

## Omnibus Deep-Sea Coral Amendment

Amendment **xx** to the Northeast Multispecies FMP

Amendment **xx** to the Atlantic Sea Scallop FMP

Amendment **x** to the Monkfish FMP

Amendment **x** to the Atlantic Herring FMP

Amendment **x** to the Red Crab FMP

Amendment **x** to the Skate FMP

Amendment **x** to the Atlantic Salmon FMP



**DRAFT: September 17, 2015**

Prepared by the  
New England Fishery Management Council

**COVER IMAGES, CLOCKWISE FROM UPPER RIGHT:**

*A large black coral and two Paramuricea corals in Oceanographer Canyon. Image courtesy of NOAA Okeanos Explorer Program, 2013 Northeast U.S. Canyons Expedition.*

*Close-up of a sea pen colony at 2,023 meters depth on Retriever Seamount. Sea pens are octocorals and the characteristic eight pinnate tentacles are plainly visible in this image. The dark line running down below the tentacles of each polyp is the pharynx, connecting the mouth to the bag-like digestive cavity. A mysid shrimp (“possum shrimp”) is swimming by the colony. Image courtesy of NOAA Okeanos Explorer Program, *Our Deepwater Backyard: Exploring Atlantic Canyons and Seamounts*.*

*Cup corals and a sea star a mile underwater in Heezen Canyon. Image courtesy of NOAA Okeanos Explorer Program, 2013 Northeast U.S. Canyons Expedition.*

*A Paramuricea coral in Nygren Canyon which 165 nautical miles southeast of Cape Cod, Massachusetts. Image courtesy of NOAA Okeanos Explorer Program, 2013 Northeast U.S. Canyons Expedition.*

## **1 Executive summary**

### **1.1 Need and purpose for action**

The purpose of this amendment is to designate deep-sea coral zones and implement fishing restrictions necessary to protect the corals within those zones.

### **1.2 Alternatives considered**

### **1.3 Environmental consequences of alternatives**

### **1.4 Areas of controversy**

### **1.5 Issues to be resolved**

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### 3 Background and purpose

Worldwide, deep corals can build reef-like structures or occur as thickets, isolated colonies, or solitary individuals, and often are significant components of deep-sea ecosystems, providing habitat (substrate, refugia) for a diversity of other organisms, including many commercially important fish and invertebrate species. They are suspension feeders, but unlike most tropical and subtropical corals, do not require sunlight and do not have symbiotic algae (zooxanthellae) to meet their energy needs. Deep corals can be found from near the surface to 6000 m depth, but most commonly occur between 50-1000 m on hard substrate (Puglise and Brock 2003), hence their “deep-sea” appellation.

An array of coral species live in the northeast region. These corals vary in terms of their size, shape, and flexibility, growth rates and reproductive strategies, and habitat associations. Some are relatively common, whereas other types are rare. All of these species have some level of vulnerability to fishing gear impacts, but the degrees of susceptibility and the rates of recovery are likely variable. Specifically, the gorgonians and the black corals have fairly complex physical structure that is likely to be more susceptible to damage from fishing. Other species likely to be more vulnerable are listed in Table 1.

**Table 1 – Species of coral in the NE region that are likely to be more vulnerable to fishing gear based on their physical characteristics**

| Species, Order  | Form   | Distribution (needs to be updated with new data)   |
|---|--|--|
| <i>Acanella arbuscula</i> ;<br>alcyonacean                                      | Only 15 cm high, but stiff and delicate            | Canyons (Watling et al 2011), including on soft bottom, few in Oceanographer Canyon (Hecker and Blechschmidt); also on seamounts   |
| <i>Acanthogorgia armata</i> ;<br>alcyonacean                                    | Up to 50 cm high, usually 10-20 cm                 | Western N. Atlantic, including on seamounts (Appendix B in Hecker & Blechschmidt 1980 MMS Report, Watling et al 2011)  |
| <i>Anthomastus agassizii</i><br>and <i>A. grandiflorus</i> ;<br>alcyonaceans    | Stalked colonial corals                            | Deeper areas of canyons, <i>A. grandiflorus</i> on seamounts (Watling et al 2011)  |
| <i>Chrysogorgia agassizi</i> ;<br>alcyonacean                                   | 30 cm or more, delicate-looking with fine branches | Several in deep water in vicinity of Hudson Canyon (Appendix B in Hecker & Blechschmidt 1980 MMS Report); other species of <i>Chrysogorgia</i> on seamounts (Watling et al 2011)                                     |
| <i>Paragorgia arborea</i> ,<br>other <i>Paragorgia</i><br>species; alcyonaceans | Very large, up to 1.5 m high                       | <i>P. arborea</i> : western North Atlantic, including in axes of Oceanographer, Baltimore and Norfolk canyons (Appendix B in Hecker & Blechschmidt 1980 MMS Report); other species on seamounts (Watling et al 2011) |
| <i>Paramuricea grandis</i> ;<br>alcyonacean                                     | Up to 80 cm, frequently 20-30 cm                   | Not found south of Georges Bank (Appendix B in Hecker & Blechschmidt 1980 MMS Report)  |

