Canyon) have documented corals, while corals have been documented near but not within Veatch Canyon.

Map 14 – Tilefish Gear Restricted Areas and associated HAPCs.



3.4.1.8 Gulf of Maine coral zones

The PDT also discussed the designation of coral zones in the Gulf of Maine – two areas identified by the DSCRTP are western Jordan Basin and the Mount Desert Rock area. The available information on GOM corals needs to be further investigated.

3.4.2 Management measures for deep-sea coral zones

Once coral zones alternatives have been narrowed down to preferred options, the impacts of implementing these zones with varying levels of fishing restrictions can be evaluated using fishing distribution data compiled for the SASI model. Other projects are also underway to relate fishing locations and locations with documented corals using VMS and observer data.

3.4.2.1 Gear restrictions

The following range of alternatives would protect deep-sea corals via restrictions on various types of commercial and/or recreational fishing within deep-sea coral zones.

3.4.2.1.1 Status quo

This alternative would maintain any existing gear restrictions in designated deep-sea coral zones. These would include the mobile gear restrictions implemented via Amendment 1 to the Tilefish FMP in the four canyons identified as Tilefish GRAs, as well as prohibitions on fishing during a monkfish DAS enacted via Amendment 2 to the Monkfish FMP.

3.4.2.1.2 Prohibition on mobile bottom tending gears

This alternative would prohibit all mobile bottom-tending fishing gear operation in deep-sea coral zones.

3.4.2.1.3 Prohibition on all commercial bottom-tending gears

This alternative would prohibit all commercial bottom-tending fishing gear operation in deep-sea coral zones.

3.4.2.1.4 Prohibition on all commercial fishing gear

This alternative would prohibit all commercial fishing gear operation in deep-sea coral zones.

3.4.2.1.5 Prohibition on all fishing gear

This alternative would prohibit all commercial and recreational fishing gear operation in deep-sea coral zones.

3.4.2.2 Access areas

This alternative would allow access to designated deep-sea coral zones or portions of those zones for specific fisheries/gear types, following the South Atlantic Fishery Management Council (SAFMC) example. The SAFMC finalized 'Comprehensive

Ecosystem-Based Amendment 1 for the South Atlantic Region (CE-BA 1)' in October 2009, which was implemented by NMFS effective July 22, 2010 (see SAFMC 2009 and Federal Register Vol. 75 No. 119, pp 35330-35335). This action designated Deepwater Coral Habitat Areas of Particular Concern (CHAPCs) and created Shrimp Fishery Access Areas (SFAA) and Allowable Golden Crab Fishing Areas within the CHAPCs. The intention of the action was to strike a balance between established fishery uses of the areas, and precautionary protection of deepwater corals and associated species and live/hard bottom habitats by allowing fishing to continue to historic fishing grounds while preventing expansion into sensitive habitats. The boundaries of the CHAPCs were drawn based on a series of scientific reports commissioned by the SAFMC, and the SFAAs and Allowable Golden Crab Fishing Areas were designated in a collaborative process involving industry advisory panels, conservation groups, and others.

The preferred alternatives in CE-BA 1 were structured as follows:

- Action 1 – Alternative 1 – No action. Alternative 2 – Establish CHAPCs in one or more of the five proposed areas and prohibit possession of coral species and use of all bottom damaging gear, including bottom longline, trawl (bottom and mid-water), dredge, pot or trap, use of anchors, anchor and chain, or grapple and chain by all fishing vessels. The definition of coral species had been previously established in the Coral FMP. The five CHAPCs ranged in size from 10 km^2 to 60,937 km^2.
- Action 2 – Alternative 1 – No action. Alternative 2 – Create SFAAs within some portions of some of the designated CHAPCs, as appropriate, where shrimp trawling is allowed by vessels holding rock shrimp limited access permits.
- Action 3 – Alternative 1 – No action. Alternative 2 – Create Allowable Golden Crab Fishing Areas within some portions of some of the designated CHAPCs, as appropriate, where crab trapping is allowed.

Note that development of these alternatives required designation of CHAPCs followed by evaluation of areas within those CHAPCs to be considered for fishery access. Note also that in CE-BA 1 the coral areas were established via EFH authority, vs. under the discretionary authority (which was implemented after development of CE-BA 1 commenced).

