

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

Options and Alternatives to Minimize the Effects of Fishing on EFH

DRAFT: 10 September 2012

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

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TABLE OF CONTENTS

1.0 INTRODUCTION..... 9

1.1 Identification of habitat management areas..... 11

1.2 Measures for habitat management areas..... 25

1.2.1 Closures to certain gear types 25

1.2.2 Gear modifications..... 26

1.2.2.1 Development history of gear modification options 27

1.2.2.2 Ground cables and their use..... 27

1.2.2.3 Current range of gear modification options..... 28

1.2.2.4 Analytical and practicability considerations for gear modification options 29

1.3 Next steps 31

2.0 MANAGEMENT ALTERNATIVES TO MINIMIZE THE ADVERSE EFFECTS OF FISHING ON ESSENTIAL FISH HABITAT..... 32

2.1 Alternative 1 – No Action 32

2.1.1 Maintain existing Jeffreys Bank habitat closed area as a mobile bottom-tending gear closure 32

2.1.2 Maintain existing Cashes Ledge habitat closed area as a mobile bottom-tending gear closure 32

2.1.3 Maintain existing Western Gulf of Maine habitat closed area as a mobile bottom-tending gear closure..... 32

2.1.4 Maintain existing Closed Area II habitat closed area as a mobile bottom-tending gear closure 32

2.1.5 Maintain existing Closed Area I habitat closed areas as mobile bottom-tending gear closures..... 32

2.1.6 Maintain existing Nantucket Lightship habitat closed area as a mobile bottom-tending gear closure..... 32

2.2 Alternative 2 – Remove or modify existing habitat areas and implement new habitat management areas..... 34

2.2.1 Eliminate the existing Western Gulf of Maine habitat area..... 37

2.2.2 Eliminate the existing Closed Area II habitat closed area 37

2.2.3 Eliminate the existing Closed Area I habitat closed areas 37

2.2.4 Eliminate the existing Nantucket Lightship habitat closed area..... 37

2.2.5 Adjust the boundaries of the existing Jeffreys Bank habitat closed area to create the Jeffreys Bank habitat management area and maintain status as a mobile bottom-tending gear closure..... 37

2.2.6 Adjust the boundaries of the Cashes Ledge habitat closed area to create the Cashes Ledge habitat management area and maintain status as a mobile bottom-tending gear closure 38

2.2.7 Adjust the boundaries of the WGOM habitat closed area to create the Jeffreys Ledge habitat management area, and maintain status as a mobile bottom-tending gear closure 38

2.2.8 Adjust the boundaries of the WGOM habitat closed area to create the Stellwagen habitat management area, and maintain status as a mobile bottom-tending gear closure 38

2.2.9	Adjust boundaries of the WGOM habitat area to remove only the northwest corner, and maintain the remaining portion as a mobile bottom-tending gear closure	39
2.2.10	Establish the Ammen Rock Habitat Management Area and close it to all fishing gear types	39
2.2.11	Establish the Fippennies Ledge habitat management area and close it to mobile bottom-tending gear	39
2.2.12	Establish the Platts Bank habitat management areas and close them to mobile bottom-tending gear	40
2.2.13	Establish the Western Georges Shoal habitat management area and close it to mobile bottom-tending gears	40
2.2.14	Establish the Eastern Georges Shoal habitat management area and close it to mobile bottom-tending gears	40
2.2.15	Establish four habitat management areas west of the Great South Channel and close them to mobile bottom tending gears	40
2.2.16	Establish two management areas on and around Cox Ledge and close them to mobile bottom-tending gear	40
2.3	Alternative 3 – TBD – A subset of Alternative 2 options	41
3.0	GEAR MODIFICATION OPTIONS THAT REQUIRE FURTHER DEVELOPMENT	42
3.1	Maintain the existing Jeffreys Bank habitat closed area boundary but change management measures to require shortened ground cables on bottom trawls	44
3.2	Adjust the boundaries of the Jeffreys Bank habitat closed area to create the Jeffreys Bank habitat management area and require shortened ground cables on bottom trawls	44
3.3	Maintain the existing Cashes Ledge habitat closed area boundary but change management measures to require shortened ground cables on bottom trawls	44
3.4	Adjust the boundaries of the Cashes Ledge habitat closed area to create the Cashes Ledge habitat management area and require shortened ground cables on bottom trawls	44
3.5	Establish the Fippennies Ledge habitat management area and require shortened ground cables on bottom trawls	44
3.6	Establish Platts Bank habitat management areas and require shortened ground cables on bottom trawls	44
3.7	Adjust the boundaries of the WGOM habitat closed area to create the Jeffreys Ledge habitat management area, and require shortened ground cables on bottom trawls	44
3.8	Adjust the boundaries of the WGOM habitat closed area to create the Stellwagen habitat management area, and require shortened ground cables on bottom trawls	44
3.9	Establish one or more Georges Shoal habitat management areas and require shortened ground cables on bottom trawls	44
3.10	Maintain the existing CAI habitat closed area boundaries but change management measures to require shortened ground cables on bottom trawls	45
3.11	Establish one or more habitat areas west of the Great South Channel require shortened ground cables on bottom trawls	45

3.12 Establish two management areas on Cox Ledge and require shortened ground cables on bottom trawls 45

4.0 PREVIOUSLY CONSIDERED OPTIONS..... 46

4.1 Roller gear and ground cable restrictions in clusters 1, 3, and 4..... 46

4.2 Extend the boundaries of the Jeffreys Ledge habitat management area to the west 46

4.3 Allow shrimp vessels in existing WGOM habitat closed area 46

4.4 Adjust the boundaries of the existing Closed Area II habitat closed area..... 46

4.5 Adjust the boundaries of the existing Nantucket Lightship habitat closed area.. 46

4.6 Establish a single large habitat management area in the Great South Channel... 47

4.7 Establish a habitat management area on Stellwagen that includes Tillies Bank. 47

4.8 Establish a habitat management area on Stellwagen that includes an extension to the east 47

4.9 Establish a habitat management area on Stellwagen that includes an extension to the east 48

4.10 Establish a habitat management area on Stellwagen that includes an extension to the east in addition to Wildcat Knoll..... 48

4.11 Extend the Jeffreys Ledge habitat management area boundary to include New Scantum 48

4.12 Establish a habitat management area on Gloucester Bank-Lower Stellwagen Bank 49

5.0 ADDITIONAL MAPS 50

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TABLES

Table 1 – Coordinates for existing habitat areas in degrees, decimal minutes. 22

Table 2 – Coordinates for new or modified habitat areas in degrees, decimal minutes.
Points are in clockwise order starting in the upper right of each polygon. 23

Table 3 – Summary of habitat management options included in Alternative 2. Gear
modification areas where shortened ground cables would be required are not
included in the table below but may be added to this alternative later based on
recommendations from the Habitat Advisory Panel to the Habitat Committee.
MBTG = mobile bottom tending gear..... 34

Table 4 - Range of areas that are candidates for ground cable length restrictions 42

FIGURES

Figure 1 - Ground cable with cookies..... 28

Figure 2 - Schematic of trawl gear (top down view) showing the relative contribution of
doors vs. ground cables vs. sweep to gear width/area swept. Not to scale. 29

MAPS

Map 1 – Vulnerable areas recommended by the PDT at the Committee’s July 21, 2011
meeting 16

Map 2 – Habitat management areas recommended by the PDT at the Committee’s August
30, 2011 meeting..... 17

Map 3 – Habitat management areas recommended by the Committee at their August 30,
2011 meeting..... 18

Map 4 – Additional habitat management areas in the western Gulf of Maine
recommended by the PDT at their February 7, 2012 meeting. 19

Map 5 - Habitat management areas recommended by the Committee at their June 8, 2012
meeting for further development as mobile bottom tending gear closures (most
areas) or as a closure to all fishing (Ammen Rock only). Ammen Rock is not
labeled on the map, but is shown in yellow and overlays the Cashes Ledge
modified area shown in royal blue. 20

Map 6 – Habitat management areas recommended by the Committee at their June 8, 2012
meeting for further development as gear modification areas with maximum
ground cable length requirements. Differences from the previous map include
the addition of Georges Shoal Large and CAI N and S to the list of areas under
consideration, and the removal of the Ammen Rock area, which is not under
consideration for gear modification measures. 21

Map 7 – Alternative 1 – No action habitat management areas. The map shows the
Lydonia and Oceanographer Canyon areas that are in the monkfish plan and
closed to fishing while on a monkfish DAS, but these areas have not received
much discussion in the context of OA2. 33

Options and Alternatives to Minimize the Effects of Fishing on EFH

Map 8 – Alternative 2 – Remove or modify existing habitat areas and implement new habitat management areas. Areas where only gear modification options are under consideration (i.e. Georges Shoal Large, Closed Area I North & South) are not shown on the map below..... 36

Map 9 - Areas where gear modifications, specifically, ground cable length limits, are being considered. Note the inclusion of three existing habitat closures – Jeffreys Bank, Cashes Ledge, Closed Area I North and South – as compared to Map 8. More detailed maps of individual areas are found in section 5.0. 43

Map 11 – Jeffreys Bank habitat management areas – current (grey outline) and modified (green). 50

Map 12 – Cashes Ledge modified (blue) and Fippennies Ledge (purple) habitat management areas. Existing habitat and groundfish closures are shown in grey and dotted red. The Ammen Rock area (yellow) is proposed as a closure to all types of fishing activity. Depth contours are in meters..... 51

Map 13 - Platts Bank habitat management areas are shown in dark green. Depth contours are in meters. 52

Map 14 – Jeffreys Ledge habitat management area shown in light green. The northern portions of the current WGOM habitat and groundfish areas are shown in grey and dotted red outlines. Depth contours are in meters. 53

Map 15 – Stellwagen habitat management area shown in purple. The southern portions of the current WGOM habitat and groundfish areas are shown in grey and dotted red outlines. Depth contours are in meters..... 54

Map 16 – Georges Shoal habitat management areas – eastern area in green, western area in magenta, and large area encompassing both eastern and western plus the area in between in light blue. The northern portion of the existing CAII groundfish area is shown in dotted red outline, and the existing CAII habitat area is shown in grey outline. Depth contours are in meters. 55

Map 17 – Habitat management areas west of the Great South Channel including Chatham Light, Great Rip, North of Fishing Rip, and North of Davis Bank are shown in yellow. Portions of Closed Area I and the Nantucket Lightship Closed Area are outlined in gray (habitat areas) or dotted red (groundfish areas). 56

Map 18 – Cox Ledge habitat management areas are shown in turquoise..... 57

1.0 Introduction

The purpose of Omnibus Essential Fish Habitat Amendment 2 (OA2) is meet NMFS' published guidelines for implementation of the Magnuson-Stevens Act's EFH provisions. An omnibus action, as opposed to an FMP by FMP approach, was selected as the preferred strategy to minimize adverse effects from fishing on EFH across all Council plans. The specific goals and objectives for OA2 are as follows:

GOALS:

1. Redefine, refine or update the identification and description of all EFH for those species of finfish and mollusks managed by the Council, including the consideration of HAPCs;
2. Identify, review and update the major fishing activities (MSA and non-MSA) that may adversely affect the EFH of those species managed by the Council;
3. Identify, review and update the major non-fishing activities that may adversely affect the EFH of those species managed by the Council;
4. Identify and implement mechanisms to protect, conserve, and enhance the EFH of those species managed by the Council to the extent practicable;
5. Define metrics for achieving the requirements to minimize adverse impacts to the extent practicable;
6. Integrate and optimize measures to minimize the adverse impacts to EFH across all Council managed FMPs;
7. Update research and information needs;
8. Review and update prey species information;
9. Protect deep-sea corals and their habitats throughout the Northeast Region from fishing impacts.¹

OBJECTIVES:

- A. Identify new data sources and assimilate into the process to meet goals (state, federal and other data sources);
- B. Implement review of existing HAPCs and consider modified or additional HAPCs (Goal 1);

¹ At the 02/04/08 Habitat Committee meeting, the PDT informed the Committee that the 2007 MSA added discretionary provisions that allow the Council to protect corals independent of their role as Essential Fish Habitat. The committee passed a motion that "the Habitat PDT evaluate existing information on deep sea corals and develop management options to protect that habitat. It is understood that such options would be independent of EFH and HAPC designations". The Council is considering splitting off the coral alternatives into a separate omnibus amendment.

- C. Review EFH designations and refine or redefine where appropriate as improved data and analysis become available (Goal 1);
- D. Develop analytical tools for designation of EFH, minimization of adverse impacts, and monitoring the effectiveness of measures designed to protect habitat (Goal 1, Goal 3 and Goal 5);
- E. Modify fishing methods and create incentives to reduce the impacts on habitat associated with fishing (Goal 4);
- F. Support restoration and rehabilitation of fish habitat which have already been degraded (by fishing and non-fishing activities) (Goal 4);
- G. Support creation and development of fish habitat where appropriate and when increased fishery resources would benefit society (Goal 4);
- H. Develop a strategy for prioritizing habitat protection (Goal 4);
- I. Develop criteria for establishing and implementing dedicated habitat research areas (Goal 7);
- J. Design a system for monitoring and evaluating the benefits of EFH management actions including dedicated habitat research areas (Goal 7);
- K. Consider modifications to groundfish closed areas (Goal 6)²;
- L. Using the discretionary provisions established via the 2007 MSA, develop deep-sea coral protection zones using the best available data on corals and coral habitats, and implement fishing restrictions in those zones as necessary to minimize fishing impacts (Goal 9)³.

This document describes a range of management alternatives intended to address goals 4 and 6 above, and ultimately will be folded into the full OA2 DEIS document. It is divided into four sections:

1. Introduction
 - a. Objectives for area-based habitat management,
 - b. Development history and summary of the range of draft habitat management areas, and
 - c. Types of management measures that may be enacted within habitat management areas
2. Area-specific habitat management alternatives and component options (current as of 08/23/12 Habitat Committee meeting)
3. Area-specific habitat management options that require further development

² At the 04/28/11 Council meeting, a series of recommended approaches to integrating consideration of the groundfish rebuilding closures with the Omnibus Amendment were presented by staff. After reviewing the possible approaches, the Council moved to “expand the scope of EFH action to include modification of the groundfish closed areas”.

³ See footnote 1.

4. Area-specific habitat management options that have been previously discussed by the Habitat Committee and removed from further consideration

The following definitions are used throughout:

- **Option** refers to a single habitat management area (existing, modified, or newly proposed) and a single associated management measure. For example, “Establish the Platts Bank habitat management areas and close them to mobile bottom-tending gear”. The intention is to provide some analysis of options on an individual basis. This document summarizes adverse effects minimization options; options designed to achieve groundfish objectives are currently in development.
- **An alternative** is a combination of options that would be discussed and analyzed as a group. For example, the no action alternative would include options to maintain each of the six existing habitat closed areas.
- **A habitat management area** is a location where habitat management measures could be implemented. These locations are bounded by specific coordinates that were developed by the Habitat Committee and Plan Development Team between July 2011 and June 2012.
- **Management measures** are the fishing restrictions that could be associated with new or modified habitat management areas. Individual areas generally have two different types of measures that might be selected, specifically a mobile bottom tending gear restriction, where these gear types are prohibited entirely, or a ground cable modification option, where shortened ground cables would be required for all bottom otter trawls. The Ammen Rock habitat management area is a special case, where the only measure under consideration is a prohibition on all fishing gears. This area overlaps completely with the Cashes Ledge Habitat Area and would therefore represent an enhanced protection level for the specific habitat types on the Ammen Rock pinnacle.

1.1 Identification of habitat management areas

The Magnuson Stevens Fishery Conservation and Management Act states that fishery management plans must do the following:

“Describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat”

The Secretarial guidelines define ‘adverse’ as a combination of effects on habitat that are both ‘more than minimal’ and ‘not temporary’ (see EFH final rule for details; a copy is posted at <http://www.nefmc.org/habitat/efhfinalrule.pdf>). However, determinations about what exactly is meant by minimal and temporary, and about what management measures are practicable, are left to the Council’s discretion.

To foster objective decision making in regards to habitat management, the Council's Habitat PDT developed the Swept Area Seabed Impact (SASI) approach to estimating adverse effects. SASI was developed by the NEFMC Habitat Plan Development Team (PDT) especially for use in OA2. This document assumes that the reader has a basic understanding of the SASI approach to evaluating the impacts of fishing on benthic habitats. A brief summary of the SASI approach is available here:

http://www.nefmc.org/habitat/sasi_info/110624_SASI_Summary_v2.pdf. A more detailed explanation of the SASI approach is available here: http://www.nefmc.org/habitat/sasi_info/110121_SASI_Document.pdf.

Two overarching objectives for the design of a habitat management strategy are identified that are consistent with the SASI approach. They are:

1. Protect the most vulnerable habitats from the adverse effects of fishing
2. Reduce seabed area swept to reduce the magnitude of adverse effects
 - a. Use modified gear types in such a way that reduces net area swept
 - b. Design an area-based management system that facilitates high catch per unit effort fishing, to the extent possible

It is difficult to say which came first – the listed objectives, or the SASI approach. Fishery management in the region has been area-based (objective 1) for many years. The two existing Habitat Areas of Particular concern were designated in 1999 via Omnibus EFH Amendment 1, and six habitat closure areas were implemented via Amendment 13 to the multispecies FMP. Building on this area-management framework, SASI was developed to serve as a spatially-referenced decision support tool. A key aspect of SASI is that habitats characteristics vary spatially and various habitat types may be differentially susceptible to various fishing gear types.

An overarching objective for habitat management measures is that they be practicable. The concept of practicability is part of the EFH Final Rule, and some guidance is provided, but ultimately the determination of whether a particular measure is practicable is left to the Council's discretion. One way to evaluate practicability is to compare habitat protection benefits and economic costs of a particular measure.

“In determining whether it is practicable to minimize an adverse effect from fishing, Councils should consider the nature and extent of the adverse effect on EFH and the long and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with national standard 7. In determining whether management measures are practicable, Councils are not required to perform a formal cost/benefit analysis.”