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| Species, Order   | Form   | Distribution (needs to be updated with new data)   |
|--|--|--|
| <i>Primnoa resedaeformis</i> ;<br>alcyonacean  | Large colonies up to 1 m or more, stiff yet flexible, hard/rigid at base   | Found in Norfolk, Lydonia, Baltimore canyons (Appendix B in Hecker & Blechschmidt 1980 MMS Report)                               |
| <i>Thouarella grasshoffi</i> ;<br>alcyonacean  | Colonies consist of 1–3 main branches, from which numerous closely spaced (usually less than 2 mm apart) branchlets originate on all sides of the main branch in a bottlebrush arrangement. The branchlets are undivided, about 4.5 cm in length, and flexible in tension. The holotype is a single main stem 35 cm tall and 8–9 cm in width that has been broken from its base, the axis being 2.4 mm in proximal diameter and brownish in color. | Manning and Bear Seamounts of the New England Seamount Chain, and Oceanographer Canyon (Cairns, S.D. 2006, Watling et al. 2011). |
| <i>Desmophyllum cristagalli</i> ; stony coral  | Large solitary horn coral (related species <i>D. dianthus</i> up to 10 cm high)  | On hard substrates in canyon axes on hard bottom (Appendix C in Hecker & Blechschmidt 1980 MMS Report)                           |
| <i>Solenosmilla variabilis</i> ; stony coral   | Forms large bushy colonies   | Lydonia Canyon, Hendrickson Canyon (Appendix C in Hecker & Blechschmidt 1980 MMS Report), Bear Seamount                          |
| The black corals (order Antipatharia), genera <i>Antipathes</i> , <i>Leiopathes</i> , <i>Parantipathes</i> | Branching colonial corals  | Have only been documented on seamounts, but it is possible that they exist in other areas as well which haven't been surveyed    |

### 3.1 Need and purpose for action

The purpose of this amendment is to designate deep-sea coral zones and implement fishing restrictions necessary to protect the corals within those zones.

### 3.2 Goals and objectives

### 3.3 Management background and authority

There are multiple provisions in the Magnuson Stevens Fishery Conservation and Management Act (MSA) that can be used to justify coral protection. One is the Essential Fish Habitat (EFH) authority, where corals are considered a component of essential fish habitat, and fishing restrictions are enacted in the context of minimizing, to the extent practicable, the effects of fishing on EFH (see section 305(b)). In the Northeast region, this authority was used in Monkfish FMP Amendment 2 to protect deep-sea corals and associated habitat features in two offshore canyons, Lydonia and Oceanographer, from fishing activity occurring under a monkfish day at sea. Options for minimizing the adverse effects of fishing on EFH include fishing equipment restrictions, time/area closures, and harvest limits (in this case, direct harvest of corals).

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In the Northeast Region, coral distributions extend well beyond the bounds of designated EFH. The Section 303(b) discretionary provisions found in the 2007 reauthorization of the MSA (below) provide a second and more flexible mechanism by which Councils may protect deep-sea corals from the effects of fishing.

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

- (A) designate zones where, and periods when, fishing shall be limited, or shall not be permitted, or shall be permitted only by specified types of fishing vessels or with specified types and quantities of fishing gear;
- (B) designate such zones in areas where deep sea corals are identified under section 408 (this section describes the deep-sea coral research and technology program), to protect deep sea corals from physical damage from fishing gear or to prevent loss or damage to such fishing gear from interactions with deep sea corals, after considering long-term sustainable uses of fishery resources in such areas; and
- (C) with respect to any closure of an area under this Act that prohibits all fishing, ensure that such closure—
  - (i) is based on the best scientific information available;
  - (ii) includes criteria to assess the conservation benefit of the closed area;
  - (iii) establishes a timetable for review of the closed area's performance that is consistent with the purposes of the closed area; and
  - (iv) is based on an assessment of the benefits and impacts of the closure, including its size, in relation to other management measures (either alone or in combination with such measures), including the benefits and impacts of limiting access to: users of the area, overall fishing activity, fishery science, and fishery and marine conservation;

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

- Coral areas must have a nexus to a fishery managed by the Council under a fishery management plan. Councils need to show that the deep-sea coral areas are located within the geographical range of the fishery as described in the fishery management plan.
- Coral zones can include additional area beyond the locations of deep-sea corals if necessary to ensure the effectiveness of protection measures, which may include the following:
  - Restrictions on time/location of fishing within zones,
  - Limiting fishing to specific vessel types or vessels fishing with specific gear types/quantities of gear, and
  - Closure of zones to fishing.
- Protective measures can apply to any MSA regulated fishing activity, even if that activity or gear type is not managed by the FMP that includes the measures.