3.4.3 Research recommendations

3.4.3.1 Fully document all coral catch in NEFSC survey data

This alternative would require documentation of deep sea corals during Northeast Fishery Science Center resource surveys, with documentation to include identification to lowest taxonomic level possible and quantification of catch by weight.

3.4.3.2 Fully document all coral bycatch during observed fishing trips

This alternative would require documentation of deep sea corals during observed fishing trips, with documentation to include identification to lowest taxonomic level possible and quantification of catch by weight.

3.4.3.3 Additional focused coral surveys

This alternative would specify Council support for resource surveys specific to coral distribution mapping. Specific suggested locations include Hudson Canyon, Gilbert Canyon, and along the shelf/slope break.

3.4.3.4 Create coral guide to support collection of data during research trips and fishing trips

This alternative would specify Council support for the development of a deep sea coral guidebook, which would support identification of corals during research and fishing trips. Staff at NEFSC's Sandy Hook lab would direct guidebook development.

4.0 Considered and rejected alternatives

4.1 Considered and rejected Essential Fish Habitat designations

This section will contain a general summary of EFH designations considered and rejected during Phase 1, in addition to listing individually any specific alternatives rejected during Phase 2.

4.2 Summary of considered and rejected Habitat Area of Particular Concern designations

This section will contain a general summary of any HAPC designations considered and rejected during Phase 1.

4.3 Considered and rejected adverse impacts minimization alternatives

The following adverse impacts minimization options and alternatives were considered but rejected.

4.4 Considered and rejected deep-sea coral alternatives

The following deep-sea coral alternatives were considered but rejected.

4.4.1 Designate a deep-sea coral zone for the shelf-slope area from 50 m to boundary of EEZ

This alternative would designate the entire shelf-slope area from 50 m to the boundary of the EEZ as a deep-sea coral zone. The specific northern and southern extents of this coral zone would need to be determined. This alternative was discussed at the 9/27 ctte meeting but rejected as being too broad to be useful.

5.0 Other EFH-related requirements

In addition to updating EFH and HAPC designations, and developing alternatives to minimize the impacts of fishing on EFH, the Omnibus EFH Amendment updates the list of prey types consumed by each managed species, and summarizes non-fishing impacts to EFH.

5.1 Identify prey types consumed by managed species

The EFH Final Rule (50 CFR 600) requires that Fishery Management Plans (FMPs) established or amended under the Sustainable Fisheries Act of 1996 defines essential fish habitat (EFH) as

> "Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: ''Waters'' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; ''substrate'' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; ''necessary'' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and ''spawning, breeding, feeding, or growth to maturity'' covers a species' full life cycle."

Further, the Rule requires that these FMPs *"list the major prey species for the species in the fishery management unit and discuss the location of prey species' habitat."* According to the Rule:

> "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. … Adverse effects on prey species and their habitats may result from fishing and non-fishing activities."

National Marine Fisheries Service has offered the Councils the following draft guidance (April 2006) on implementing the Prey Species Requirement of the EFH Final Rule as follows:

> The definition of EFH in the regulatory guidelines acknowledge that prey, as part of "associated biological communities", may be considered a component of EFH for a species and/or lifestage (50 CFR 600.10). However, including prey in EFH identifications and descriptions has considerable implications for the overall scope of EFH when those prey are considered during the EFH consultation process. It is

important that prey do not become a vehicle for overly expansive interpretations of EFH descriptions. To avoid this pitfall, the following suggestions should be considered when including prey in an EFH description:

1. Prey species alone should not be described as EFH. Instead, prey should be included in EFH descriptions as a component of EFH (along with others components such as depth, temperature, sediment type).

2. If the FMP identifies prey as a component of EFH, the FMP should specify those prey species and how their presence "makes the waters and substrate function as feeding habitat" (50 CFR 600.815(a)(7)).

3. While prey may be considered a component of EFH, prey habitat should not be identified as EFH in FMPs unless it is also EFH for a managed species. Identifying prey habitat as EFH could be viewed as over-extending the scope of EFH which should consist of habitat necessary for the managed species (50 CFR Preamble). However prey species habitat should be discussed in the FMP (52 CFR 600.815 (a)(7)).