The results of the SASI and associated Local Indicators of Spatial Association (LISA) analyses suggest that the habitats most likely to accumulate adverse effects of fishing (i.e. the most vulnerable habitats) are clustered together. SASI uses a dominant-substrate based definition of habitat, and habitats dominated by larger substrate grain sizes (i.e. gravels) were found to be more vulnerable to accumulating adverse effects. The LISA

analyses used spatial statistics to identify clusters of vulnerable habitats. Because gravels are spatially clustered in the northeast region, vulnerable habitats are also spatially clustered. These clusters were used as a starting point for PDT discussions about which locations to recommend to the Committee as adverse effects minimization habitat management areas. The PDT evaluated the model outputs, underlying data, and other available habitat data to move from a set of cluster outputs to a set of ‘vulnerable areas’. These vulnerable areas, which were based on natural features including banks, ledges, or gravel-dominated hotspots, were recommended as starting points for habitat management areas.

The habitat management area options for OA2 have been in development since June 2010.⁴ At that time, the PDT had just completed the Local Indicators of Spatial Association (LISA) analysis, which showed which of the SASI grid cells had higher or lower than average vulnerability, and whether they were within higher than average or lower than average vulnerability ‘neighborhoods’. Those cells that were high vulnerability and in high vulnerability neighborhoods were recommended to the Committee as a starting point for developing area-based management measures.

Although clustering of the SASI model vulnerability outputs for all gear types were evaluated using the LISA analysis, the PDT’s recommendations were based on the trawl gear SASI outputs. This was because trawl gears represent the bulk of the adverse effects in the region relative to other gears, in large part because their realized area swept is an order of magnitude greater than that for all other gear types. Per unit of area swept, scallop dredge impacts were estimated to be the same as for trawl gears. Fixed gear (longline, gillnet, and trap) impacts were found to be less adverse than mobile gear impacts. This is because geological and biological habitat features were estimated to be less susceptible to damage from fixed gears, and because with more minimal damage, recovery was estimated to occur more quickly. Hydraulic dredge impacts were also evaluated using SASI, but this fishery is spatially very localized, and only operates within certain habitat types. Specifically, areas with larger substrate grain sizes are not fished with hydraulic dredges.

Also in June 2010, the PDT conducted an Equal Area Permutation analysis. This analysis evaluated the performance of the existing habitat closures in terms of whether or not they encompassed high vulnerability habitats. Some of the closures performed well according to this metric, and others relatively poorly.

In June 2011, the PDT revisited the LISA results, and in conjunction with other information about habitats in the region, and in the context of additional Committee discussion that occurred later in 2010, identified a list of ‘vulnerable areas’ (see Map 1). This list of areas included some areas that were based on the LISA clusters and some that were outside the clusters. Also, some of the coastal LISA cluster areas were not included

⁴ Although the development history is summarized below, recent meeting summaries may also be of interest and are available at <http://www.nefmc.org/habitat/index.html>.

on the list. The vulnerable areas were presented to the Committee in July 2011. The area boundaries identified by the PDT at this time were not intended to be management area boundaries, rather, the intention was to highlight vulnerable features such as banks and ledges in the Gulf of Maine, and gravel-dominated hotspots on Georges Bank and to the west of Great South Channel. Cox Ledge in Southern New England was also highlighted.

Following the July 2011 Committee meeting, the PDT refined the boundaries of some of these areas (in particular the areas west of the Great South Channel, the gravel-dominated hotspots on and west of Georges Shoal, and the Jeffreys Ledge area) to produce more straightforward boundaries that were intended for adoption as management areas (see Map 2). At this time, the PDT also suggested intermediate options between maintaining and eliminating the Nantucket Lightship and Closed Area II habitat closed areas (again, see Map 2), although the Committee did not adopt these options for further consideration at their August 30 meeting (see Map 3).

In February 2012, the PDT developed some area-based management options for Stellwagen Bank and the surrounding area, as well as two other locations in the inshore/western Gulf of Maine, New Scantum and Gloucester Bank-Lower Stellwagen Bank. The Committee reviewed these options later that month and decided to move forward with the Stellwagen option for the southern part of the WGOM habitat closure. The full range of options as initially proposed is shown on Map 4. Details are provided in the section of this document summarizing previously considered options.

Also at their February 2012 meeting, the Committee asked the PDT to revisit the boundary options for Platts Bank, Fippennies Ledge, and Cashes Ledge, to make them more discrete. The Committee reviewed these options in April and June 2012 and accepted them for further analysis at their June meeting in Providence. Also at the June 2012 meeting, the Committee reconsidered a previously rejected option to modify the boundaries of the Jeffreys Bank habitat area. In addition, the Committee reconsidered the use of gear modifications as a management strategy in various GOM areas, and added ground cable length limit options for all areas except Ammen Rock. The current range of options are shown on (closures to bottom tending gear) and Map 6 (ground cable modifications). Coordinates for the existing and proposed habitat management areas are listed in Table 1 (existing areas),

Options and Alternatives to Minimize the Effects of Fishing on EFH

Table 2 (new or modified areas). Coordinates for existing areas are those listed in regulations; coordinates given for new or modified areas reflect the most recent updates to area boundaries.

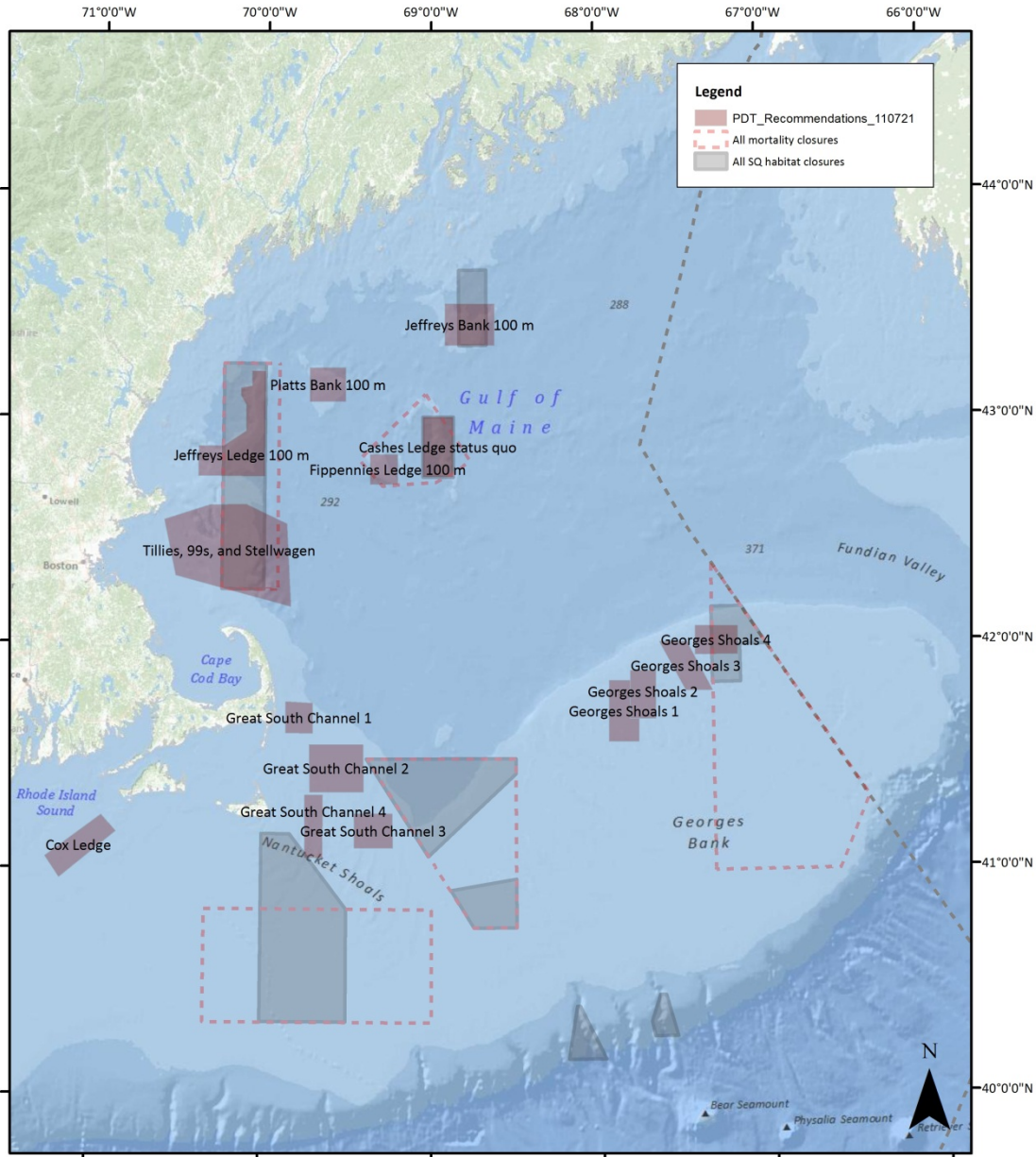
As a final note, the Lydonia and Oceanographer Canyon EFH closed areas are shown on some of the maps, and options to keep or change these areas have not really received much discussion in an adverse effects minimization context. Modified versions of these areas are under consideration as discrete coral protection zones. The coral alternatives are being developed under the discretionary provisions in the Magnuson Stevens Act, and are discussed in a separate document. Elimination of these two EFH closures could be appropriate, contingent upon implementation of coral zone alternatives, but this has not been discussed in any detail.

Options and Alternatives to Minimize the Effects of Fishing on EFH

Map 1 – Vulnerable areas recommended by the PDT at the Committee’s July 21, 2011 meeting.

Habitat Omnibus Amendment:

- (1) Vulnerable areas recommended by PDT on 7/21/2011 for possible adverse effects minimization management measures**
- (2) Status quo habitat and groundfish mortality closed areas**



New England Fishery Management Council Habitat Plan Development Team
Map date: 30 November 2011
NAD 1893 UTM Zone 19N



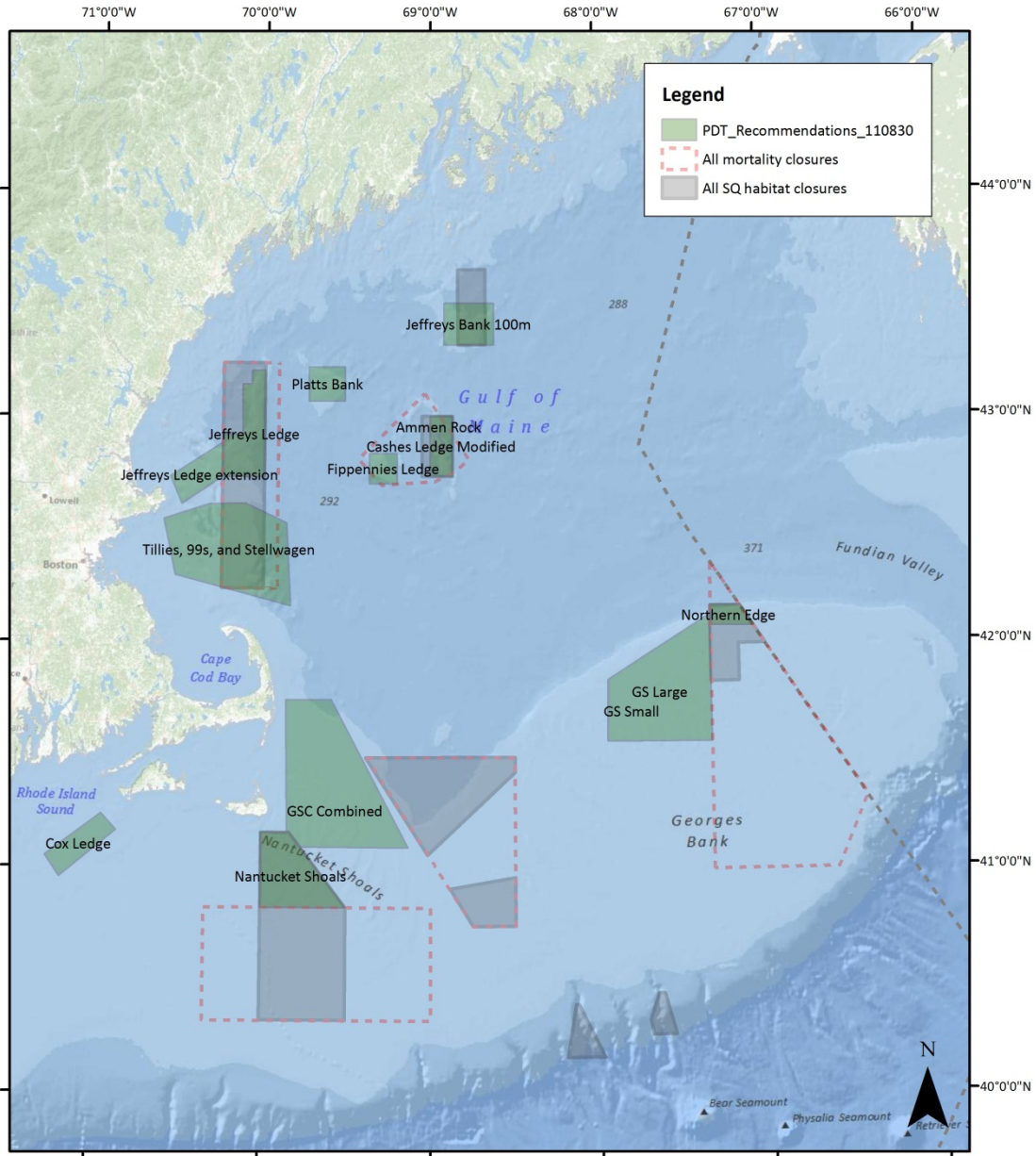
Options and Alternatives to Minimize the Effects of Fishing on EFH

Map 2 – Habitat management areas recommended by the PDT at the Committee’s August 30, 2011 meeting.

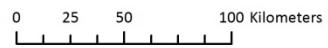
Habitat Omnibus Amendment:

(1) Adverse effects minimization management areas recommended by PDT on 8/30/2011

(2) Status quo habitat and groundfish mortality closed areas



New England Fishery Management Council Habitat Plan Development Team
Map date: 30 November 2011
NAD 1893 UTM Zone 19N

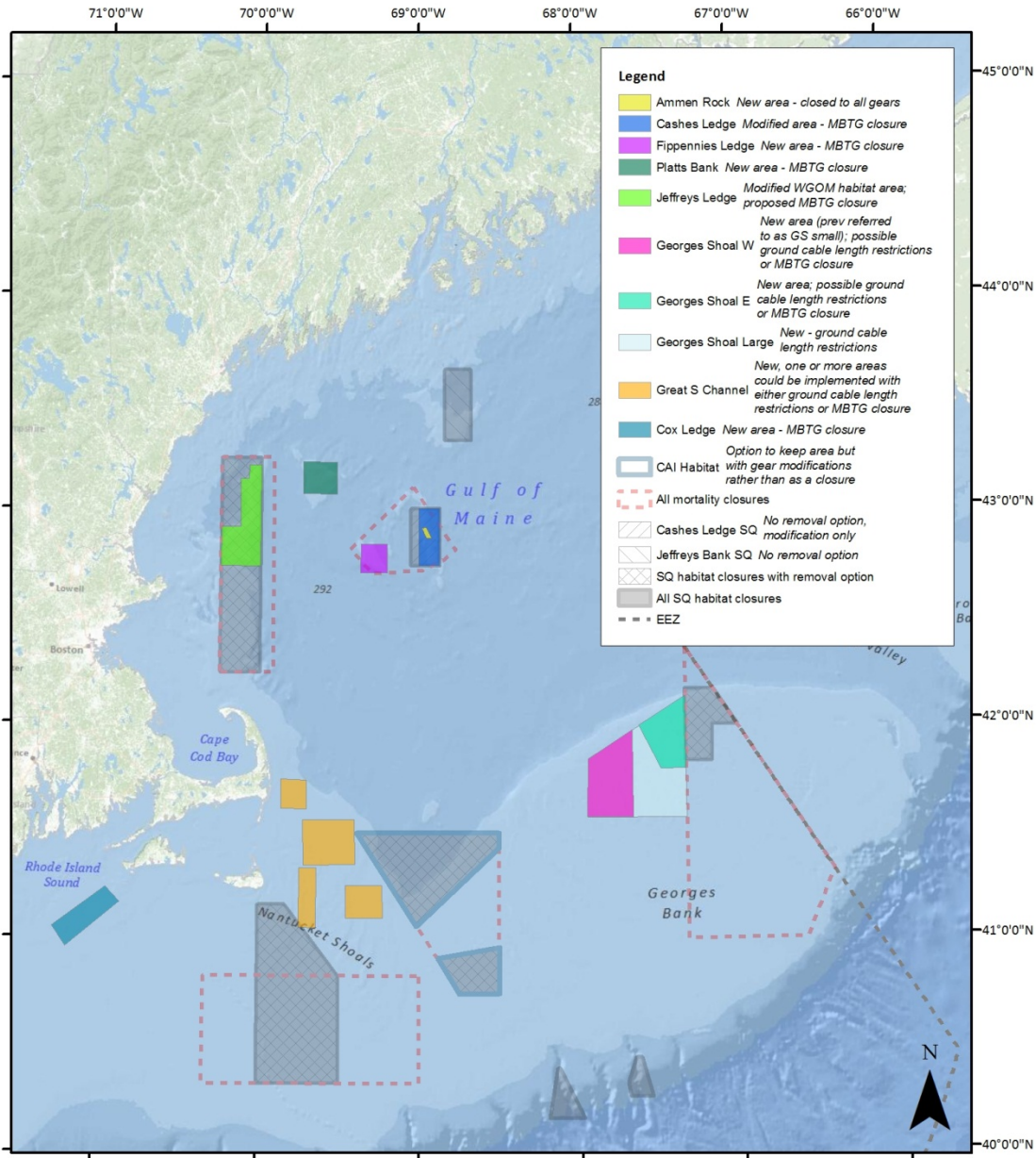


Options and Alternatives to Minimize the Effects of Fishing on EFH

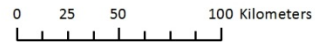
Map 3 – Habitat management areas recommended by the Committee at their August 30, 2011 meeting.