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

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

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

The NOAA Strategic Plan for Deep-Sea Coral and Sponge Ecosystems (NOAA 2010b) provides guidance on selection of coral conservation measures. This plan has six conservation and management objectives. The first three are most relevant to the Council's decisions.

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

In 2013 the New England, Mid-Atlantic, and South Atlantic Fishery Management Councils signed a memorandum of understanding to facilitate collaboration on the management of fisheries that may impact deep-sea coral habitats (<http://s3.amazonaws.com/nefmc.org/June-2013-Final-DSC-MOU.pdf>). Specifically, the purposes of this Memorandum of Understanding (MOU) are:

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1. To establish a framework for coordination and cooperation toward the protection of deep sea coral ecosystems; and
2. To clarify and explain each Council's role and geographic areas of authority and responsibility with regard to deep sea coral management.

Prior to and since signing the MOU, the New England and Mid-Atlantic Councils in particular have been sharing technical information and monitoring policy approaches discussed by the other Council to improve consistency in the policies proposed as well as in the use of scientific information.

### **3.4 Amendment development process**

The coral protection zones included in this amendment were initially developed during 2010 and 2011 as part of the Council's Omnibus Essential Fish Habitat Amendment 2 (OHA2). The Council approved a specific range of alternatives for analysis in April 2012. In September 2012, the Council split the coral protection zones areas and associated management measures out of OHA2 into a separate omnibus amendment. The the canyon and seamount Habitat Area of Particular Concern designations, which do not restrict fishing activities but rather serve as a focus for future management efforts as well as EFH consultations, were retained within OHA2. The OHA2 HAPC designations and the coral zones in this action have overlapping but not identical locations and boundaries. The Council took final action on OHA2 in June 2015, including approval of the canyon and seamount HAPCs. OHA2 and its associated Environmental Impact Statement are currently undergoing final development and review, with implementation expected during summer 2016. The HAPC designations will be in place sooner than that, upon approval and publication of the FEIS, since they do not require rulemaking.

Because Mid-Atlantic and New England-managed fisheries overlap spatially along the shelf break, the two Councils have been coordinating their coral management efforts for years through technical work groups (NEFMC Habitat PDT, MAFMC Coral FMAT) and via the NEFMC Habitat Committee. In June 2013, the Councils formalized this coordination via the memorandum of understanding described above. Under the MOU, each Council develops measures within their respective area of jurisdiction. Inter-council boundaries identifying areas of jurisdiction are specified at 50 CFR §600.105. The boundary between the Mid-Atlantic and New England regions runs diagonally across the shelf from the CT/RI/NY intersection point across Alvin Canyon to the EEZ. Thus, one important outcome of the MOU is that Mid-Atlantic region alternatives are no longer included in the NEFMC coral amendment.

In addition, the MOU includes a commitment to develop consistent management approaches when possible, and to engage potentially affected stakeholders regardless of which Council manages their fishery. The Mid-Atlantic Council took final action on their coral amendment, which is Amendment 16 to the Mackerel, Squid, and Butterfish FMP, in June 2015. Many of the coral zones selected by MAFMC were initially developed by NEFMC, although the boundaries were subsequently refined by MAFMC using new sources of data and stakeholder feedback, and some additional areas were added. The management measures (e.g. gear restrictions) selected by MAFMC generally fall within

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the range initially developed by NEFMC and approved for analysis in 2012. While MAFMC has not yet submitted their coral amendment, and therefore final approval by NMFS has not yet occurred, the preferred MAFMC approach is described below to facilitate continuity in management approaches.

- MAFMC selected discrete zones in various individual canyons or canyon complexes, specifically Block, Ryan/McMaster, Emery/Uchupi, Jones/Babylon, Mey-Lindenkohl Slope, Spencer, Wilmington, N. Heyes/S. Wilmington, S. Vries, Baltimore, Warr/Phoenix, Accomac/Leonard, Washington, and Norfolk.
  - The Council adopted boundaries developed during a workshop held during April 2015. The workshop included input from industry members, conservation organizations, and scientists, and participants reviewed updated bathymetric data, habitat suitability model outputs, and the locations of direct coral observations prior to and during the meeting.
- MAFMC selected a broad zone with a landward boundary between 400-500 meters extending to the EEZ.
  - The landward boundary line is comprised of straight segments, with the following constraints: minimum depth of 400 m, maximum depth of 500 m, and consistency with discrete boundaries where possible.
  - The north/south extent encompasses the entire MAFMC area of jurisdiction.
- For both broad and discrete zones, MAFMC's amendment prohibits all bottom tending-gear, with an exemption for the red crab fishery. Prohibition would not apply to the American lobster fishery managed by ASMFC. Transit would be allowed subject to gear stowage requirements.
- Frameworkable measures would include:
  - Boundaries of coral zones,
  - Management measures within zones, including fishing restrictions, exemptions, monitoring, and anchoring,
  - New discrete coral zones, and
  - Special access programs.
- Finally, MAFMC's amendment implements a VMS requirement for all *Illex* squid moratorium vessels, whether they are fishing within or outside of coral zones.