Accordingly, the New England Fishery Management Council has developed a description of the major prey types for each managed species under its jurisdiction. These descriptions, organized by managed species, are provided in Appendix B. In addition, benthic invertebrate prey types and their vulnerability to fishing gear impacts are summarized in Appendix D as part of the Swept Area Seabed Impact model analysis.

5.2 Evaluate non-fishing impacts to EFH

The EFH Final Rule (50 CFR 600) specifies that Fishery Management Plans (FMPs) must:

> "identify activities other than fishing that may adversely affect EFH. Broad categories of such activities include, but are not limited to: dredging, filling, excavation, mining, impoundment, discharge, water diversions, thermal additions, actions that contribute to non-point source pollution and sedimentation, introduction of potentially hazardous materials, introduction of exotic species, and the conversion of aquatic habitat that may eliminate, diminish, or disrupt the functions of EFH. For each activity, the FMP should describe known and potential adverse effects to EFH."

This requirement is fulfilled by Appendix E. Major findings of this analysis are summarized below:

5.3 EFH-related research needs

The EFH Final Rule (50 CFR 600) specifies that Fishery Management Plans (FMPs) 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."

This requirement is fulfilled by Appendix F. Major findings of this analysis are summarized below.

6.0 Affected environment

6.1 Biological and physical environment

6.2 Economic and social environment

7.0 Environmental consequences of alternatives

7.1 Physical and biological environment

7.1.1 Essential Fish Habitat designations

7.1.2 Habitat Area of Particular Concern designations

7.1.3 Alternatives to integrate and optimize measures to minimize the adverse impacts to EFH across all Council managed FMPs

7.1.4 Alternatives to protect deep-sea corals

7.2 Economic and social environment

7.2.1 Essential Fish Habitat designations

7.2.2 Habitat Area of Particular Concern designations

7.2.3 Alternatives to integrate and optimize measures to minimize the adverse impacts to EFH across all Council managed FMPs

7.2.4 Alternatives to protect deep-sea corals

7.3 Cumulative effects

8.0 Consistency with Magnuson-Stevens Fishery Conservation and Management Act

To be completed.

National Standard 2:
In order to develop the EFH designation components, *Councils need basic information to understand the usage of various habitats by each managed species. 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. The primary source of information used to update the EFH designations was the NEFSC EFH Source Document Technical Memo series and references therein. The Council evaluated the efficacy and importance of each information source and utilized *different types of information according to its scientific rigor*. As such, the Council used the best scientific information available.

9.0 Relationship to other applicable laws

9.1 National Environmental Policy Act (NEPA)

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 M-S Act and NEPA. The Council on Environmental Quality (CEQ) 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.

The required elements of an Environmental Impact Statement Assessment (EIS) are specified in 40 CFR 1508.9(b). They are included in this document as follows:

The need for this action is described in section

The alternatives that were considered are described in sections

The environmental impacts of the Proposed Action are described in section

The agencies and persons consulted on this action are listed in section

While not required for the preparation of an EA, this document includes the following additional sections that are based on requirements for an Environmental Impact Statement (EIS).

An Executive Summary can be found in section.

A table of contents can be found in section.

Background and purpose are described in section.

A summary of the document can be found in section.

A brief description of the affected environment is in section.

Cumulative impacts of the Proposed Action are described in section.

A list of preparers is in section.

The index is in section.

9.2 Endangered Species Act

Section 7 of the Endangered Species Act requires federal agencies conducting, authorizing or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species.

9.3 Marine Mammal Protection Act

9.4 Coastal Zone Management Act

Section 307(c)(1) of the Federal CZMA of 1972 requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable.

9.5 Administrative Procedure Act

This action was developed in compliance with the requirements of the Administrative Procedures Act, and these requirements will continue to be followed when the proposed regulation is published. Section 553 of the Administrative Procedure Act establishes procedural requirements applicable to informal rulemaking by Federal agencies. The purpose of these requirements is to ensure public access to the Federal rulemaking process, and to give the public adequate notice and opportunity for comment. At this time, the Council is not requesting any abridgement of the rulemaking process for this action.