Habitat Omnibus Amendment:

- (1) Areas recommended by Committee on 8/30/2011 for adverse effects minimization measures
- (2) Status quo habitat and groundfish mortality closed areas



New England Fishery Management Council Habitat Plan Development Team
 Map date: 03 January 2012
 NAD 1893 UTM Zone 19N

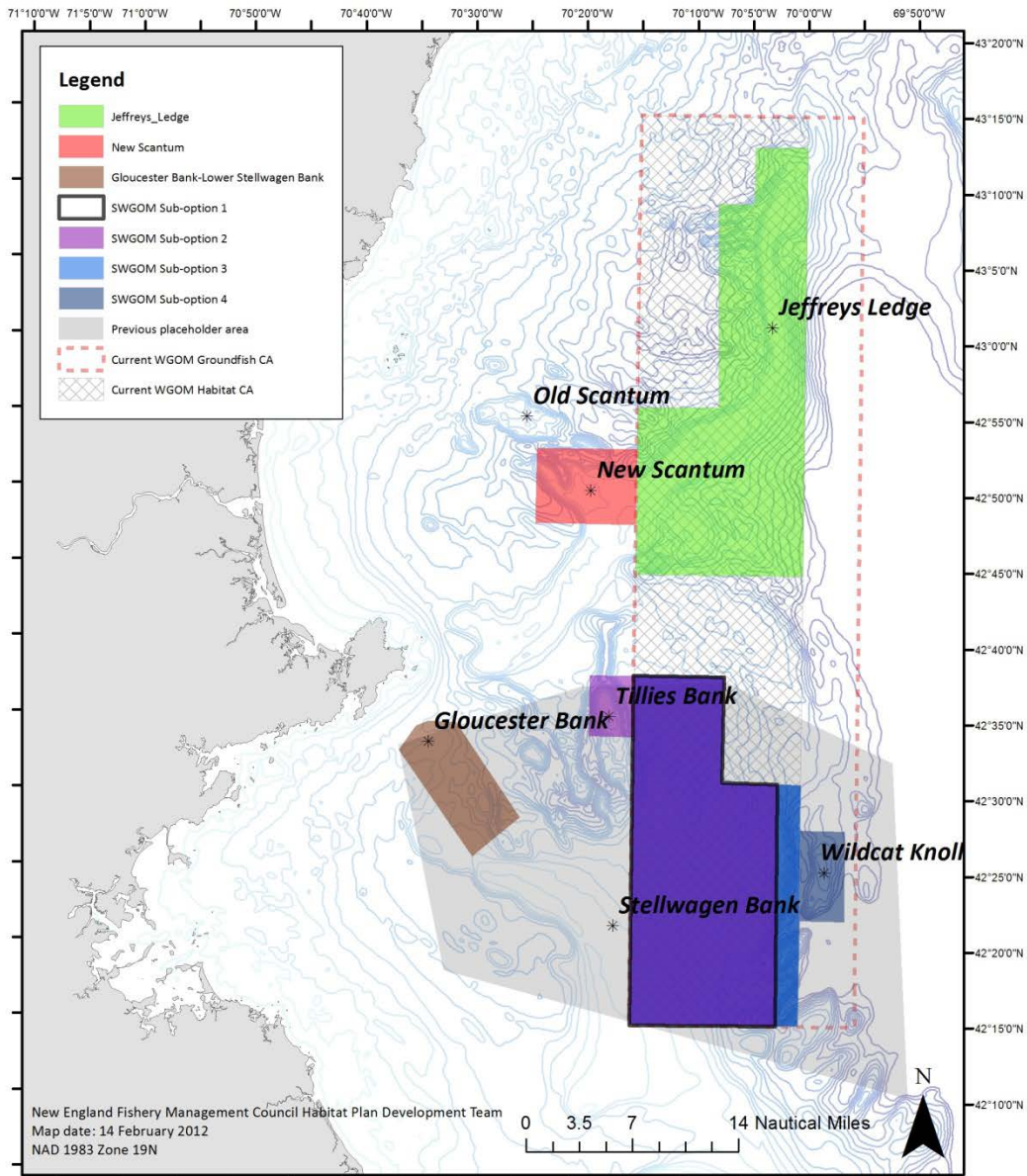


Map 4 – Additional habitat management areas in the western Gulf of Maine recommended by the PDT at their February 7, 2012 meeting.

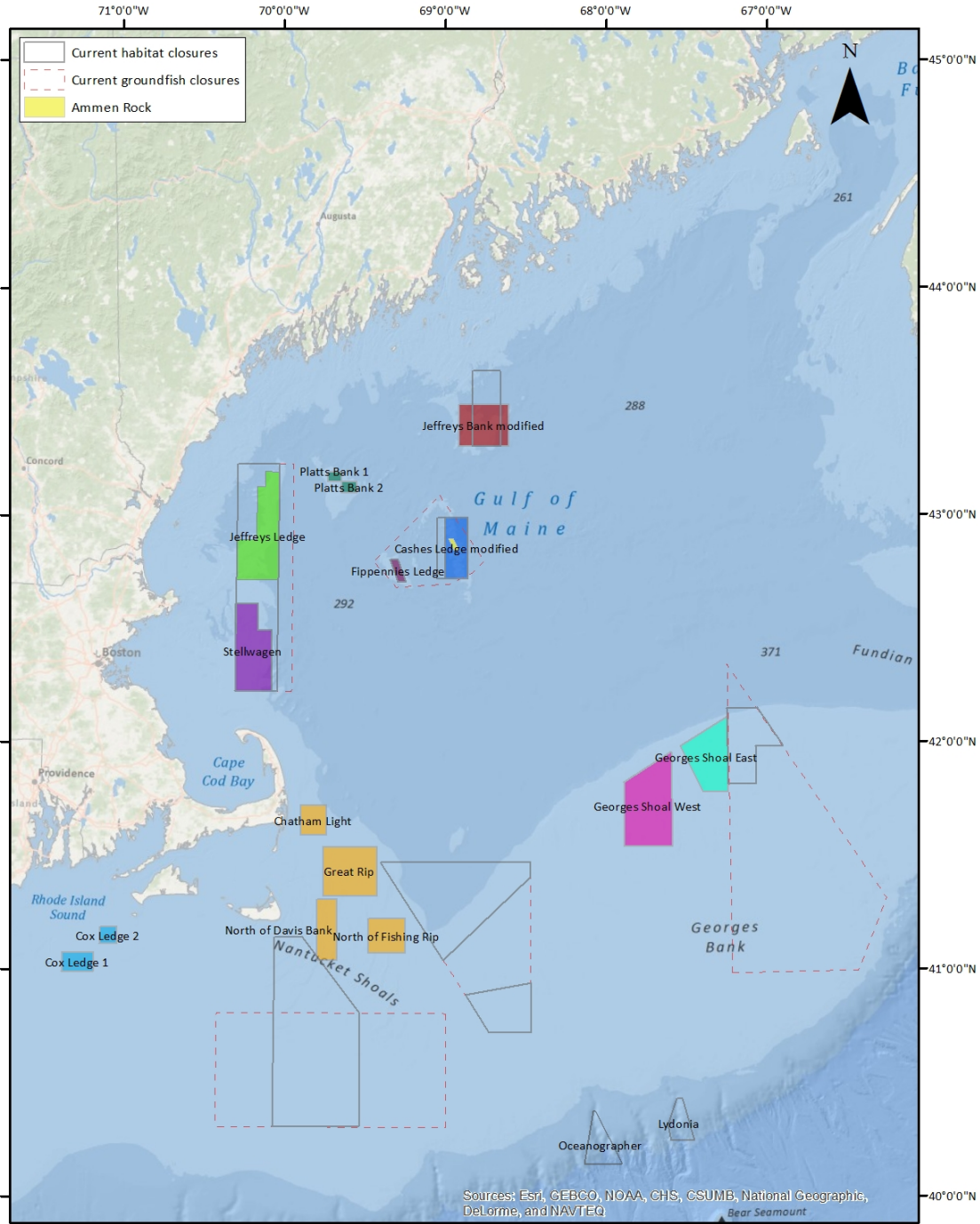
Habitat Omnibus Amendment:

Adverse effects minimization measures for the western Gulf of Maine, including:

- (1) Jeffreys Ledge area recommended by Committee on 8/30/2011
- (2) Additional areas recommended by PDT on 2/7/2012
- (3) Status quo habitat and groundfish mortality closed areas



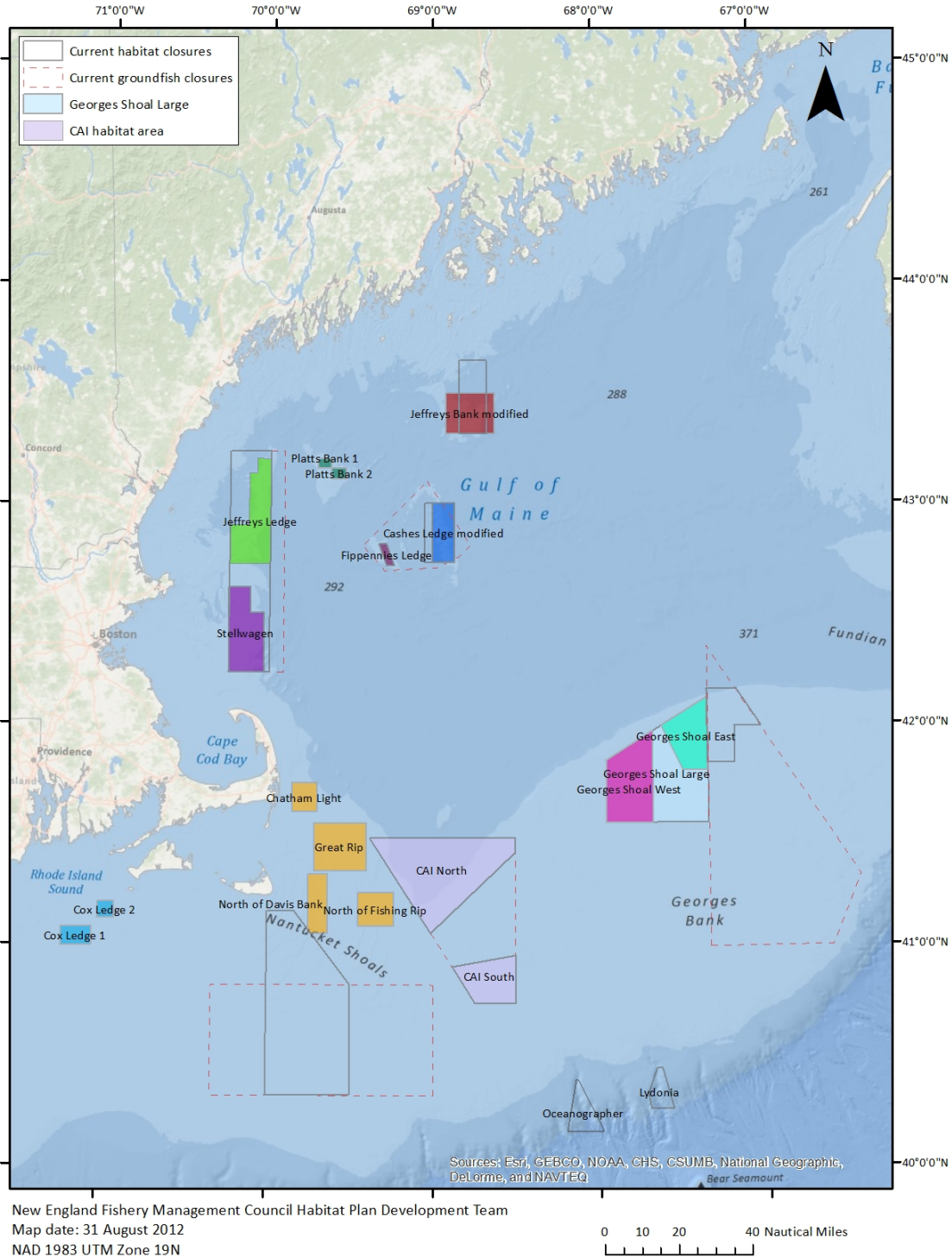
Map 5 - Habitat management areas recommended by the Committee at their June 8, 2012 meeting for further development as mobile bottom tending gear closures (most areas) or as a closure to all fishing (Ammen Rock only). Ammen Rock is not labeled on the map, but is shown in yellow and overlays the Cashes Ledge modified area shown in royal blue.



New England Fishery Management Council Habitat Plan Development Team
 Map date: 31 August 2012
 NAD 1983 UTM Zone 19N

0 10 20 40 Nautical Miles

Map 6 – Habitat management areas recommended by the Committee at their June 8, 2012 meeting for further development as gear modification areas with maximum ground cable length requirements. Differences from the previous map include the addition of Georges Shoal Large and CAI N and S to the list of areas under consideration, and the removal of the Ammen Rock area, which is not under consideration for gear modification measures.



Options and Alternatives to Minimize the Effects of Fishing on EFH

Table 1 – Coordinates for existing habitat areas in degrees, decimal minutes.

Jeffreys Bank Habitat Closure Area

Point	Latitude	Longitude
JB1	43° 40'	-68° 50'
JB2	43° 40'	-68° 40'
JB3	43° 20'	-68° 40'
JB4	43° 20'	-68° 50'

Cashes Ledge Habitat Closure Area

Point	Latitude	Longitude
CLH1	43° 01'	-69° 03'
CLH2	43° 01'	-68° 52'
CLH3	42° 45'	-68° 52'
CLH4	42° 45'	-69° 03'

Western Gulf of Maine Habitat Closure Area

Point	Latitude	Longitude
WGM4	43° 15'	-70° 15'
WGM1	42° 15'	-70° 15'
WGM5	42° 15'	-70° 00'
WGM6	43° 15'	-70° 15'

Closed Area II Habitat Closure Area

Point	Latitude	Longitude
CIIH1	42° 10'	-67° 20'
CIIH2	42° 10'	-67° 09.3'
CIIH3	42° 00'	-67° 0.5'
CIIH4	42° 00'	-67° 10'
CIIH5	41° 50'	-67° 10'
CIIH6	41° 50'	-67° 20'

Closed Area I Habitat Closure Area N

Point	Latitude	Longitude
CI1	41° 30'	-69° 23'
CI4	41° 30'	-68° 30'
CIH1	41° 26'	-68° 30'
CIH2	41° 04'	-69° 01'

Closed Area I Habitat Closure Area S

Point	Latitude	Longitude
CIH3	40° 55'	-68° 53'
CIH4	40° 58'	-68° 30'
CI3	40° 45'	-68° 30'
CI2	40° 45'	-68° 45'

Nantucket Lightship Habitat Closure Area

Point	Latitude	Longitude
NLH1	41° 10'	-70° 00'
NLH2	41° 10'	-69° 50'
NLH3	40° 50'	-69° 30'
NLH4	40° 20'	-69° 30'
NLH5	40° 20'	-70° 00'

Options and Alternatives to Minimize the Effects of Fishing on EFH

Table 2 – Coordinates for new or modified habitat areas in degrees, decimal minutes. Points are in clockwise order starting in the upper right of each polygon.

Ammen Rock Habitat Management Area

Point	Latitude	Longitude
1	42° 55.5'	-68° 57.0'
2	42° 52.5'	-68° 55.0'
3	42° 52.5'	-68° 57.0'
4	42° 55.5'	-68° 59.0'

Modified Cashes Ledge Habitat Management Area

Point	Latitude	Longitude
1	43° 01.0'	69° 00.0'
2	43° 01.0'	68° 52.0'
3	42° 45.0'	68° 52.0'
4	42° 45.0'	69° 00.0'

Platts Bank: Habitat Management Area 1

Point	Latitude	Longitude
1	43° 13.0'	-69° 37.5'
2	43° 10.5'	-69° 37.5'
3	43° 10.5'	-69° 42.5'
4	43° 13.0'	-69° 42.5'

Platts Bank: Habitat Management Area 2

Point	Latitude	Longitude
1	43° 10.5'	-69° 32.0'
2	43° 07.5'	-69° 32.0'
3	43° 07.5'	-69° 37.5'
4	43° 10.5'	-69° 37.5'

Fippennies Ledge Habitat Management Area

Point	Latitude	Longitude
1	42° 50.0'	-69° 17.0'
2	42° 44.0'	-69° 14.0'
3	42° 44.0'	-69° 18.0'
4	42° 50.0'	-69° 21.0'

Jeffreys Ledge Habitat Management Area

Point	Latitude	Longitude
1	43° 13.0'	-70° 00.0'
2	42° 44.4'	-70° 00.0'
3	42° 44.4'	-70° 15.0'
4	42° 55.0'	-70° 15.0'
5	42° 55.0'	-70° 08.0'
6	43° 09.0'	-70° 08.0'
7	43° 09.0'	-70° 05.0'
8	43° 13.0'	-70° 05.0'

Stellwagen Habitat Management Area

Point	Latitude	Longitude
1	42° 38.0'	-70° 07.0'
2	42° 31.0'	-70° 07.0'
3	42° 31.0'	-70° 02.0'
4	42° 15.0'	-70° 02.0'
5	42° 15.0'	-70° 15.0'
6	42° 38.0'	-70° 15.0'

Georges Shoal (three areas)

Western Georges Shoal Area

Point	Latitude	Longitude
1	41° 58.848'	-67° 40.0'
2	41° 34.0'	-67° 40.0'
3	41° 34.0'	-67° 57.0'
4	41° 51.0'	-67° 57.0'

Eastern Georges Shoal Area

Point	Latitude	Longitude
1	42° 08.0'	-67° 20.0'
2	41° 48.0'	-67° 20.0'
3	41° 48.0'	-67° 29.0'
4	42° 0.23'	-67° 37.0'

Large Georges Shoal Area

Point	Latitude	Longitude
1	42° 08.0'	-67° 20.0'
2	41° 34.0'	-67° 20.0'
3	41° 34.0'	-67° 57.0'
4	41° 51.0'	-67° 57.0'

Options and Alternatives to Minimize the Effects of Fishing on EFH

Great South Channel (four areas)

Great South Channel Area 1 – Chatham Light

Point	Latitude	Longitude
1	41° 45.0'	-69° 42.0'
2	41° 37.0'	-69° 42.0'
3	41° 37.0'	-69° 51.0'
4	41° 45.0'	-69° 51.0'

Great South Channel Area 2 – Great Rip

Point	Latitude	Longitude
1	41° 34.0'	-69° 24.0'
2	41° 21.0'	-69° 24.0'
3	41° 21.0'	-69° 43.0'
4	41° 34.0'	-69° 43.0'

Great South Channel Area 3 – N of Fishing Rip

Point	Latitude	Longitude
1	41° 15.0'	-69° 14.0'
2	41° 06.0'	-69° 14.0'
3	41° 06.0'	-69° 27.0'
4	41° 15.0'	-69° 27.0'

Great South Channel Area 4 – N of Davis Bank

Point	Latitude	Longitude
1	41° 20.0'	-69° 38.0'
2	41° 04.0'	-69° 38.0'
3	41° 04.0'	-69° 45.0'
4	41° 20.0'	-69° 45.0'

Cox Ledge Habitat Management Area 1

Point	Latitude	Longitude
1	41° 05.0'	-71° 03.0'
2	41° 00.0'	-71° 03.0'
3	41° 00.0'	-71° 14.0'
4	41° 05.0'	-71° 14.0'

Cox Ledge Habitat Management Area 2

Point	Latitude	Longitude
1	41° 12.0'	-70° 55.0'
2	41° 07.5'	-70° 55.0'
3	40° 07.5'	-71° 01.0'
4	41° 12.0'	-71° 01.0'

1.2 Measures for habitat management areas

Most of the modified or newly proposed habitat management areas have two types management measures that could be selected, either closure to certain gear types, typically mobile bottom tending gears, or modification of trawl ground cables to limit them to some area-specific maximum length. These two management options and the areas in which they might be applied are summarized below.