## 4 Management alternatives

This section describes management measures to conserve deep-sea corals within the New England region. Two conceptual approaches are proposed for the development of coral zones. Both would rely on the discretionary coral protection authority provided in the 2007 MSA reauthorization.

The **‘discrete areas’** approach would designate more narrowly defined coral zones based on discrete bathymetric/geological features and groupings of corals. These zones include discrete areas of the GOM, single canyons, and individual seamounts. The discrete coral zones were developed to encompass species that attach to hard substrates, and are relatively large or have other attributes that make them more susceptible to fishing-related impact. While there is abundant soft substrate in the deep ocean, hard substrate areas are much more limited in their distribution. The boundaries of the discrete coral zones would be based on direct observations of corals and other animals, plus inferences about the likely presence of suitable coral habitats for locations within the zones that have not been directly observed.

*The Council should consider revisiting the existing range of discrete zones and their boundaries given updated scientific data collected since 2012.*

The **‘broad areas’** approach would designate a coral zone along the entire shelf-slope region between the US/Canada EEZ boundary and the New England/Mid-Atlantic Council boundary, beginning at the 300, 400, or 500 m depth contour and extending to the 200 mile limit. Broad zones are generally intended to cover areas beyond the distribution of currently occurring fishing effort, and represent a precautionary approach to management that would prevent the expansion of fishing into additional deep-water habitats. They would encompass coral habitats in the canyons, on the continental slope and on the seamounts. The broad areas do not overlap the coral zones in the Gulf of Maine. Although a detailed analysis of the overlap between fishing effort and the broad zone boundaries has not been conducted, the deep-sea red crab fishery is the only one that is expected to have a substantial overlap with the broad zones, particularly at the deeper minimum depths of 400 or 500 meters.

The broad zone alternatives, in addition to encompassing the canyon and seamounts themselves, include additional areas of low-relief mud habitats that harbor other species of corals, including sea pens. Specifically, the white sea pen, *Stylatula elegans*, and the common sea pen, *Pennatula aculeata* possibly have lower susceptibility to fishing disturbance, and are more widely distributed than other types of corals. Other corals, fall into the category of lower susceptibility – specifically, the hard coral *Dasmosmilia lymani* was noted as being relatively common, including in shallower depths, small in size, and possibly less susceptible to fishing gear impacts. Some larger species such as the bamboo coral *Acanella arbuscula* are also associated with these soft substrates.

Management options for restricting or modifying fishing operations within the deep-sea coral zones include restrictions on mobile bottom-tending gears, restrictions on bottom-tending gears, and authorized exemptions to these restrictions. Different restrictions may

be appropriate in broad vs. discrete zones, or among the various discrete zones. Something to consider when developing fishing restrictions for coral zones is which Council has primary or sole management authority for a particular fishing activity:

Note that broad areas and discrete areas could be implemented simultaneously. The individual discrete zones do not overlap one another. However, all discrete zones on the slope, canyons, and seamounts overlap the broad coral zone options. Generally, the landward boundary of the discrete canyon zones is slightly shallower than the landward boundary of the shallowest broad zone, so a combination approach would protect additional coral habitats. A combination approach might also be appropriate if more restrictive management measures are desired in the discrete areas. For example, the Council might prohibit all bottom-tending gears in a discrete deep-sea coral zone, but only prohibit mobile-bottom tending gears in the surrounding/overlapping broad deep-sea coral zone. Different exemptions could be authorized in broad vs. discrete zones as well.

In order to to increase flexibility and allow for incorporation of new scientific information there is an alternative that would allow fishing restrictions in designated coral zones to be implemented via framework action.

Note that a few regulations currently in place offer some level of protection to deep-sea corals in the region. Both were developed via the MSA EFH authority, not using the discretionary provisions.

- **Monkfish FMP (Joint New England and Mid-Atlantic Councils):** prohibitions on fishing during a monkfish DAS in Lydonia and Oceanographer Canyons. The management areas and associated restrictions were implemented via Amendment 2. These same areas were adopted as mackerel, squid, and butterfish bottom trawling restricted areas.
- **Tilefish FMP (Mid-Atlantic Council):** mobile gear restrictions (Gear Restricted Areas, or GRAs) in four canyons – Lydonia, Oceanographer, Veatch, and Norfolk. The GRAs were implemented via Amendment 1. Note that the Tilefish GRAs are located towards the heads of the canyons, with the boundaries based on those of the Tilefish Habitat Areas of Particular Concern (HAPC). The HAPCs were designed to protect clay outcrop habitats in waters between 100 and 300 meters, although they cover deeper water areas along the axis of the canyons as well.