9.6 Data Quality Act

Pursuant to NOAA guidelines implementing section 515 of Public Law 106-554 (the Data Quality Act), all information products released to the public must first undergo a Pre-Dissemination Review to ensure and maximize the quality, objectivity, utility, and integrity of the information (including statistical information) disseminated by or for Federal agencies. The following section addresses these requirements.

9.6.1 Utility of Information Product

The information presented in this document is helpful to the intended users (the affected public) by presenting a clear description of the purpose and need of the Proposed Action, the measures proposed, and the impacts of those measures. A discussion of the reasons for selecting the Proposed Action is included so that intended users may have a full understanding of the Proposed Action and its implications.

Until a proposed rule is prepared and published, this document is the principal means by which the information contained herein is available to the public. The information provided in this document is based on the most recent available information from the relevant data sources. The development of this document and the decisions made by the Council to propose this action are the result of a multi-stage public process. Thus, the information pertaining to management measures contained in this document has been improved based on comments from the public, the fishing industry, members of the Council, and NOAA Fisheries Service.

This document is available in several formats, including printed publication, CD-ROM, and online through the Council's web page in PDF format. The Federal Register notice that announces the proposed rule and the final rule and implementing regulations will be made available in printed publication, on the website for the Northeast Regional Office, and through the Regulations.gov website. The Federal Register documents will provide metric conversions for all measurements.

9.6.2 Integrity of Information Product

Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction, to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information. All electronic information disseminated by NOAA Fisheries Service adheres to the standards set out in Appendix III, "Security of Automated Information Resources," of OMB Circular A-130; the Computer Security Act; and the Government Information Security Act. All confidential information (e.g., dealer purchase reports) is safeguarded pursuant to the Privacy Act; Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business, and financial information); the Confidentiality of Statistics provisions of the Magnuson-Stevens Act; and NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics.

9.6.3 Objectivity of Information Product

For purposes of the Pre-Dissemination Review, this document is considered to be a "Natural Resource Plan." Accordingly, the document adheres to the published standards of the Magnuson-Stevens Act; the Operational Guidelines, Fishery Management Plan Process; the Essential Fish Habitat Guidelines; the National Standard Guidelines; and NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act.

9.7 Executive Order 13132 (Federalism)

This E.O. established nine fundamental federalism principles for Federal agencies to follow when developing and implementing actions with federalism implications. The E.O. also lists a series of policy making criteria to which Federal agencies must adhere when formulating and implementing policies that have federalism implications. However, no federalism issues or implications have been identified relative to the measures proposed in Amendment 16. This action does not contain policies with federalism implications sufficient to warrant preparation of an assessment under E.O. 13132. The affected states have been closely involved in the development of the proposed management measures through their representation on the Council (all affected states are represented as voting members of at least one Regional Fishery Management Council).

9.8 Executive Order 13158 (Marine Protected Areas)

The Executive Order on Marine Protected Areas requires each federal agency whose actions affect the natural or cultural resources that are protected by an MPA to identify such actions, and, to the extent permitted by law and to the maximum extent practicable, in taking such actions, avoid harm to the natural and cultural resources that are protected by an MPA. The E.O. directs federal agencies to refer to the MPAs identified in a list of MPAs that meet the definition of MPA for the purposes of the Order. The E.O. requires that the Departments of Commerce and the Interior jointly publish and maintain such a list of MPAs.

9.9 Paperwork Reduction Act

The purpose of the PRA is to control and, to the extent possible, minimize the paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. The authority to manage information and recordkeeping requirements is vested with the Director of the Office of Management and Budget (OMB). This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

9.10 Preliminary Regulatory Economic Evaluation

9.11 Executive Order 12866

The purpose of E.O 12866 is to enhance planning and coordination with respect to new and existing regulations. This E.O. requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be "significant." Section of this document represents the RIR, which includes an assessment of the costs and benefits of the Proposed Action, in accordance with the guidelines established by E.O. 12866. The analysis included in the RIR shows that this action is a not "significant regulatory action" because it will not affect in a material way the economy or a sector of the economy.

E.O. 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a significant action is any regulatory action that may

Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
Raise novel legal or policy issues arising out of legal mandates, the President's priorities, of the principles set forth in the Executive Order.

10.0 List of public meetings

11.0 References

11.1 Literature cited

11.2 Glossary

11.3 Index

11.4 List of preparers