1.2.1 Closures to certain gear types

One type of adverse effects minimization management measure is the closure of specified habitat areas to particular types of fishing gear. A mobile bottom tending gear restriction, which includes all types of trawls and dredges, applies to the existing habitat closed areas, and is proposed as an option for most of the new and modified areas:

Existing mobile bottom tending gear habitat closures:

- Jeffreys Bank habitat closure
- Cashes Ledge habitat closure
- Western Gulf of Maine habitat closure
- Closed Area I habitat closure
- Closed Area II habitat closure
- Nantucket Lightship Closed Area habitat closure

Modified habitat management areas with mobile bottom tending gear closure options:

- Jeffreys Bank (modified boundaries)
- Cashes Ledge (modified boundaries)
- Jeffreys Ledge (subset of current WGOM habitat area)
- Stellwagen Bank (subset of current WGOM habitat area)

New habitat management areas with mobile bottom tending gear closure options:

- Fippennies Ledge (within the current Cashes Ledge groundfish closure)
- Platts Bank (2 subareas)
- Georges Shoal (2 subareas, east and west)
- West of the Great South Channel (4 subareas)
- Cox Ledge (2 subareas)

Another option under consideration is closure to all types of fishing activity. This restriction would include all types of bottom tending gear: bottom trawls, dredges, demersal longlines, sink gillnets, and traps, with the exception of lobster traps, as well as midwater trawl gear and recreational gear. Although for an equal amount of area swept fixed gears were estimated to have substantially reduced adverse effects in comparison to trawls and dredges, for some types of benthic features, habitat impacts due to fixed gear use could be significant and long lasting (‘adverse’ effects are both ‘more than minimal’ and ‘not temporary’).

- This level of restriction is only suggested for the Ammen Rock area.

1.2.2 Gear modifications

A major premise of the SASI approach is that the overall magnitude of adverse effects of fishing on habitat is directly related to the magnitude of fishing gear seabed contact. Thus, if fishing can be done in such a way as to minimize seabed contact, it will help to minimize adverse effects on EFH. There are a few different ways to minimize seabed contact: reduce the overall amount of fishing, use gear types that have less seabed contact (either modified gear types, i.e. raised footrope trawls, or totally different gear types, i.e. longlines instead of trawls), or fish in areas with higher catch per unit effort (CPUE), such that the same amount of fish can be caught with less fishing time, and thus less seabed contact.

An overall reduction in fishing as a means to minimize area swept and thus adverse effects on EFH is likely not practicable, so this leaves modified gear types and fishing with high CPUE. Modified gear types, specifically setting maximum trawl ground cable lengths, are considered explicitly in the range of area-based management options in this amendment. Managing fisheries to generate high CPUE is less straightforward, as many factors interact to produce the spatial patterns of fishing and associated catch rates that we observe. However, SASI provides an analytical tool that can be used to consider the tradeoffs associated with protecting specific areas and achieving high CPUE. This approach, referred to as a practicability analysis, combines information about past area swept and revenues (a proxy for catch rates) with assumptions about how fishing effort would shift under various area closure/area reopening scenarios.

In a particular habitat management area, gear modifications could be used in lieu of closure to minimize the adverse effects of fishing on habitat. For bottom otter trawls, a maximum ground gear size on the sweep and/or a maximum ground cable length could be employed. Limiting ground gear size would be expected to reduce seabed impact by making it difficult to fish bottom otter trawls over areas of complex relief, thereby redirecting fishing effort into less complex habitats. Limiting ground cable length would be expected to reduce the linear effective width of the gear and thereby the area swept and associated seabed impacts. These statements are oversimplifications, however, and a full accounting of the costs and benefits to habitat, managed species, and the fishing industry should be undertaken in order to more fully balance habitat, resource, and economic considerations associated with gear modifications.

Currently, ground gear restrictions are used in two large areas. The inshore GOM roller gear restricted area covers over 11,000 km² in the western GOM and has a 12 inch ground gear size limit. A 6 inch size limit is in place in the southern monkfish area for vessels operating on a monkfish DAS. The southern monkfish area covers a very large area: all areas south of 41° N latitude east of Cape Cod; plus all areas to the south and west of Cape Cod. Ground cable length limits are in place in the northern shrimp fishery, which is managed by ASMFC.

1.2.2.1 Development history of gear modification options

In the context of minimizing adverse effects, gear modification requirements were first considered by the Habitat Committee at their June 2010 meeting, within the LISA⁵ clusters in the Gulf of Maine (GOM), on Georges Bank (GB), and in Southern New England (SNE). The Committee reiterated their desire for analysis of both ground cable and roller gear restrictions in GOM clusters 1, 3, and 4 at their October 2010 meeting. At their October 2010 meeting, the Committee agreed to provide some recommendations to the PDT about an appropriate range of options for ground cable lengths, but at the current time, specific length options need further development by the PDT and Committee.

During their June 2011 meeting, the PDT reviewed the LISA cluster results and other non-SASI information, and recommended a range of vulnerable areas to the Committee as candidate areas for adverse effects minimization measures. At their July 2011 meeting, the Committee recommended analyzing mobile bottom tending gear closures and ground cable restrictions in potential management areas designed to encompass gravel hotspots identified by the PDT on and west of Georges Shoal. Also at that meeting, they recommended analysis of ground cable length restrictions in lieu of the current mobile bottom tending gear closure in the existing Closed Area I habitat areas. Specifically, the ground cable options would set a maximum total ground cable length for trawl vessels operating in a particular spatial area.

At their August 2011 meeting, the PDT recommended ground cable length restrictions only in a large area on Georges Shoal and in a large area combining four separate gravel hotspots west of the Great South Channel. At their August 2011 meeting, the Committee recommended analyzing ground cable restrictions for three areas on and west of Georges Shoal (Georges Shoal Large, as recommended by the PDT for this purpose, Georges Shoal East area developed at the meeting, and a Georges Shoal West area combining the two westernmost gravel hotspots). The Committee also recommended ground cable restrictions be analyzed for the four Great South Channel areas individually, and a single Cox Ledge area, and reiterated their support for the analysis of the existing CAI habitat areas as ground cable modification areas.

At their June 2012 meeting, the Habitat Committee added a ground cable length limit option for all of the GOM areas, with the exception of the Ammen Rock subsection of the Cashes Ledge area. These include the new and modified areas on Jeffreys Bank, Cashes Ledge, Fippennies Ledge, Platts Bank, Jeffreys Ledge, and Stellwagen, and the existing WGOM, Jeffreys Bank, and Cashes Ledge habitat closures.

1.2.2.2 Ground cables and their use

Ground cables are defined as wire ropes 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

⁵ Local Indicators of Spatial Association analysis of Swept Area Seabed Impact model outputs

passing the wires through rubber disks (cookies) or rollers; this modification is designed to assist passage of the ground cables over the seabed.

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 1). There are some reports that a few fishermen use chain as an alternative to wire rope. Cable diameter ranges from $\frac{9}{16}$ inch to $\frac{3}{4}$ inch, with $1\frac{3}{4}$ to 3 inch diameter cookies (2 inch to $2\frac{3}{8}$ inch cookies are commonly used).

Figure 1 - Ground cable with cookies



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 obstructions that can catch or damage the gear.

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 in cable/cookie composition when targeting groundfish, although a small number of fishermen may change ground cables when changing nets.

1.2.2.3 Current range of gear modification options

The following locations are currently under consideration by the Habitat Committee as gear modification areas where a maximum size limit on ground cables would be set. Note that the sizes of the existing and proposed management areas vary widely; there are larger and smaller management areas existing and proposed throughout the region in the Gulf of Maine, on Georges Bank, and in Southern New England. These are current as of June 8, 2012.

Existing habitat closed areas with options (as of 6/8/12) to be converted to ground cable length limited areas:

- Jeffreys Bank
- Cashes Ledge
- Closed Area I (two areas)

Modified habitat management areas with options (as of 6/8/12) to be converted to ground cable length limited areas:

- Jeffreys Bank (modified boundaries)
- Cashes Ledge (modified boundaries)
- Jeffreys Ledge (subset of current WGOM habitat area)
- Stellwagen Bank (subset of current WGOM habitat area)

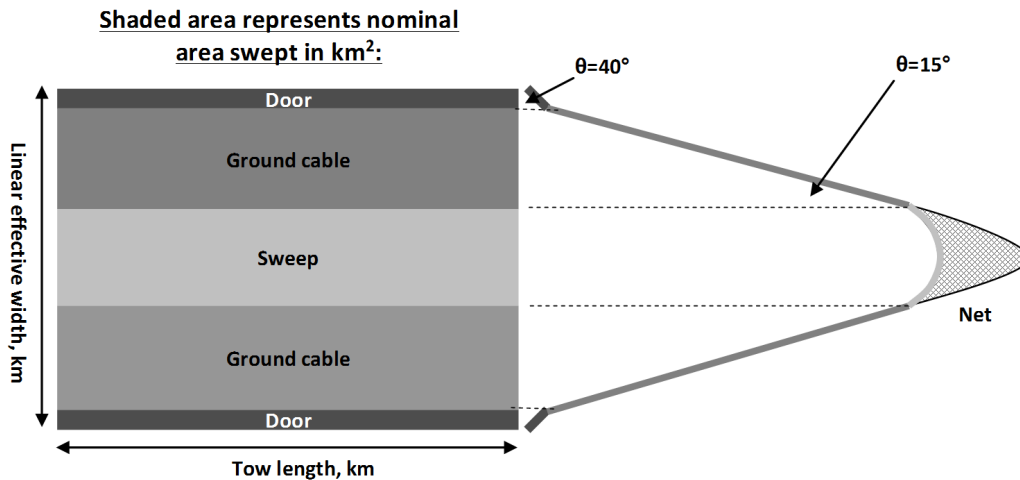
New habitat management areas with options (as of 6/8/12) to be implemented as ground cable length limited areas:

- Fippennies Ledge (within the current Cashes Ledge groundfish closure)
- Platts Bank (2 subareas)
- Georges Shoal (3 subareas)
- West of the Great South Channel (4 subareas)
- Cox Ledge (2 subareas)

1.2.2.4 Analytical and practicability considerations for gear modification options

In comparison with the sweep and the doors, ground cables are the longest element of bottom trawl gear and thus they contribute the greatest proportion of area swept for a given fishing event (Figure 2 shows the relative contribution of each gear element to the effective width of the gear). Thus, shortening their length and/or reducing their contact with the seabed provides a mechanism to reduce overall area swept and bottom contact, thereby decreasing the adverse effects of fishing on EFH.

Figure 2 - Schematic of trawl gear (top down view) showing the relative contribution of doors vs. ground cables vs. sweep to gear width/area swept. Not to scale.



Given some straightforward assumptions about angle of attack, and holding all else constant, it is relatively simple to estimate the reductions in linear effective gear width that could result from shortened cable lengths, and to then use these reduced area swept estimates in the SASI model to estimate changes in adverse effects within the location of the gear restrictions. **However, in order to understand if there is a net benefit for use**

of these types of gear modifications to minimize total area swept, other information would need to be incorporated into the analysis, such as:

- *The cable length/catchability trade-off for target species.* If catchability is reduced with shortened cables, does tow length/duration increase to compensate? Would gear modifications lead to a net increase or decrease in area swept, and thus EFH adverse effects, within restricted areas because of the trade-off between CPUE and ground cable length?
- *The distribution of effort after gear restrictions are enforced.* Will shortened cable lengths actually restrict use of gear in those habitats we are targeting for conservation? What degree of reduction in catchability will lead a vessel to simply fish elsewhere, rather than within the restricted ground cable area? The answers depend on our ability to estimate likely changes in behavior, and the spatial distribution of fishing effort, for use in the SASI model.
- *The scope of use for the modified gear.* Are there ground cable length reductions that achieve EFH protection goals and cause insignificant enough changes in catchability, such that fishermen use these nets in all fishing areas? If this is not the case, and fishermen carry two separate nets on board, the associated increases in costs to maintain the additional gear would need to be calculated when estimating impacts to the fishing industry.

Looking more holistically at fishing across a full suite of managed and unmanaged areas, reductions in either the amount of fishing effort or the catch rates inside a ground cable area could lead to increased fishing effort in other locations. The size and direction of changes in adverse effect estimates can be calculated using applications of the SASI model, but only if effort allocation is well understood. However, the effect of ground cable modifications on species catchability, limitations across the gradient of habitat complexity, and thus fishermen profits and effort allocation, is not well understood. Any gear modification impact analysis, including its general effectiveness in terms of adverse effect mitigation, will necessitate assumptions regarding the relationship between catchability and ground cable length, and there is little data known for our region on which to base these assumptions.

Past changes to fishing gears have been authorized following extensive field trials of the new gear type to determine how target and non-target species catches are affected. There is one good example of ground cable changes made in the North Pacific where habitat protection was one of the primary management objectives. Scientists and fishermen in the Bering Sea have examined the habitat and bycatch related benefits and costs to industry of ground cable changes (Rose et al. 2009⁶, Rose et al. 2010⁷). The wire ground

⁶ Rose, C. S., J. R. Gauvin, et al. (2009). "Effective herding of flatfish by cables with minimal seafloor contact." *Fishery Bulletin* **108**(2): 136-144.

⁷ Rose, C., E. Munk, et al. (2010). Feature: Cooperative Research to Reduce the Effects of Bering Sea Flatfish Trawling on Seafloor Habitat and Crabs. Alaska Fisheries Science Center Quarterly Research Reports, Jan-Feb-Mar 2010: 6.

cables (called sweeps in the North Pacific) were raised off the seabed by adding cookies of various sizes at various spacing intervals. They examined changes in the catch of target and incidental species and found that seafloor contact could be reduced with relatively low associated losses in catch. As of 2011, Bering Sea flatfish trawlers must use the reduced contact gear. Similar experiments in the Northeast would provide the knowledge necessary to fully gauge the net effect of gear modifications on EFH.

1.3 Next steps

The habitat PDT is in the process of developing metrics for analysis of adverse effects minimization options that will allow the Council and interested parties to consider the tradeoffs between habitat protection and fisheries costs and benefits. Some of these analyses will look at areas on an individual basis in terms of their component habitat types and their degree of vulnerability, or the fisheries that currently occur there (or would be likely to occur there, in the case of currently closed areas) and their economic value. These individual area assessments will be completed in the short term for consideration at the Habitat Committee's next meeting (October or November). Although the methods are substantially developed for conducting a cumulative effects analysis (the practicability analysis mentioned above), this work will mostly be completed after the Council approves a range of alternatives for analysis because the PDT does not have an understanding at this time how specific combinations of habitat management areas and groundfish management areas are likely to be implemented.

The PDT and advisory panel members will meet in October to discuss the feasibility of implementing ground cable modification options, and, if needed, to determine appropriate maximum cable lengths for specific areas.

The PDT is also working with the Committee to develop a range of Dedicated Habitat Research Area alternatives.

In addition, an ad hoc working group of the Groundfish PDT is currently considering the relative importance of various positive and negative impacts of closed area management and drafting additional objectives for the Omnibus EFH Amendment related specifically to groundfish area management. These draft objectives will be reviewed by the Groundfish PDT and Oversight Committee and used to design a range of area-based options for managing the groundfish and other fisheries.

2.0 Management alternatives to minimize the adverse effects of fishing on Essential Fish Habitat

2.1 Alternative 1 – No Action

The No Action Alternative would maintain the following mobile bottom tending gear habitat closures: Jeffreys Bank, Cashes Ledge, Western Gulf of Maine, Closed Area II, Closed Area I, and Nantucket Lightship. Lydonia Canyon and Oceanographer Canyon EFH closures in the monkfish plan would also be maintained, although they have not been discussed much in an adverse effects minimization context. It may be more useful to reconsider their boundaries in the context of deep-sea coral protection zone designations. The areas are shown on Map 7.

Individual options that are a part of this alternative are as follows:

2.1.1 Maintain existing Jeffreys Bank habitat closed area as a mobile bottom-tending gear closure

This option would maintain the current mobile, bottom tending gear habitat closure in the multispecies and scallop FMPs.

2.1.2 Maintain existing Cashes Ledge habitat closed area as a mobile bottom-tending gear closure

This option would maintain the current mobile bottom tending gear habitat closure on Cashes Ledge in the multispecies and scallop FMPs.