#### **4.1 Broad deep-sea coral zone designations**

These alternatives would designate a broad shelf-slope area as a deep-sea coral zone. This type of coral zone would extend from the boundary of the EEZ along the southern flank of Georges Bank to the New England/Mid-Atlantic Council boundary line. The landward boundary would be the 300 m, 400 m, or 500 m contour, and the seaward boundary would be the EEZ. These options are mutually exclusive, i.e., only one of the four alternatives (three depths in addition to No Action) could be selected.

**Rationale:** The overall objective of this type of measure would be to prevent the expansion of fishing effort into deepwater coral areas, while not restricting current fishing operations.

**Table 2 – Size and depth of broad coral zones**

| Area name        | Area size, km <sup>2</sup> | Minimum depth, m | Maximum depth, m     |
|------------------|----------------------------|------------------|----------------------|
| 300 m broad zone | 75,639                     | 300              | 6000 m (approximate) |
| 400 m broad zone | 74,840                     | 400              | 6000 m (approximate) |
| 500 m broad zone | 74,202                     | 500              | 6000 m (approximate) |

#### **4.1.1 No Action – No broad coral zones designated**

No broad zone is currently designated.

#### **4.1.2 Landward boundary at 300 m contour**

This option would designate a broad coral zone from the US-CAN EEZ boundary to the boundary between the New England and Mid-Atlantic Council regions, with the landward boundary at the 300 m contour and the seaward boundary at the EEZ.

#### **4.1.3 Landward boundary at 400 m contour**

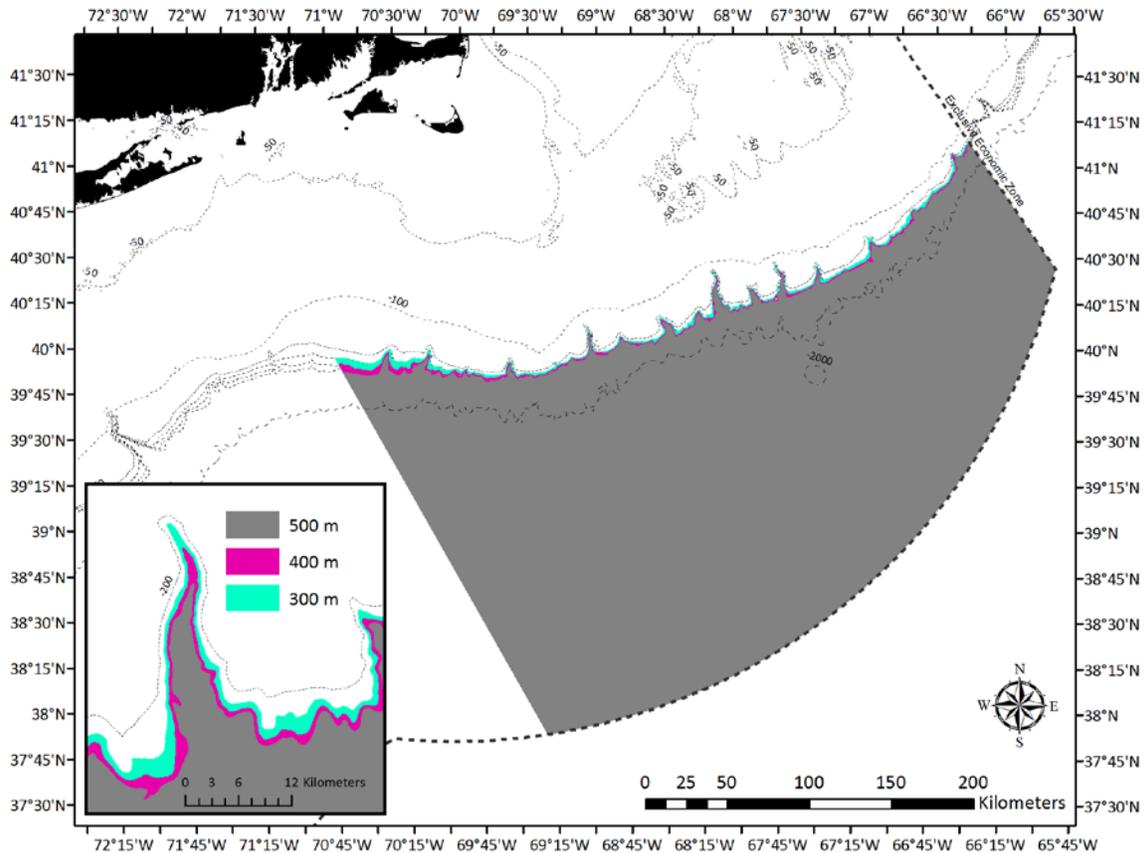
This option would designate a broad coral zone from the US-CAN EEZ boundary to the boundary between the New England and Mid-Atlantic Council regions, with the landward boundary at the 400 m contour and the seaward boundary at the EEZ.