2.1.3 Maintain existing Western Gulf of Maine habitat closed area as a mobile bottom-tending gear closure

This option would maintain the WGOM habitat closed area in both the multispecies and scallop FMPs.

2.1.4 Maintain existing Closed Area II habitat closed area as a mobile bottom-tending gear closure

This option would maintain the CAII habitat closed area in both the multispecies and scallop FMPs.

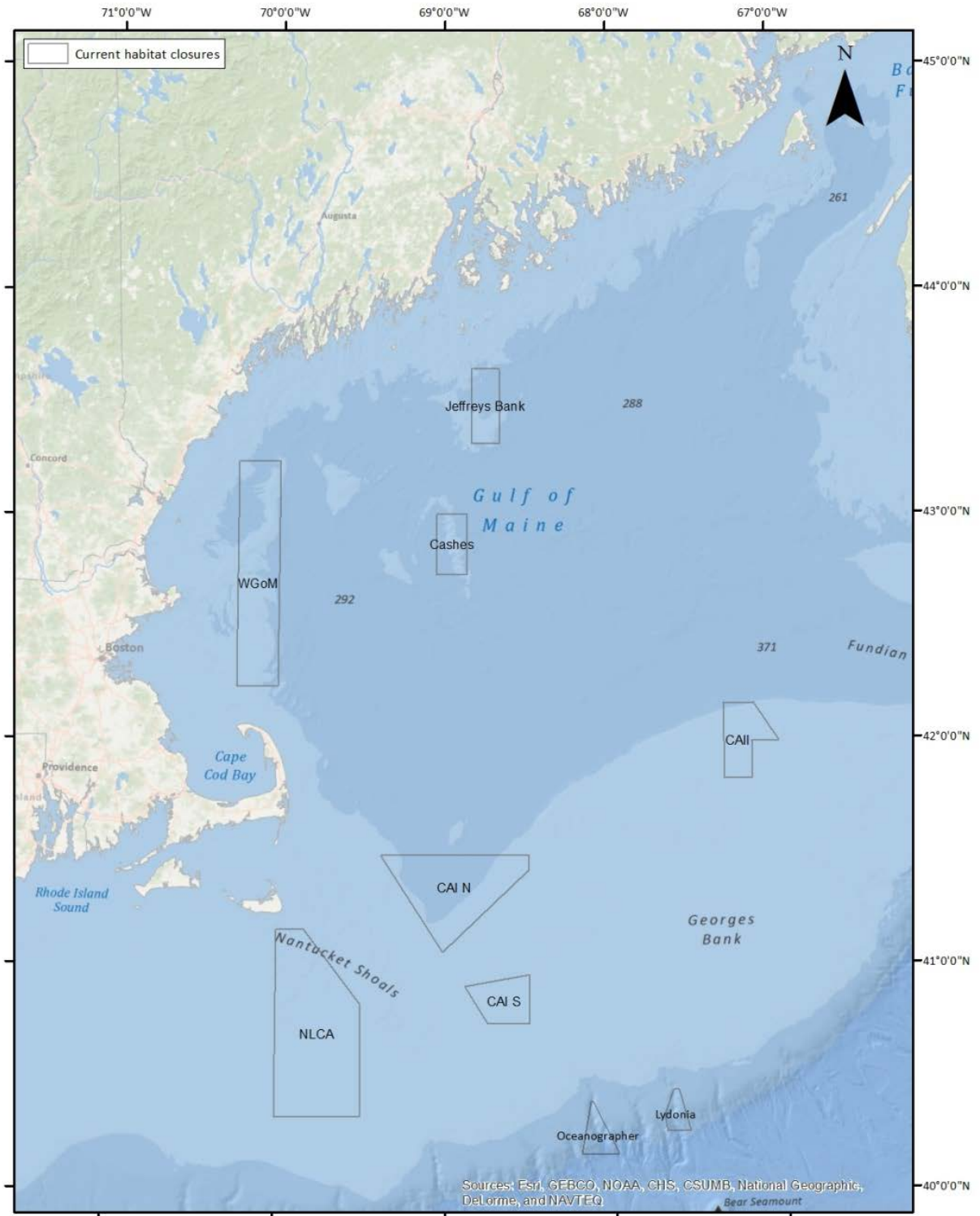
2.1.5 Maintain existing Closed Area I habitat closed areas as mobile bottom-tending gear closures

This option would maintain the CAI habitat closed area in both the multispecies and scallop FMPs.

2.1.6 Maintain existing Nantucket Lightship habitat closed area as a mobile bottom-tending gear closure

This option would maintain the NLCA habitat closed area in both the multispecies and scallop FMPs.

Map 7 – Alternative 1 – No action habitat management areas. The map shows the Lydonia and Oceanographer Canyon areas that are in the monkfish plan and closed to fishing while on a monkfish DAS, but these areas have not received much discussion in the context of OAZ.



New England Fishery Management Council Habitat Plan Development Team
Map date: 31 August 2012
NAD 1983 UTM Zone 19N

0 10 20 40 Nautical Miles

2.2 Alternative 2 – Remove or modify existing habitat areas and implement new habitat management areas

Alternative 2 would eliminate some of the existing habitat closures, modify others to create updated habitat management areas, and create some new habitat management areas. At their meeting on August 23, the Habitat Committee discussed that management options for the modified or new areas would include (1) closure to all fishing gears, (2) closure to mobile bottom tending gears, (3) require use of shortened ground cables on trawl gears. Because these ground cable options require further development as of this writing (September 2012), this section of the document only lists the gear closure management options. The range of gear modification options is listed in section 3.0. The gear closure options included in this alternative are shown on Map 8.

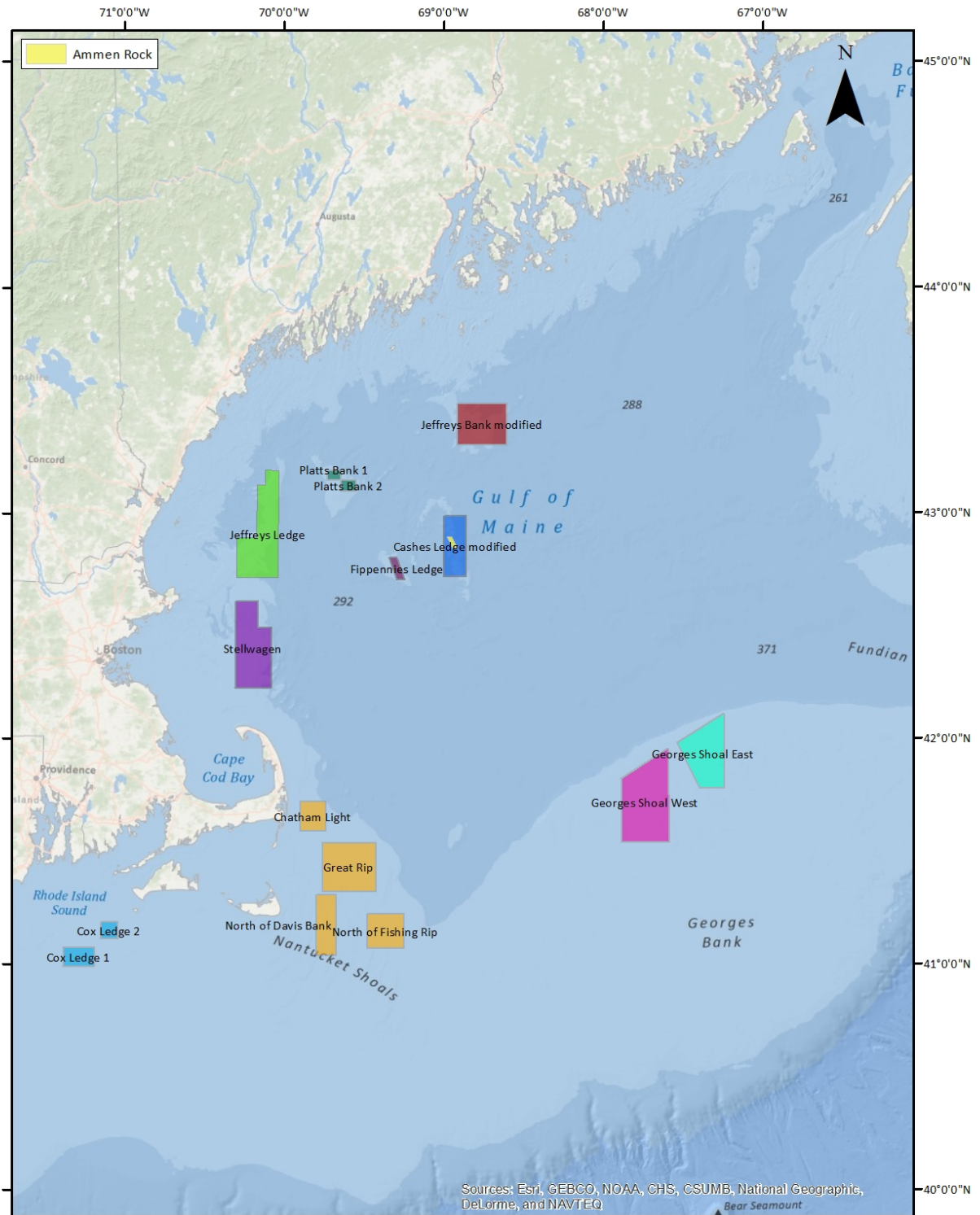
Table 3 – Summary of habitat management options included in Alternative 2. Gear modification areas where shortened ground cables would be required are not included in the table below but may be added to this alternative later based on recommendations from the Habitat Advisory Panel to the Habitat Committee. MBTG = mobile bottom tending gear.

Location	Area	Action	Subareas, if applicable	Notes
Jeffreys Bank	Existing Jeffreys Bank	Modify boundaries but keep as a MBTG closure	None	
	Modified Jeffreys Bank		None	Designed to encompass shallower habitats (<100 m)
Cashes Ledge	Existing Cashes Ledge	Modify boundaries but keep as a MBTG closure	None	
	Modified Cashes Ledge		None	Smaller area designed to encompass shallower habitats (<100 m)
	Ammen Rock	Close to all fishing	None	Subset of both the existing and the modified Cashes Ledge habitat areas
Fippennies Ledge	Fippennies Ledge	Create new area, MBTG closure	None	Subset of the existing Cashes Ledge <u>groundfish</u> closed area
Platts Bank	Platts Bank	Create new areas, MBTG closure	Platts Bank 1, Platts Bank 2	Both areas would be implemented under this alternative
Western Gulf of Maine	Existing Western Gulf of Maine habitat closure	Modify boundaries to create Jeffreys Ledge and Stellwagen areas but keep as a MBTG closure	None	Another option would be remove just the northwestern corner of the WGOM area
	Jeffreys Ledge		None	
	Stellwagen		None	
Closed Area II	Existing Closed Area II habitat closure	Remove	None	Would be removed under this alternative
Georges Shoal	Western Georges Shoal	Create new area, MBTG closure	None	Both GS areas would be implemented under

Options and Alternatives to Minimize the Effects of Fishing on EFH

Location	Area	Action	Subareas, if applicable	Notes
Georges Shoal	Eastern Georges Shoal	Create new area, MBTG closure	None	this alternative
Closed Area I	Existing Closed Area I habitat closure	Remove	North and South	
West of Great South Channel	West of Great South Channel	Create new areas, MBTG closure	Chatham Light, Great Rip, North of Davis Bank, North of Fishing Rip	All four areas would be implemented under this alternative
Nantucket Lightship	Existing Nantucket Lightship habitat closure	Remove	None	
Cox Ledge	Cox Ledge	Create new areas, MBTG closure	Cox Ledge (1), 19 Fathom Bank (2)	Both subareas would be implemented under this alternative

Map 8 – Alternative 2 – Remove or modify existing habitat areas and implement new habitat management areas. Areas where only gear modification options are under consideration (i.e. Georges Shoal Large, Closed Area I North & South) are not shown on the map below.



New England Fishery Management Council Habitat Plan Development Team
Map date: 31 August 2012
NAD 1983 UTM Zone 19N

0 10 20 40 Nautical Miles

Individual options that are a part of this alternative are as follows:

2.2.1 Eliminate the existing Western Gulf of Maine habitat area

This option would eliminate the WGOM habitat closed area from the multispecies and scallop FMPs. Other options listed below would designate portions of this area as the Jeffreys Ledge and Stellwagen habitat management areas.

2.2.2 Eliminate the existing Closed Area II habitat closed area

This option would eliminate the CAII habitat closed area from both the multispecies and scallop FMPs.

2.2.3 Eliminate the existing Closed Area I habitat closed areas

This option would eliminate the CAI habitat closed area from both the multispecies and scallop FMPs. Note that the CAI habitat closed area is comprised of two non-contiguous areas, CAI-N and CAI-S, and that this option would eliminate both areas.

2.2.4 Eliminate the existing Nantucket Lightship habitat closed area

This option would eliminate the NLCA habitat closed area from both the multispecies and scallop FMPs.

2.2.5 Adjust the boundaries of the existing Jeffreys Bank habitat closed area to create the Jeffreys Bank habitat management area and maintain status as a mobile bottom-tending gear closure

This option would change the boundaries of the current Jeffreys Bank habitat closure, and close the updated area to mobile bottom tending gear. The current management area encompasses both shallower hard-bottom habitats on the bank (southern portion) and deeper, muddy habitats (northern portion). The modification would change the boundaries to focus on just the southern portion, with an expansion of the area to the east and to the west to incorporate the portion of Jeffreys Bank shallower than approximately 100 m. Note that the Habitat Committee has not proposed complete removal of the Jeffreys Bank habitat area, only modification.

During June 2011, the PDT developed a list of areas likely to accumulate adverse effects to EFH (i.e. 'vulnerable areas'). Areas were identified using the generic trawl gear SASI/LISA cluster analysis and other extra-SASI information. The area in and around Jeffreys Bank clustered in the LISA analysis, and Jeffreys Bank contains gravel habitats vulnerable to fishing gear impacts. In July 2011, the PDT recommended that the Committee consider management options to minimize adverse effects in these areas. One of the vulnerable areas discussed was Jeffreys Bank. The PDT recommended modifying the existing Jeffreys Bank habitat closure to better encompass likely hard bottom (i.e. boulder) habitats. Specifically, they recommended area encompassed the portion of the bank shallower than 100 m. While the advisory panel recommended continued consideration of both the current and modified Jeffreys Bank areas, at their July and August meetings, the Committee discussed both areas and recommended keeping the current closure and moving the modified area to the list of considered but rejected

options. In June 2012, the Committee reconsidered and adopted this option for further analysis. See Map 10.

2.2.6 Adjust the boundaries of the Cashes Ledge habitat closed area to create the Cashes Ledge habitat management area and maintain status as a mobile bottom-tending gear closure

This option would change the boundaries of the current Cashes Ledge habitat closure, moving the western boundary to 69° W longitude. The area would remain closed to mobile bottom tending gear. The PDT recommended keeping the current Cashes Ledge habitat closed area at the July 21, 2011 Committee meeting. The PDT then recommended at the August 30, 2011 Committee meeting to modify the Cashes Ledge habitat closed area western boundary by moving it to 69° W longitude. This recommendation was based on feedback from industry members who attended the August 15, 2011 PDT meeting. The PDT discussed that most of the hard-bottom, shallower habitats on Cashes Ledge are included in the modified, smaller area, including all features shallower than 100 meters. The PDT discussed that these are the most important habitat types on Cashes Ledge to protect from the adverse effects of fishing. The Committee agreed to include the modified area as an option for Cashes Ledge. As above for Jeffreys Bank, the Committee has not proposed complete removal of the Cashes Ledge habitat area, only modification. See Map 11.

2.2.7 Adjust the boundaries of the WGOM habitat closed area to create the Jeffreys Ledge habitat management area, and maintain status as a mobile bottom-tending gear closure

This option would adjust the boundaries of the current WGOM habitat closed area to create a habitat management area on Jeffreys Ledge, and then maintain that area as a mobile bottom tending gear closure. See Map 13.

2.2.8 Adjust the boundaries of the WGOM habitat closed area to create the Stellwagen habitat management area, and maintain status as a mobile bottom-tending gear closure

This option would adjust the boundaries of the current WGOM habitat closed area to create a habitat management area focused on the eastern portion of Stellwagen Bank, and then maintain that area as a mobile bottom tending gear closure. The eastern boundary extends only to the edge of the multibeam sampling area discussed below, not to the current habitat closure boundary, because the existence of vulnerable habitat types is best documented in the areas sampled with multibeam.

The Stellwagen HMA was designed to encompass areas with high-intensity backscatter values, which represent coarse sand, gravelly sand, sandy gravel, gravel (including boulder ridges and piles of boulders), and bedrock outcrops (Valentine et al 2005a⁸). The

⁸ Valentine, P.C., T.S. Unger, and J.L. Baker. 2005a. Backscatter Intensity and Sun-Illuminated Sea Floor Topography in the Stellwagen Bank National Marine Sanctuary Region. USGS Scientific Investigations Map 2840-C. <http://woodshole.er.usgs.gov/pubs/sim2840/>

boulder ridges were identified using various types of information including topographic and backscatter data, terrain ruggedness index values, and thousands of video and photographic stations (Valentine et al 2005b⁹). Some of the boulder ridges are quite large, with the largest tens of meters wide and hundreds of meters long, with a maximum height of 18 m (Valentine et al 2005b). The ridges are composed of cobbles and boulders interspersed with voids, and harbor an array of attached organisms as well as various fish species (Valentine et al 2005b). The SASI vulnerability assessment indicates that cobble and boulder-dominated habitats and their associated geological and biological features have relatively high susceptibility to fishing gear impacts and relatively slow recovery. Defining a habitat management area in this location and restricting the operation of mobile bottom-tending gears within it would be expected to reduce the accumulation of adverse effects in these particularly vulnerable habitats. See Map 14.

2.2.9 Adjust boundaries of the WGOM habitat area to remove only the northwest corner, and maintain the remaining portion as a mobile bottom-tending gear closure

This option would adjust the boundaries of the existing WGOM habitat closed area to remove the northwestern portion (the same area eliminated by the creation of the Jeffreys Ledge HMA). This portion of the WGOM closure is deeper and dominated by mud substrates, in comparison with the sand and gravel substrates on Jeffreys Ledge and on and east of Stellwagen Bank. Prior to implementation of the WGOM habitat closure, which restricts mobile bottom tending gear, including shrimp trawls, seasonal shrimp fishing occurred in this location.

2.2.10 Establish the Ammen Rock Habitat Management Area and close it to all fishing gear types

This option would establish the Ammen Rock Habitat Management Area and close it to all types of fishing gear that can be managed by the Council. At the August 2011 Committee meeting, the PDT recommended additional restrictions on Ammen Rock, within Cashes Ledge. The Committee agreed to consider additional restrictions on Ammen Rock. See Map 11.

2.2.11 Establish the Fippennies Ledge habitat management area and close it to mobile bottom-tending gear

This option would establish a new habitat management area on Fippennies Ledge, and close the area to mobile bottom tending gear. Note that this area is currently closed to this gear type, but that this is due to its status as a part of the Cashes Ledge groundfish mortality closure, not because of any habitat management designation. At the July 2011 Committee meeting, the PDT recommended establishing a habitat management area on Fippennies Ledge. The Committee agreed to consider Fippennies Ledge as an option for minimizing adverse impacts from fishing by instructing the PDT to consider gear

⁹ Valentine, P.C., L.A. Scully, S.J. Fuller. 2005b. Distribution of boulder ridges and bedrock outcrops in the Stellwagen Bank National Marine Sanctuary Region. USGS Scientific Investigations Map 2840-F. <http://woodshole.er.usgs.gov/pubs/sim2840/>

restrictions, including no gear restrictions, in this area. In June 2012, the Committee modified a larger potential management area based on encompassing the entirety of the ledge to the 100m contour to focus on the core shallow portions of the bank. The objective was to protect a representative array of substrate and habitat types while allowing fishing activity along the edges of the ledge. See Map 11.

2.2.12 Establish the Platts Bank habitat management areas and close them to mobile bottom-tending gear

This option would establish a new habitat management area on Platts Bank consisting of two sub-areas, and close it to mobile bottom-tending gear. At the July 2011 Committee meeting, the PDT recommended establishing a habitat management area on Platts Bank. The Committee agreed to consider Platts Bank as an option for minimizing adverse impacts from fishing. In June 2012, the Committee modified a larger potential management area based on encompassing the entirety of the bank to the 100m contour to focus on two shallow portions of the bank. The objective was to protect a representative array of substrate and habitat types while allowing fishing activity along the edges of the bank. See Map 12.

2.2.13 Establish the Western Georges Shoal habitat management area and close it to mobile bottom-tending gears

This option would create a habitat management area west of Georges Shoal and close the area to mobile bottom-tending gears. See Map 15.

2.2.14 Establish the Eastern Georges Shoal habitat management area and close it to mobile bottom-tending gears

This option would create a habitat management area on and immediately west of Georges Shoal, encompassing portions of the two easternmost vulnerable areas presented to the Committee in on July 21, 2011, and close the area to mobile bottom-tending gears. See Map 15.

2.2.15 Establish four habitat management areas west of the Great South Channel and close them to mobile bottom tending gears

This option would create habitat management areas in one or more of the four sub-areas west of the Great South Channel, and close the area(s) to mobile bottom tending gear. See Map 16.

2.2.16 Establish two management areas on and around Cox Ledge and close them to mobile bottom-tending gear

This option would establish two habitat management areas, Cox Ledge 1 (Cox Ledge) and Cox Ledge 2 (19 Fathom Bank), and close the areas to mobile bottom-tending gear. See Map 17.

2.3 Alternative 3 – TBD – A subset of Alternative 2 options

This alternative would consist of a subset of the options from Alternative 2, as well as from the range of ground cable modification options listed below. The options to be included would be decided upon following initial analysis and public hearings. Final analysis of this alternative including a cumulative effects analysis of the combined options would occur after the alternative is drafted.

3.0 Gear modification options that require further development

This section lists a range of areas where reduced ground cable lengths for trawls have been considered as an adverse effects minimization strategy. Some of these areas were added to the list of gear modification areas early in the process of habitat management area development, while others were added more recently. The Habitat Committee requested that the Habitat Advisory Panels meet in conjunction with the Habitat PDT to consider whether these options are viable in the short term as a part of the EFH Omnibus Amendment, and if so, to develop them further. Specifically, the advisors and PDT were charged with determining the maximum appropriate ground cable length for each management area that balances various considerations – reducing swept area, maintaining catchability, cost and practicality of implemented gear modification requirements, etc.

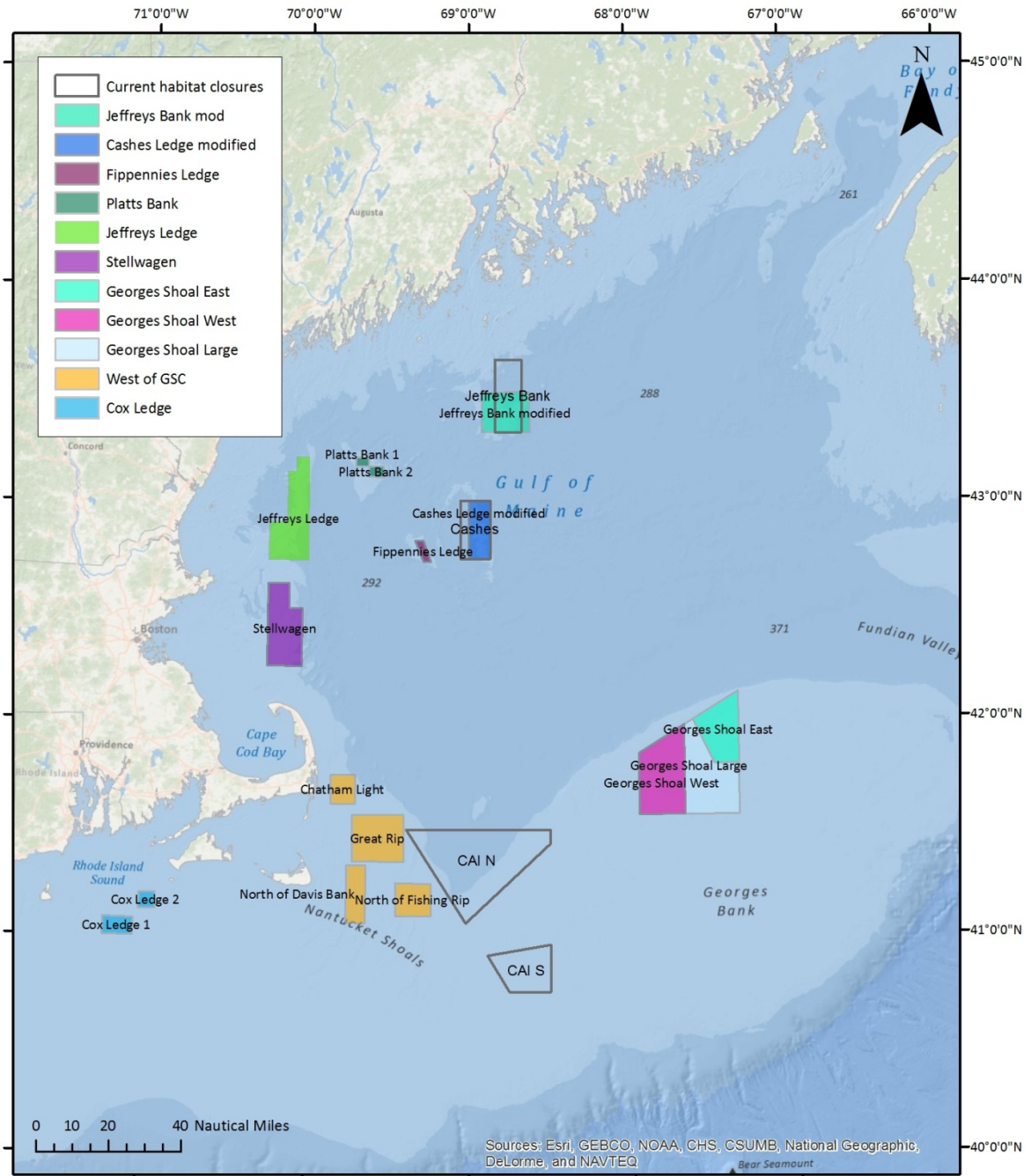
Although areas are listed individually below, some of the options are not independent of one another, as shown in Table 4 (the second column lists alternative similar areas). The understanding at the Habitat Committee meeting on August 23 was that subareas, such as for Platts Bank, Cox Ledge, etc., might be implemented singly or in combination.

Table 4 - Range of areas that are candidates for ground cable length restrictions

Area	Alternative similar areas, if applicable	Subareas, if applicable	Notes
Existing Jeffreys Bank	Modified Jeffreys Bank	-	Only existing or modified, not both
Existing Cashes Ledge	Modified Cashes Ledge	-	Only existing or modified, not both
Fippennies Ledge	-	-	Within Cashes Ledge groundfish closed area
Platts Bank	-	Platts Bank 1, Platts Bank 2	Three choices: Platts Bank 1, Platts Bank 2, or Platts Bank 1 and 2
Jeffreys Ledge	-	-	Within WGOM habitat and groundfish closed areas
Stellwagen	-	-	Within WGOM habitat and groundfish closed areas
Georges Shoal (W and E)	Large Georges Shoal	Western and Eastern	If Large Georges Shoal area selected, it would encompass both E and W areas. Four choices: large only, East only, West only, East and West
Existing Closed Area I habitat closure	-	-	Three choices: CAI-N, CAI-S, or CAI-N and CAI-S
West of Great South Channel	-	Chatham Light, Great Rip, North of Davis Bank, North of Fishing Rip	15 combinations are possible of one or more areas: CL, GR, ND, NF, CL+GR, CL+ND, CL+NF, GR+ND, GR+NF, ND+NF, CL+GR+ND, CL+GR+NF, CL+ND+NF, GR+ND+NF, CL+GR+ND+NF
Cox Ledge	-	Cox Ledge, 19 Fathom Bank	Three choices: Cox Ledge and 19 Fathom Bank, Cox Ledge only, 19 Fathom Bank only

Options and Alternatives to Minimize the Effects of Fishing on EFH

Map 9 - Areas where gear modifications, specifically, ground cable length limits, are being considered. Note the inclusion of three existing habitat closures – Jeffreys Bank, Cashes Ledge, Closed Area I North and South – as compared to Map 8. More detailed maps of individual areas are found in section 5.0.



New England Fishery Management Council Habitat Plan Development Team
 Map date: 10 Sept 2012
 NAD 1983 UTM Zone 19N

Individual options are as follows:

3.1 Maintain the existing Jeffreys Bank habitat closed area boundary but change management measures to require shortened ground cables on bottom trawls

Added as an option in June 2012. Specific ground cable length to be determined.

3.2 Adjust the boundaries of the Jeffreys Bank habitat closed area to create the Jeffreys Bank habitat management area and require shortened ground cables on bottom trawls

Added as an option in June 2012. Specific ground cable length to be determined.

3.3 Maintain the existing Cashes Ledge habitat closed area boundary but change management measures to require shortened ground cables on bottom trawls

Added as an option June 2012. Specific ground cable length to be determined.

3.4 Adjust the boundaries of the Cashes Ledge habitat closed area to create the Cashes Ledge habitat management area and require shortened ground cables on bottom trawls

Added as an option June 2012. Specific ground cable length to be determined.

3.5 Establish the Fippennies Ledge habitat management area and require shortened ground cables on bottom trawls

Added as an option in June 2012. Specific ground cable length to be determined.

3.6 Establish Platts Bank habitat management areas and require shortened ground cables on bottom trawls

Added as an option in June 2012. Specific ground cable length to be determined.

3.7 Adjust the boundaries of the WGOM habitat closed area to create the Jeffreys Ledge habitat management area, and require shortened ground cables on bottom trawls

Added as an option in June 2012. Specific ground cable length to be determined.

3.8 Adjust the boundaries of the WGOM habitat closed area to create the Stellwagen habitat management area, and require shortened ground cables on bottom trawls

Added as an option in June 2012. Specific ground cable length to be determined.

3.9 Establish one or more Georges Shoal habitat management areas and require shortened ground cables on bottom trawls

There are three habitat management areas proposed on and around Georges Shoal. Georges Shoal West encompasses most of the shoal itself, and other shoal areas to the

west. Georges Shoal east is north and east of Georges Shoal, with the eastern boundary of the area running along the existing CAII boundary. The Georges Shoal large habitat management area encompasses both the eastern and western areas and the areas in between them. This larger area is not under consideration as a mobile bottom tending gear closure, only as a gear modification area. All three areas were added to the list of areas under consideration as gear modification areas in August 2011. Specific ground cable length to be determined.

3.10 Maintain the existing CAI habitat closed area boundaries but change management measures to require shortened ground cables on bottom trawls

This option would maintain the CAI habitat closed area in both the multispecies and scallop FMPs, but rather than it being a mobile bottom-tending gear closure, there would be ground cable length limits for bottom trawl vessels fishing in the area. Closed Area I was added to the list of areas under consideration as gear modification areas in August 2011. Specific ground cable length to be determined.

3.11 Establish one or more habitat areas west of the Great South Channel require shortened ground cables on bottom trawls

This option would establish trawl gear ground cable length limits in one or more of the proposed habitat management areas west of the Great South Channel. All four areas were added to the list of areas under consideration as gear modification areas in August 2011. Specific ground cable length to be determined.

3.12 Establish two management areas on Cox Ledge and require shortened ground cables on bottom trawls

This option would establish trawl gear ground cable length limits in one or more of the two Cox Ledge management areas: Cox Ledge and 19 Fathom Bank. Added as an option in June 2012. Specific ground cable length to be determined.

4.0 Previously considered options

4.1 Roller gear and ground cable restrictions in clusters 1, 3, and 4

Gear restrictions for areas in the GOM were discussed in June 2010 and again in October 2010. The PDT analyzed data associated with each of the clusters and did not recommend any further development of management measures for clusters 1 and 4 (south of Mount Desert Island Cluster, Cape Neddick Cluster). The PDT recommended focusing management efforts just on the central, shallower portion of cluster 3 that covers Platts Bank. However, the PDT did not recommend gear restrictions in this area, but instead recommended a mobile bottom-tending gear closure.

4.2 Extend the boundaries of the Jeffreys Ledge habitat management area to the west

This option would have extended the Jeffreys Ledge area, which lies entirely within the current WGOM habitat closure, further west. The same habitat types found on the portion of the ledge within the closure extend to the southwest towards Cape Ann, Massachusetts. The Committee did not recommend further consideration of this option during their August 2011 meeting.

4.3 Allow shrimp vessels in existing WGOM habitat closed area

This option was proposed via a Committee motion made in January 2011. The PDT discussed the issue of shrimp trawling in the WGOM habitat closed area during June 2011, and recommended modifying the closure to focus more on Jeffreys Ledge, thereby removing the northwestern part of the closure. This northwestern corner includes deeper mud shrimp habitats, so adopting the Jeffreys Ledge option would create flexibility for the shrimp fishery without having to exempt shrimp trawls entirely from any habitat closure in that area. Based on a Committee motion in July 2011, an option was added to this document that would keep the WGOM closure intact, with the exception of the northwest corner, which would be eliminated.

4.4 Adjust the boundaries of the existing Closed Area II habitat closed area

There is currently a status quo option and a removal option for the CAII habitat closed area. In August 2011 the PDT discussed an intermediate option that would have modified the current CAII habitat closed area by shifting the southern boundary north. This area, referred to as the Northern Edge habitat area, was recommended by the PDT at the August 30, 2011 Committee meeting as a closure to all fishing gear. The Committee did not recommend the area for further analysis.

4.5 Adjust the boundaries of the existing Nantucket Lightship habitat closed area

Similar to the above option in CAII, this option would have adjusted the boundaries of the current NLCA habitat closed area to form the Nantucket Shoals habitat area, and kept the area closed to mobile bottom tending gear. Specifically, the Nantucket Shoals area would be the portion of the NLCA habitat area that lies outside the NLCA groundfish

closure. The PDT recommended this option in August 2011, but the Committee did not recommend the area for further analysis.

4.6 Establish a single large habitat management area in the Great South Channel

The Great South Channel is one of the areas where grid cells highly vulnerable to trawl gear clustered in the SASI LISA analysis. This area contains a relatively large amount of gravel seabed, which is vulnerable to the adverse effects of fishing. Vulnerable habitat areas were identified in the Great South Channel based on the locations of gravel-dominated hotspots as identified by Harris and Stokesbury 2010¹⁰, which analyzed the distribution of sediments on Georges Bank based on video survey data. These areas are currently open to fishing. This option would have defined a single large area that encompassed all of the gravel-dominated hotspots, and either made the area a trawl ground cable modified area, or closed it to mobile bottom tending gear. At their August 2011 meeting, the Committee did not recommend this area for further analysis, and recommended instead some combination of the smaller GSC areas.

4.7 Establish a habitat management area on Stellwagen that includes Tillies Bank

This sub-option includes all of the area covered by sub-option 1, plus an extension to encompass Tillies Bank. Tillies Bank is a relatively small area, approximately 3 miles long north to south and 1.5 miles wide east to west, that lies outside the current WGOM habitat closed area. Tillies Bank is densely covered by boulder ridges and has high intensity multibeam backscatter values, which indicates the presence of habitat types that have relatively high susceptibility to fishing gear impacts.

4.8 Establish a habitat management area on Stellwagen that includes an extension to the east

This sub-option includes all of the area covered by the proposed Stellwagen adverse effects area, plus an extension to the eastern boundary of the current WGOM habitat closed area. The additional area represents the eastern edge of Stellwagen Bank, and slopes relatively steeply from west to east. Substrates in the additional area are not particularly well sampled relative to the top of Stellwagen Bank, but based on the data assembled for the SASI substrate model, in the northern part of this extension, there appears to be a transition from sand and gravel in the shallower areas to mud in the deeper waters. The southern part of this extension contains a small unmapped bank and part of a partially mapped bank, both of which are highly likely to contain boulder ridge habitats.