#### **4.1.4 Landward boundary at 500 m contour**

This option would designate a broad coral zone from the US-CAN EEZ boundary to the boundary between the New England and Mid-Atlantic Council regions, with the landward boundary at the 500 m contour and the seaward boundary at the EEZ.

*The MAFMC broad zone approach uses a straight-line landward boundary with a minimum depth of at least 400 meters but no deeper than 500 meters.*

**Map 1 – Broad coral protection zones based on 300, 400, and 500 meter contours. The inset shows what these zones look like at the head of Oceanographer Canyon. Because the areas are so steeply sloping, the contours are often only 1-2 km apart between the canyons, and even more closely spaced within the canyons.**



## 4.2 Discrete deep-sea coral zone designations

Discrete deep-sea coral zones overlap individual canyons, seamounts, or other features. These discrete coral zones are intended to encompass known aggregations of corals, or steeply sloping habitats likely to have exposed rock outcroppings that provide suitable attachment sites for corals. Because the discrete zones do not overlap one other, any combination of areas could be selected. Maps are provided after the list of alternatives. Some maps show more than one discrete zone.

*An earlier version of this amendment grouped the discrete zones into categories of “known” vs. “inferred” coral presence, but that distinction is no longer especially meaningful, as additional survey work has been completed in many areas to confirm the presence of corals.*

### 4.2.1 No Action – no discrete coral zones designated

Currently there are no discrete coral zones designated by the Council under the discretionary authority.

#### 4.2.2 Heezen Canyon

This alternative would designate a discrete coral zone in Heezen Canyon (Map 2).

| Rationale based on data collected through winter/spring 2012  | Data collected summer 2012 to present |
|---|---------------------------------------|
| Although Heezen Canyon has only moderately adequate coral observations, corals have been found during all dives conducted. Also, suitable coral habitat (bathymetry and geology) has been documented. | High resolution bathymetry, ROV dives |

#### 4.2.3 Nygren Canyon

This alternative would designate a discrete coral zone in Nygren Canyon (Map 3).

| Rationale based on data collected through winter/spring 2012   | Data collected summer 2012 to present |
|--|---------------------------------------|
| Nygren Canyon, Munson Canyon, and Powell Canyon are among the smaller canyons in the shelf/slope region south of Georges Bank, and we know very little about them. However, they are relatively deep, and at the three degree slope contour they all have a relief from the rim of the canyon to the seafloor at the thalweg that exceeds 450 m. | High resolution bathymetry, ROV dives |

#### 4.2.4 Munson Canyon

This alternative would designate a discrete coral zone in Heezen Canyon (Map 3).

| Rationale based on data collected through winter/spring 2012   | Data collected summer 2012 to present |
|--|---------------------------------------|
| Nygren Canyon, Munson Canyon, and Powell Canyon are among the smaller canyons in the shelf/slope region south of Georges Bank, and we know very little about them. However, they are relatively deep, and at the three degree slope contour they all have a relief from the rim of the canyon to the seafloor at the thalweg that exceeds 450 m. | High resolution bathymetry, ROV dives |

#### 4.2.5 Powell Canyon

This alternative would designate a discrete coral zone in Powell Canyon (Map 4).

| Rationale based on data collected through winter/spring 2012                         | Data collected summer 2012 to present |
|--|---------------------------------------|
| Nygren Canyon, Munson Canyon, and Powell Canyon are among the smaller canyons in the | High resolution bathymetry, ROV dives |

|   |  |
|---|--|
| shelf/slope region south of Georges Bank, and we know very little about them. However, they are relatively deep, and at the three degree slope contour they all have a relief from the rim of the canyon to the seafloor at the thalweg that exceeds 450 m. |  |
|---|--|

#### 4.2.6 Lydonia Canyon

This alternative would designate a discrete coral zone in Lydonia Canyon (Map 5).

| Rationale based on data collected through winter/spring 2012  | Data collected summer 2012 to present |
|---|---------------------------------------|
| Both Lydonia Canyon and Oceanographer Canyon have been relatively well surveyed. They are recommended as coral zones based on documented presence of corals and suitable coral habitat. | High resolution bathymetry, ROV dives |

#### 4.2.7 Gilbert Canyon

This alternative would designate a discrete coral zone in Gilbert Canyon (Map 5).

| Rationale based on data collected through winter/spring 2012  | Data collected summer 2012 to present |
|---|---------------------------------------|
| Gilbert Canyon lies between two well-studied canyons, Lydonia and Oceanographer, but has not been surveyed for corals. It is recommended on the basis of habitat suitability as its height exceeds the 450 m threshold. | High resolution bathymetry, ROV dives |

#### 4.2.8 Oceanographer Canyon

This alternative would designate a discrete coral zone in Oceanographer Canyon (Map 5).

| Rationale based on data collected through winter/spring 2012  | Data collected summer 2012 to present |
|---|---------------------------------------|
| Both Lydonia Canyon and Oceanographer Canyon have been relatively well surveyed. They are recommended as coral zones based on documented presence of corals and suitable coral habitat. | High resolution bathymetry, ROV dives |

#### 4.2.9 Heel Tapper Canyon

This alternative would designate a discrete coral zone in Heel Tapper Canyon (Map 6).

| Rationale based on data collected through winter/spring 2012 | Data collected summer 2012 to present |
|--|---------------------------------------|
|  |                                       |

|  |                                   |
|--|-----------------------------------|
| <p>Heel Tapper Canyon and Welker Canyon lie southwest of Oceanographer Canyon. While we know very little about them, they are relatively deep, and at the three degree slope contour they each have a relief from the rim of the canyon to the seafloor at the thalweg that exceeds 450 m. Some ROV dives but not very recent.</p> | <p>High resolution bathymetry</p> |
|--|-----------------------------------|

#### 4.2.10 Welker Canyon

This alternative would designate a discrete coral zone in Welker Canyon (Map 6).

| <p><b>Rationale based on data collected through winter/spring 2012</b></p>   | <p><b>Data collected summer 2012 to present</b></p> |
|--|---|
| <p>Heel Tapper Canyon and Welker Canyon lie southwest of Oceanographer Canyon. While we know very little about them, they are relatively deep, and at the three degree slope contour they each have a relief from the rim of the canyon to the seafloor at the thalweg that exceeds 450 m.</p> | <p>High resolution bathymetry, ROV dives</p>        |

#### 4.2.11 Hydrographer Canyon

This alternative would designate a discrete coral zone in Hydrographer Canyon (Map 7).

| <p><b>Rationale based on data collected through winter/spring 2012</b></p>   | <p><b>Data collected summer 2012 to present</b></p> |
|--|---|
| <p>Very limited survey work has been conducted in Hydrographer Canyon, so a recommendation could not be made on the basis of coral or geological data. Hydrographer Canyon is narrow and steep relative to other canyons, and has a cross sectional relief value of over 900 m. Therefore, the area is recommended as a coral zone based on the inference of suitable habitat.</p> | <p>High resolution bathymetry, ROV dives</p>        |

#### 4.2.12 Veatch Canyon

This alternative would designate a discrete coral zone in Veatch Canyon (Map 8).

| <p><b>Rationale based on data collected through winter/spring 2012</b></p>   | <p><b>Data collected summer 2012 to present</b></p> |
|--|---|
| <p>In Veatch Canyon, there has been a lesser amount of survey work with some information on corals, although there are no images or physical samples. Substrate appears to be suitable, and the habitat suitability analysis</p> | <p>High resolution bathymetry, ROV dives</p>        |

|  |  |
|--|--|
| indicated sufficient relief to expose rock outcrops. |  |
|--|--|

#### 4.2.13 Alvin Canyon

This alternative would designate a discrete coral zone in Alvin Canyon (Map 9).

| <b>Rationale based on data collected through winter/spring 2012</b>   | <b>Data collected summer 2012 to present</b> |
|---|--|
| Similar to Hydrographer, coral survey work to support assessment of Alvin Canyon as a coral zone is inadequate, as there have been no surveys for corals. However, the relief of Alvin Canyon from the canyon rim to the seafloor along the thalweg at the three degree slope contour was measured at 721 m, which is greater than the 450 m threshold for inferring suitable habitat. Therefore, Alvin Canyon is recommended as a discrete coral zone. | High resolution bathymetry, ROV dives        |

#### 4.2.14 Bear Seamount

This alternative would designate a discrete coral zone on Bear Seamount (Map 10).

| <b>Rationale based on data collected through winter/spring 2012</b>  | <b>Data collected summer 2012 to present</b> |
|--|--|
| Bear Seamount is relatively well studied in terms of coral distributions, and a variety of species have been documented. |  |

#### 4.2.15 Retriever Seamount

This alternative would designate a discrete coral zone on Retriever Seamount (Map 10).

| <b>Rationale based on data collected through winter/spring 2012</b>  | <b>Data collected summer 2012 to present</b> |
|--|--|
| Although it has not been surveyed as well as Bear Seamount, Retriever Seamount has been surveyed for corals and a variety of species have been documented. | ROV dives                                    |