¹⁰ Harris, B. P. and K. D. E. Stokesbury (2010). "The spatial structure of local surficial sediment characteristics on Georges Bank, USA." *Continental Shelf Research* 30: 1840-1853.

4.9 Establish a habitat management area on Stellwagen that includes an extension to the east

This sub-option includes all of the area covered by the proposed Stellwagen adverse effects area, plus an extension to the eastern boundary of the current WGOM habitat closed area. The additional area represents the eastern edge of Stellwagen Bank, and slopes relatively steeply from west to east. Substrates in the additional area are not particularly well sampled relative to the top of Stellwagen Bank, but based on the data assembled for the SASI substrate model, in the northern part of this extension, there appears to be a transition from sand and gravel in the shallower areas to mud in the deeper waters. The southern part of this extension contains a small unmapped bank and part of a partially mapped bank, both of which are highly likely to contain boulder ridge habitats.

4.10 Establish a habitat management area on Stellwagen that includes an extension to the east in addition to Wildcat Knoll

This sub-option includes all of area covered by the proposed Stellwagen adverse effects area, plus the eastern extension, plus an extension to cover Wildcat Knoll. Wildcat Knoll is roughly similar in size to Tillies Bank, at about 5 miles long north to south and 2.5 miles wide east to west. It lies outside the WGOM habitat closure but inside the WGOM groundfish closure, so it is currently not fished by gear capable of catching groundfish. Although not included in the multibeam area or well characterized in the SASI sediment model, Wildcat Knoll is known to contain boulder ridge habitats that are similar to those found on Tilles and Stellwagen Banks (P. Auster, personal communication). These features also occur on the other small banks that lie southwest of Wildcat Knoll.

4.11 Extend the Jeffreys Ledge habitat management area boundary to include New Scantum

New Scantum is a peninsula-shaped extension of Jeffreys Ledge that lies immediately to the west of the WGOM habitat closure. New habitat data for the area were collected during a recent August 2011 cruise aboard the EPA's R/V Bold. The data were collected and processed using the same techniques as the SMAST video survey. An updated substrate coverage was created by aggregating data from the previous SASI substrate model (SMAST video, usSEABED grab samples) with the new data and constructing a new grid using the same Voronoi tessellation techniques employed during SASI model development. The previous SASI substrate coverage showed an area dominated by ganule-pebble and sand, but the new coverage indicates that the area contains the full range of substrate types: mud, sand, granule-pebble, cobble, and boulder.

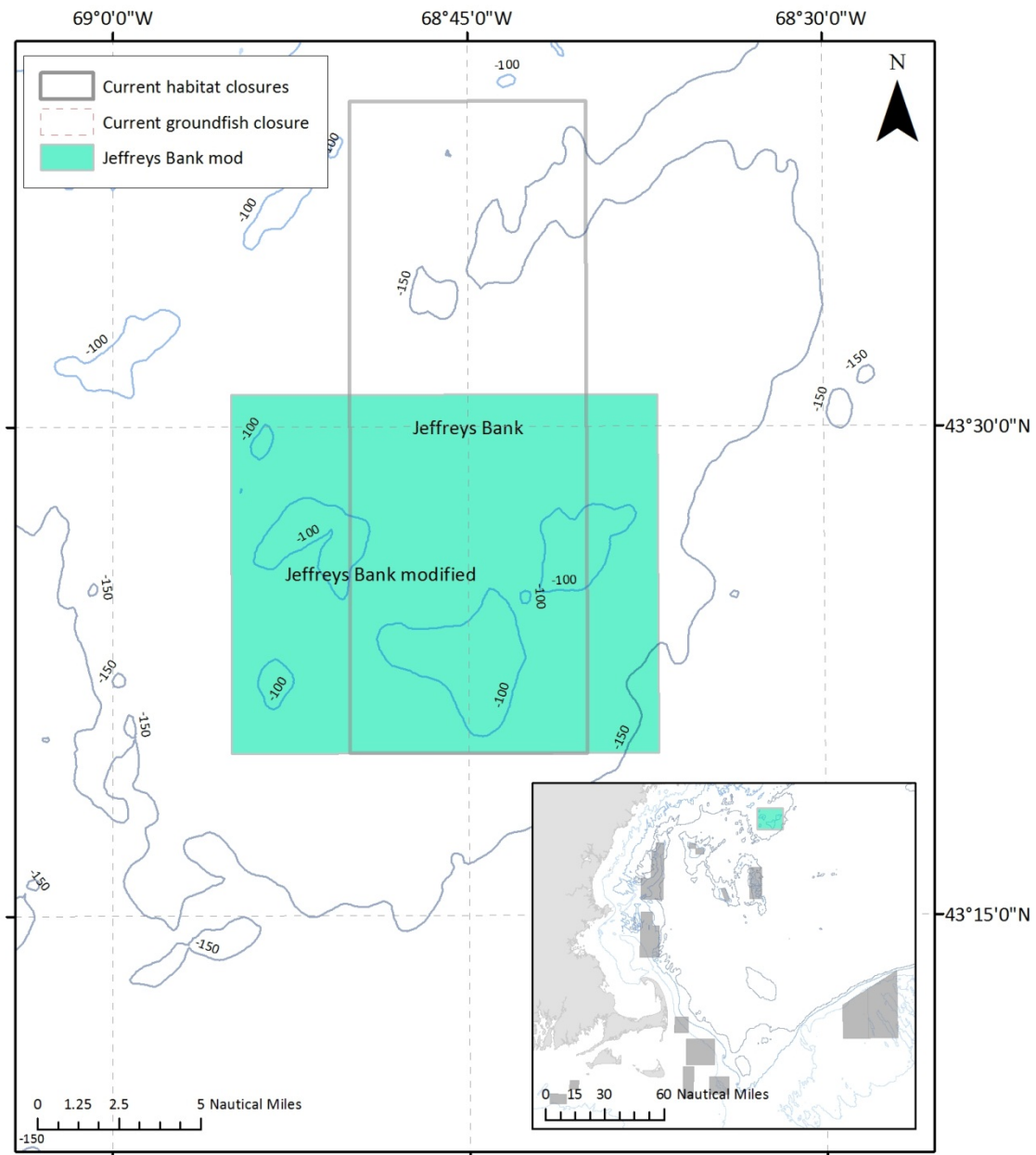
This updated substrate map is consistent with the previously available substrate map for the northern portion of Jeffreys Ledge, and is also consistent with the multibeam map and associated boulder ridge data for the southern part of Jeffreys Ledge that extends further west towards Cape Ann, Massachusetts. As noted above, the SASI vulnerability assessment indicates that cobble and boulder-dominated habitats and their associated geological and biological features have relatively high susceptibility to fishing gear impacts and relatively slow recovery. Thus, the area was recommended as a habitat management area designed to minimize the adverse effects of fishing on EFH.

4.12 Establish a habitat management area on Gloucester Bank-Lower Stellwagen Bank

Gloucester Bank lies just offshore of the 3nm state-federal boundary, southeast of Cape Ann, Massachusetts. The bank and associated similar banks extend southeastward to Lower Stellwagen Bank and are very densely covered by boulder ridge habitats. Between the shallower hard-bottom habitats with boulder ridges there are deeper muddy areas. As above, the SASI vulnerability assessment indicates that cobble and boulder-dominated habitats and their associated geological and biological features have relatively high susceptibility to fishing gear impacts and relatively slow recovery. Thus, the area was recommended as a habitat management area designed to minimize the adverse effects of fishing on EFH.

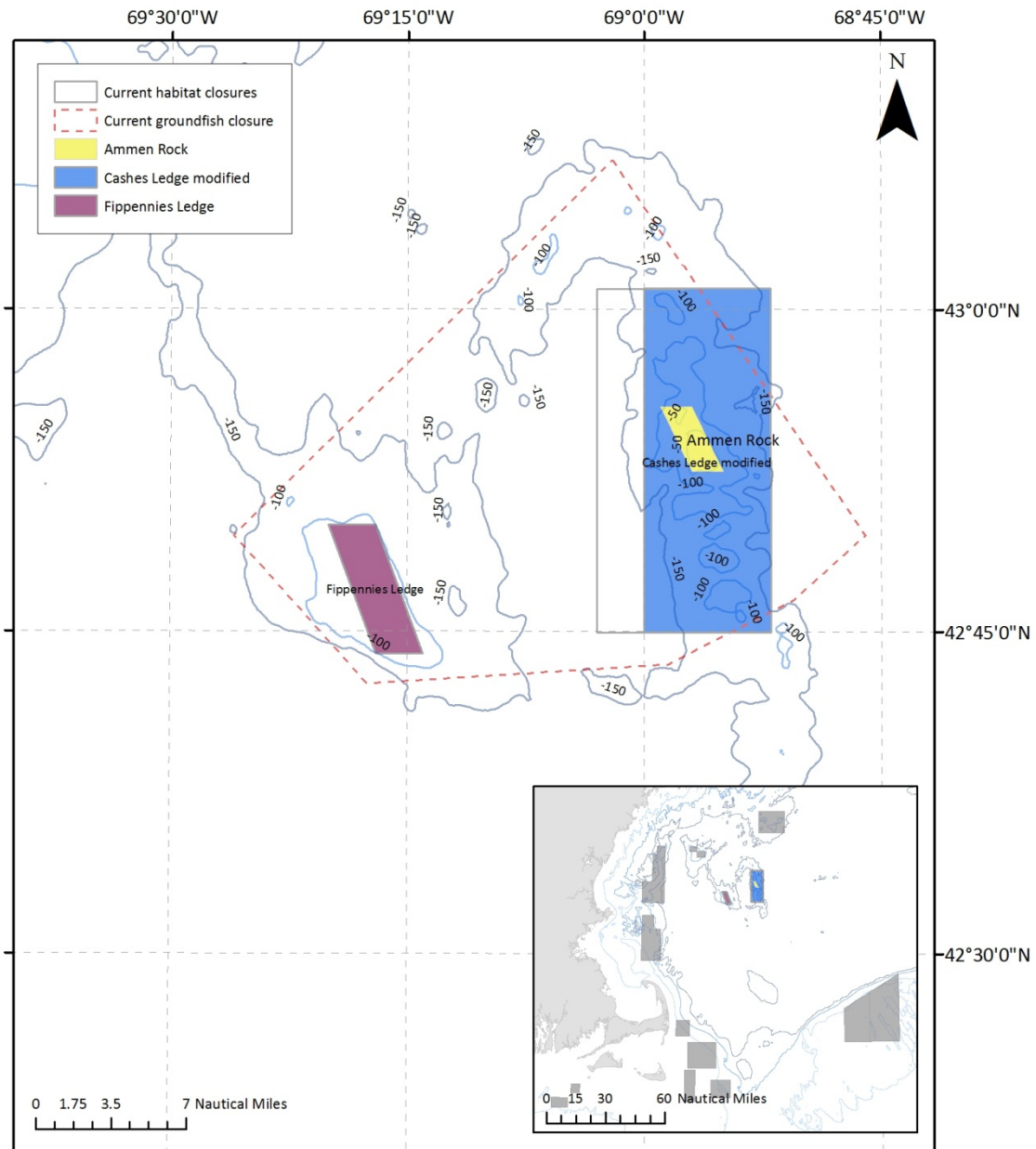
5.0 Additional maps

Map 10 – Jeffreys Bank habitat management areas – current (grey outline) and modified (green).



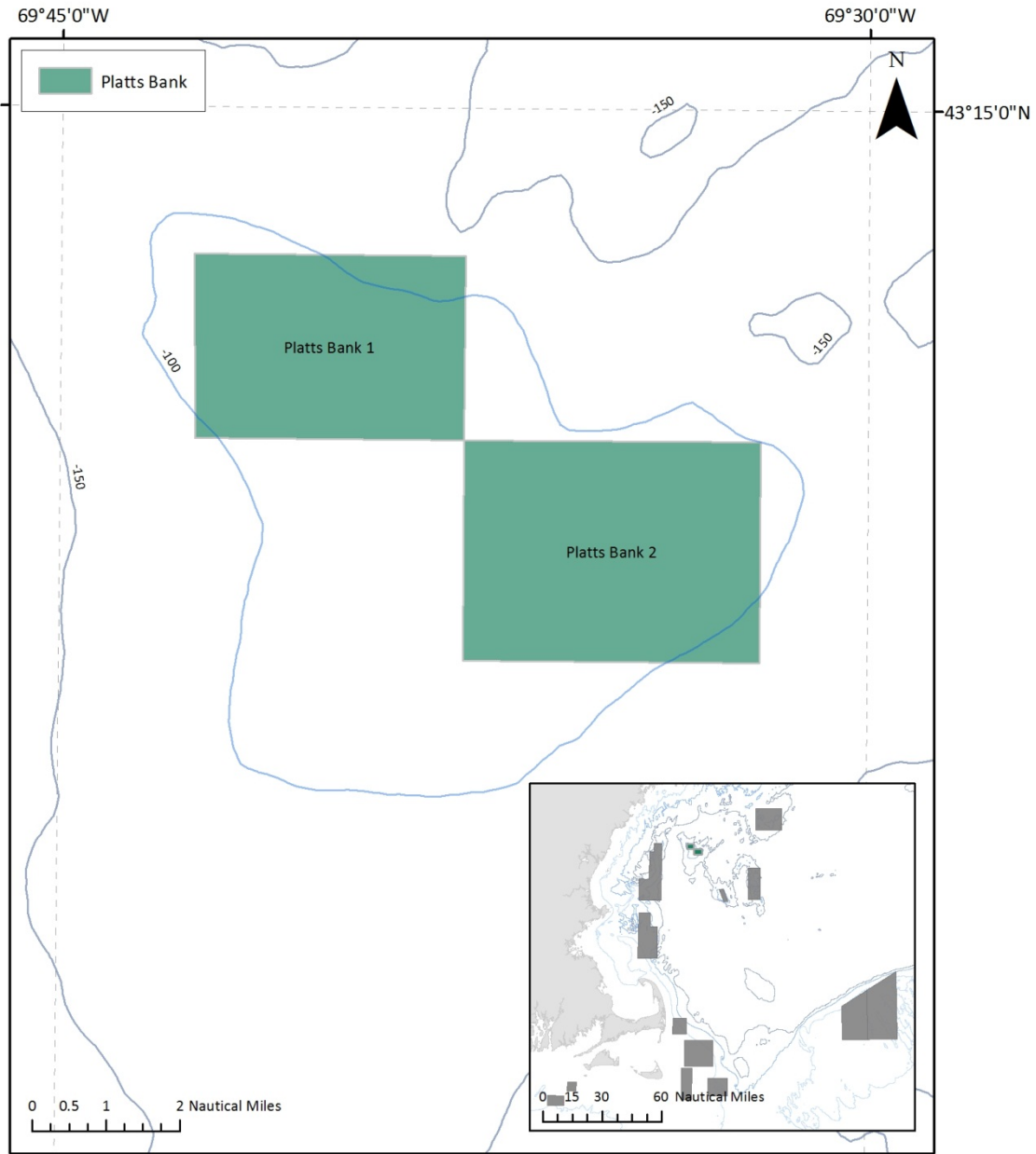
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Map date: 05 Sept 2012
NAD 1983 UTM Zone 19N

Map 11 – Cashes Ledge modified (blue) and Fippennies Ledge (purple) habitat management areas. Existing habitat and groundfish closures are shown in grey and dotted red. The Ammen Rock area (yellow) is proposed as a closure to all types of fishing activity. Depth contours are in meters.



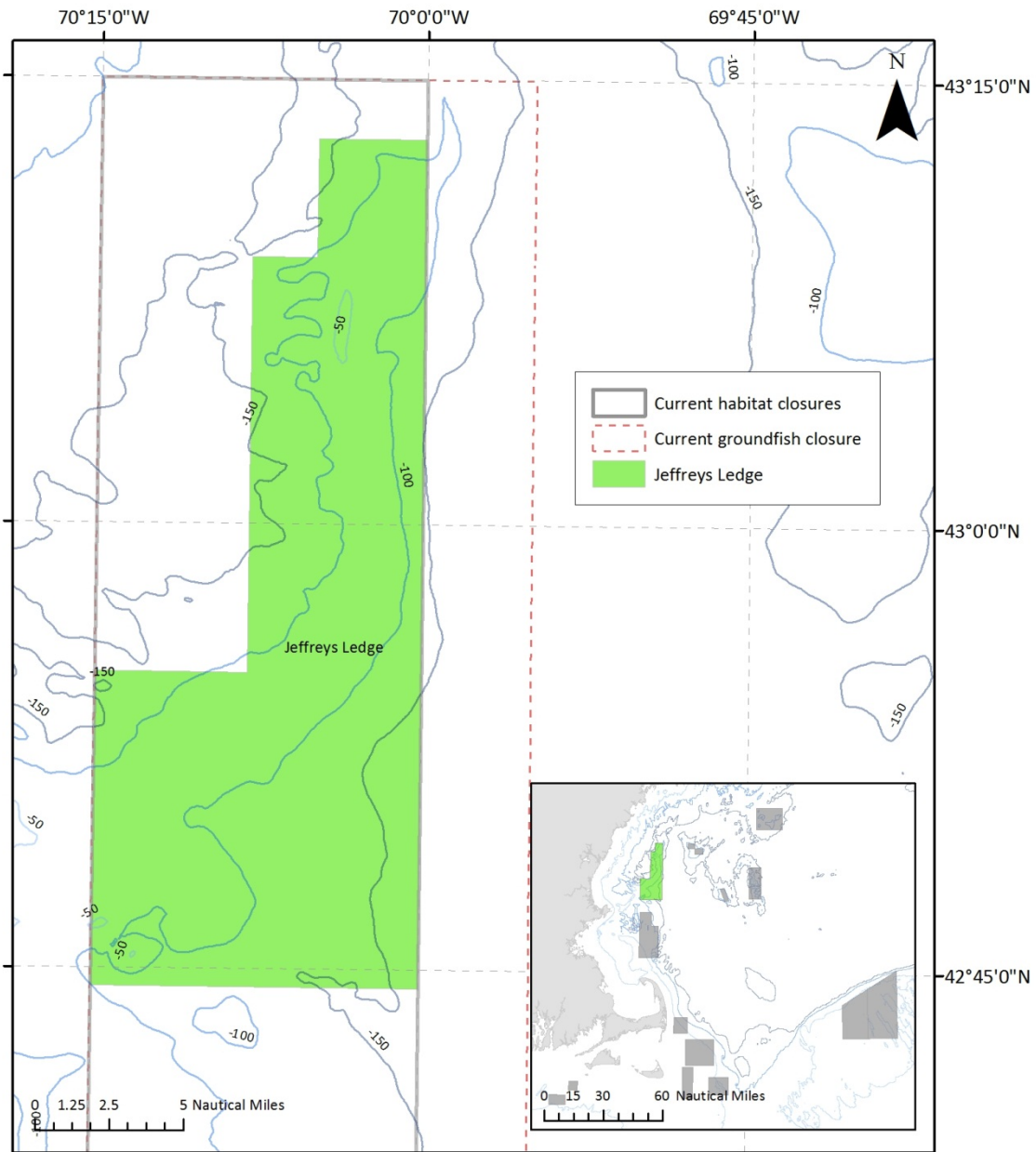
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Map date: 10 Sept 2012
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Map 12 - Platts Bank habitat management areas are shown in dark green. Depth contours are in meters.



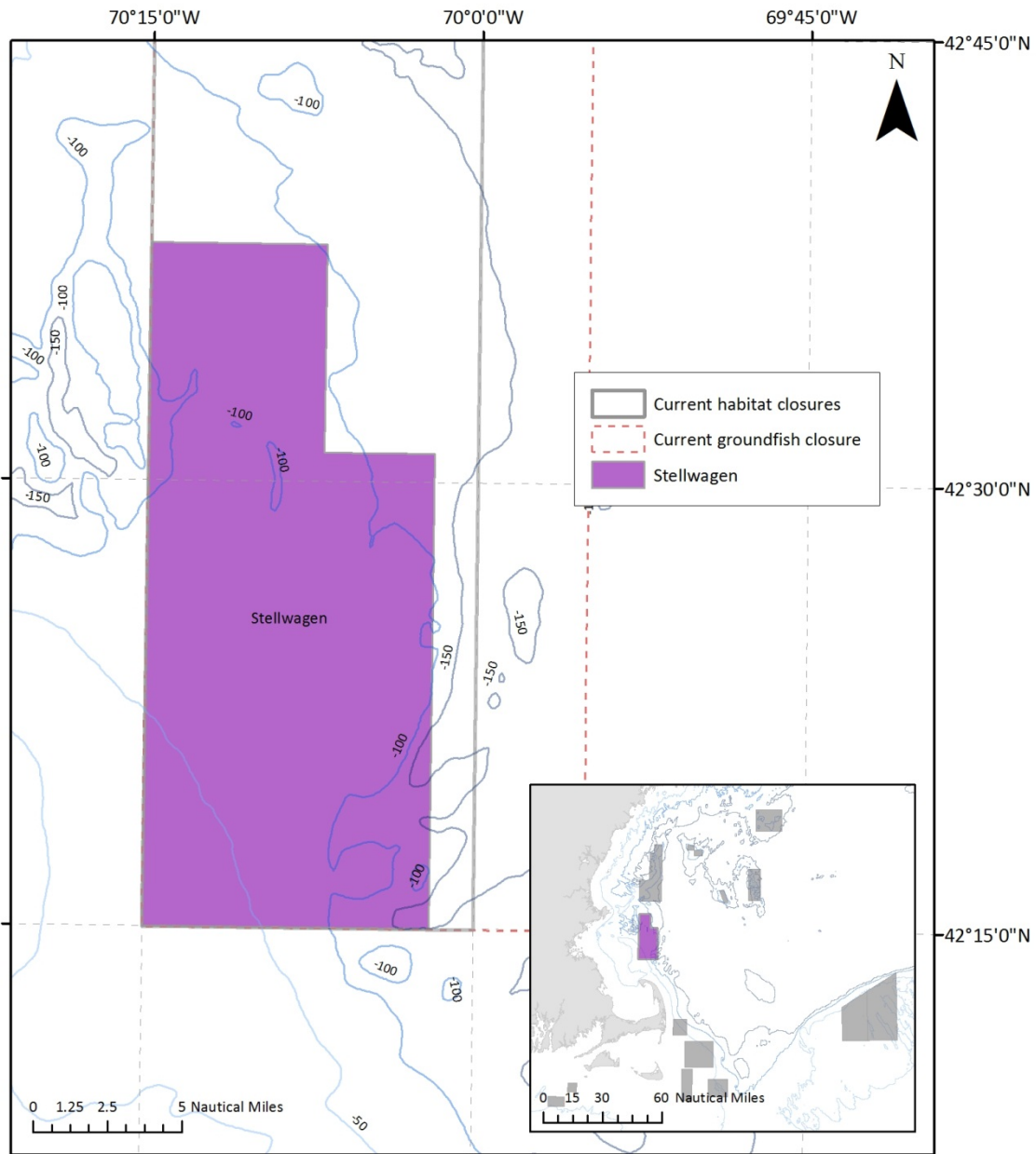
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Map date: 05 Sept 2012
NAD 1983 UTM Zone 19N

Map 13 – Jeffreys Ledge habitat management area shown in light green. The northern portions of the current WGOM habitat and groundfish areas are shown in grey and dotted red outlines. Depth contours are in meters.



New England Fishery Management Council Habitat Plan Development Team
Map date: 05 Sept 2012
NAD 1983 UTM Zone 19N

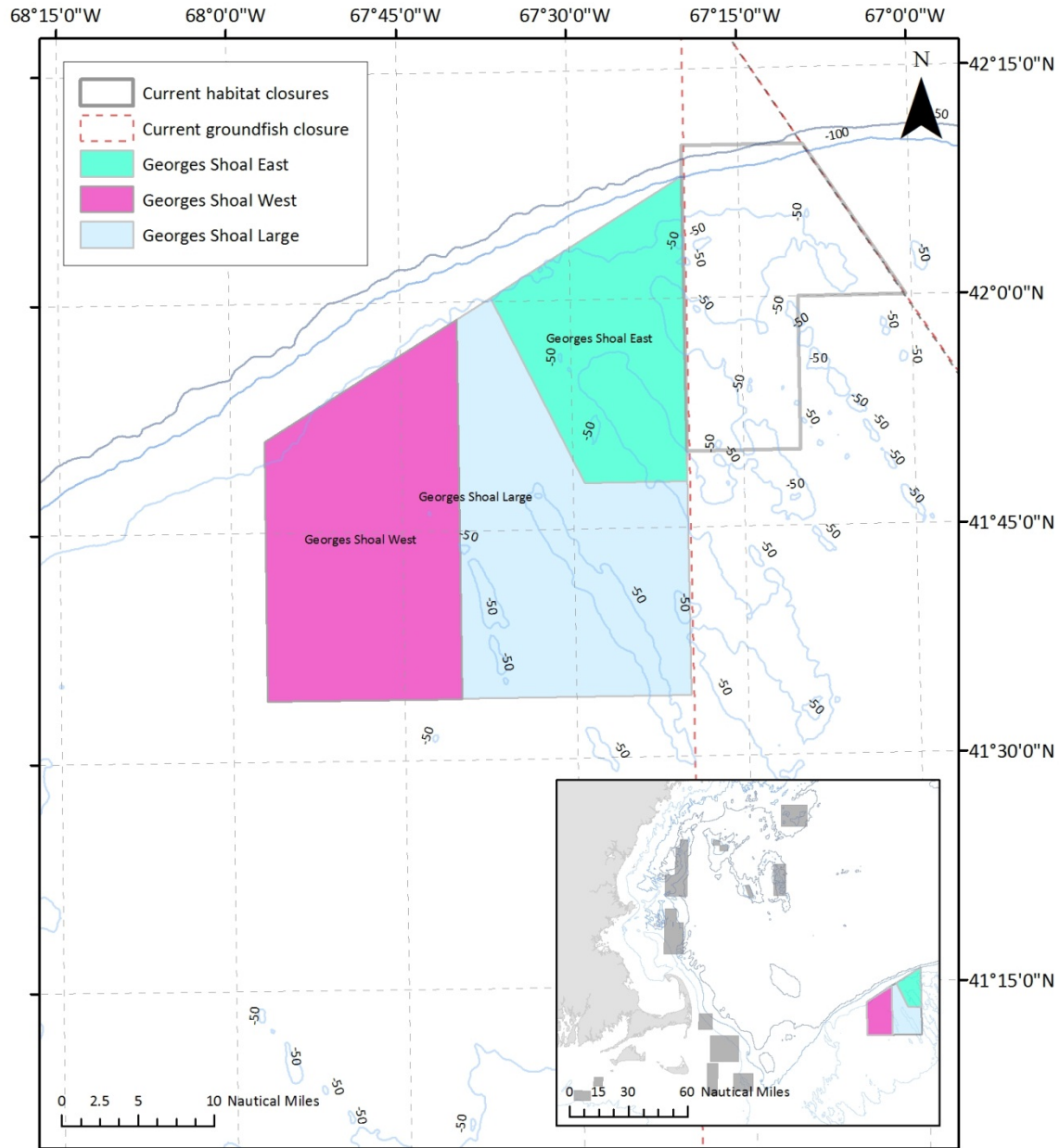
Map 14 – Stellwagen habitat management area shown in purple. The southern portions of the current WGOM habitat and groundfish areas are shown in grey and dotted red outlines. Depth contours are in meters.



New England Fishery Management Council Habitat Plan Development Team
Map date: 05 Sept 2012
NAD 1983 UTM Zone 19N

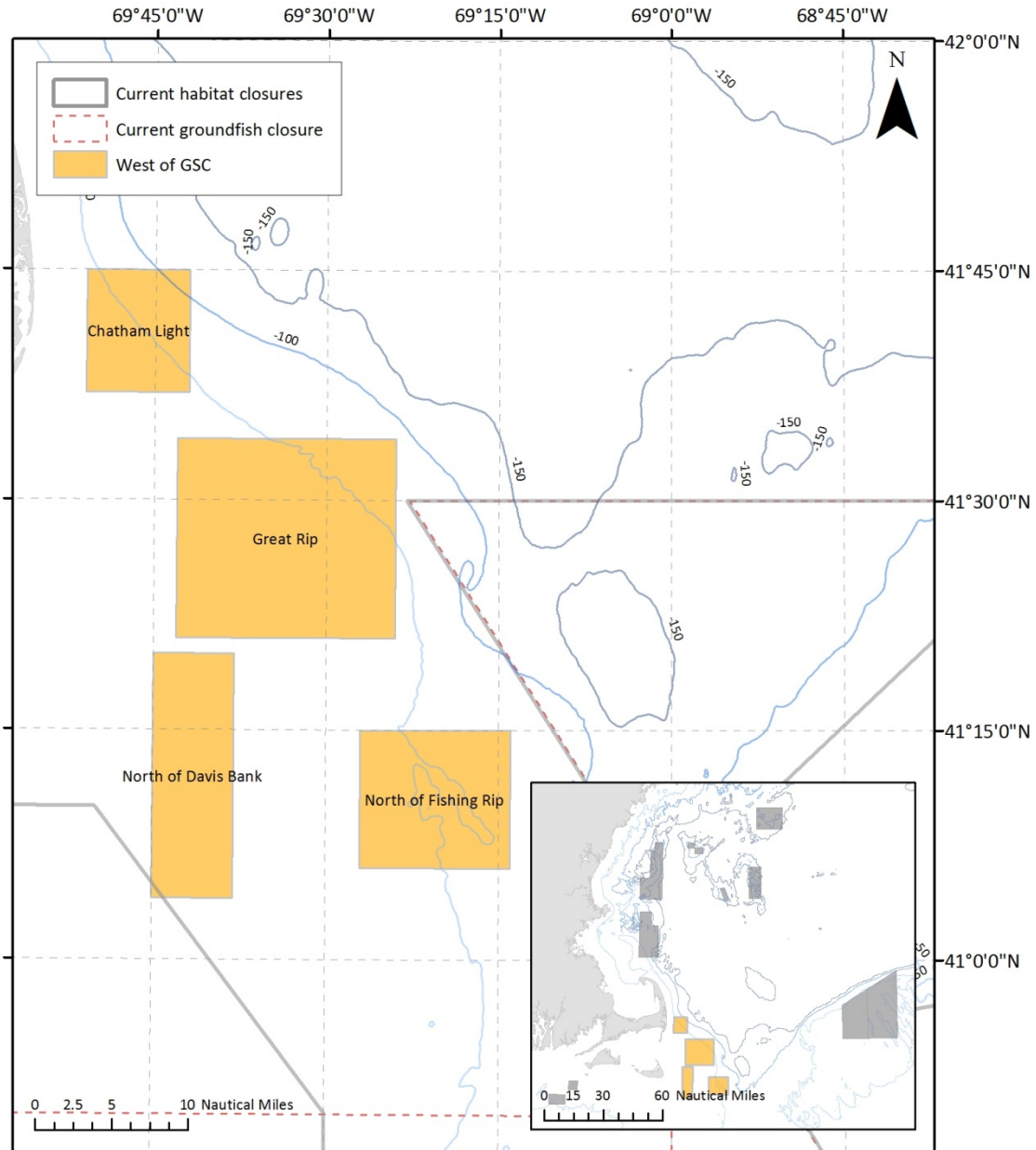
Options and Alternatives to Minimize the Effects of Fishing on EFH

Map 15 – Georges Shoal habitat management areas – eastern area in green, western area in magenta, and large area encompassing both eastern and western plus the area in between in light blue. The northern portion of the existing CAII groundfish area is shown in dotted red outline, and the existing CAII habitat area is shown in grey outline. Depth contours are in meters.



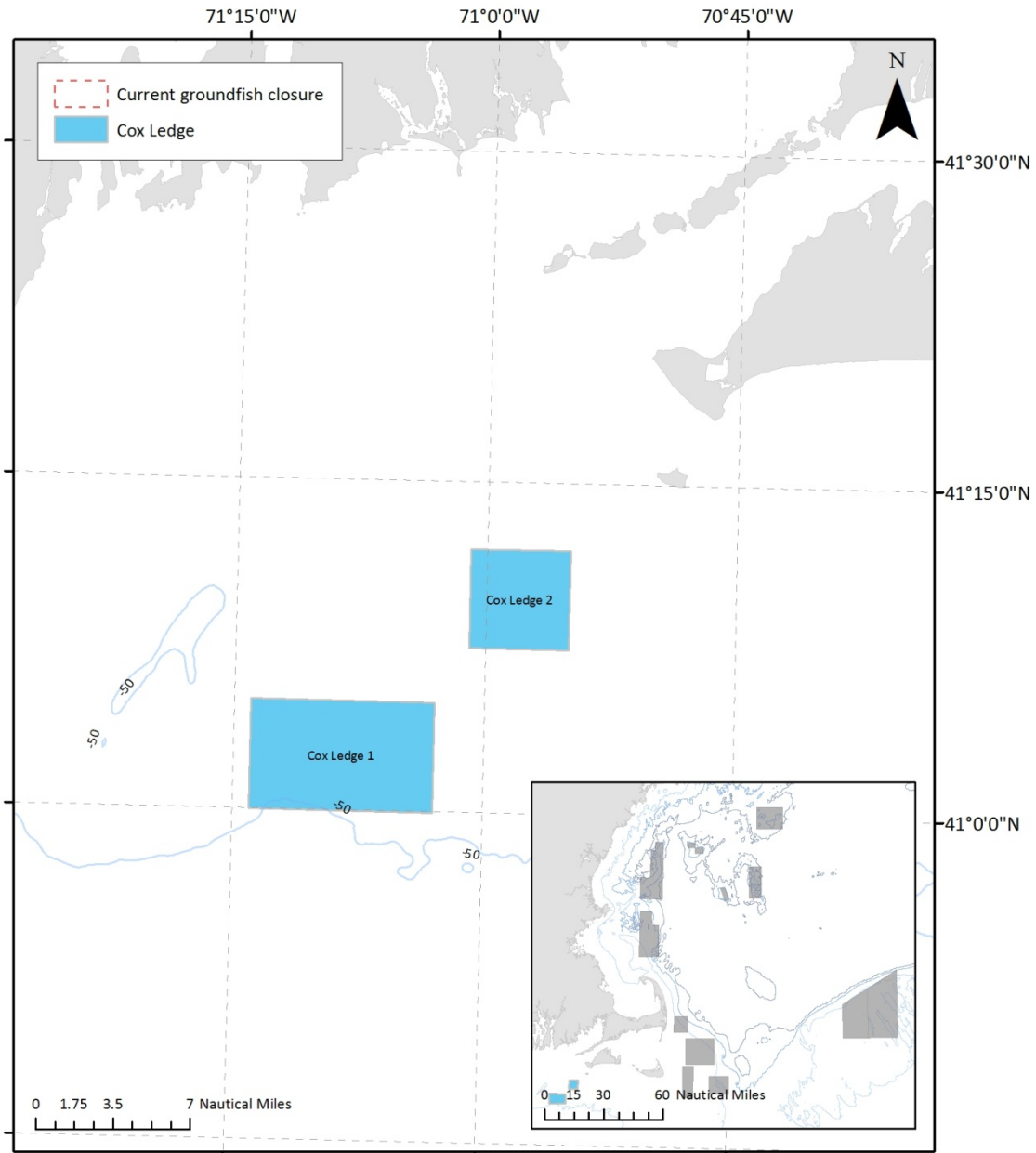
New England Fishery Management Council Habitat Plan Development Team
Map date: 05 Sept 2012
NAD 1983 UTM Zone 19N

Map 16 – Habitat management areas west of the Great South Channel including Chatham Light, Great Rip, North of Fishing Rip, and North of Davis Bank are shown in yellow. Portions of Closed Area I and the Nantucket Lightship Closed Area are outlined in gray (habitat areas) or dotted red (groundfish areas).



New England Fishery Management Council Habitat Plan Development Team
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Map 17 – Cox Ledge habitat management areas are shown in turquoise.



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