#### 4.2.16 Physalia Seamount

This alternative would designate a discrete coral zone on Physalia Seamount (Map 10).

| <b>Rationale based on data collected through winter/spring 2012</b>   | <b>Data collected summer 2012 to present</b> |
|---|--|
| Physalia Seamount and Mytilus Seamount have not been surveyed for corals, but suitable habitat is inferred based on similarities with | ROV dives                                    |

|                               |  |
|-------------------------------|--|
| Bear and Retriever Seamounts. |  |
|-------------------------------|--|

#### 4.2.17 Mytilus Seamount

This alternative would designate a discrete coral zone on Mytilus Seamount (Map 10).

| Rationale based on data collected through winter/spring 2012  | Data collected summer 2012 to present |
|---|---------------------------------------|
| Physalia Seamount and Mytilus Seamount have not been surveyed for corals, but suitable habitat is inferred based on similarities with Bear and Retriever Seamounts. | ROV dives                             |

#### 4.2.18 Mt Desert Rock

This alternative would designate a discrete coral zone near Mt. Desert Rock, which is located approximately 30 km offshore of Mt Desert Island, Maine (Map 11). The waters immediately surrounding the rock itself are 30-40 meters deep. The suggested coral zone area to the southwest of Mount Desert Rock has water depths ranging from approximately 100 m to 190 m.

| Rationale based on data collected through winter/spring 2012  | Data collected summer 2012 to present |
|---|---------------------------------------|
| Corals in this area and associate hard substrates have been documented via remotely operated vehicle (ROV) surveys. | High resolution bathymetry, ROV dives |

#### 4.2.19 Western Jordan Basin

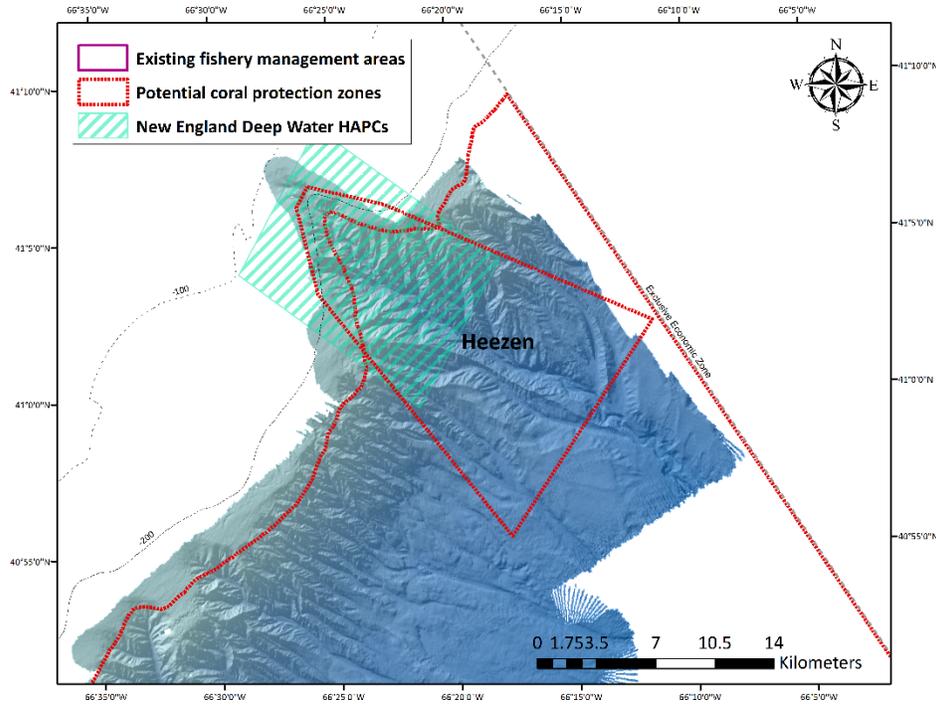
This alternative would designate a discrete coral zone in Western Jordan Basin, consisting of four small sub-areas (Map 11). Jordan Basin is 200-270 m deep basin located in the eastern Gulf of Maine that straddles the US/CAN EEZ.

| Rationale based on data collected through winter/spring 2012  | Data collected summer 2012 to present |
|---|---------------------------------------|
| Although much of the basin contains soft sediments, there are steep rock patches (bumps) in the western (US waters) part of the basin that have been found to harbor various types of corals. These bumps are generally somewhat shallower than the areas surrounding them. Corals have also been documented in eastern Jordan Basin, on the Canadian side of the EEZ. Four areas are suggested as coral zones in Western Jordan Basin within the US EEZ, including three 'bumps' which have been surveyed using ROV and documented to have corals and suitable hard substrates (WJB 1-3), plus one additional area (WJB 4) that is also somewhat shallower | High resolution bathymetry, ROV dives |

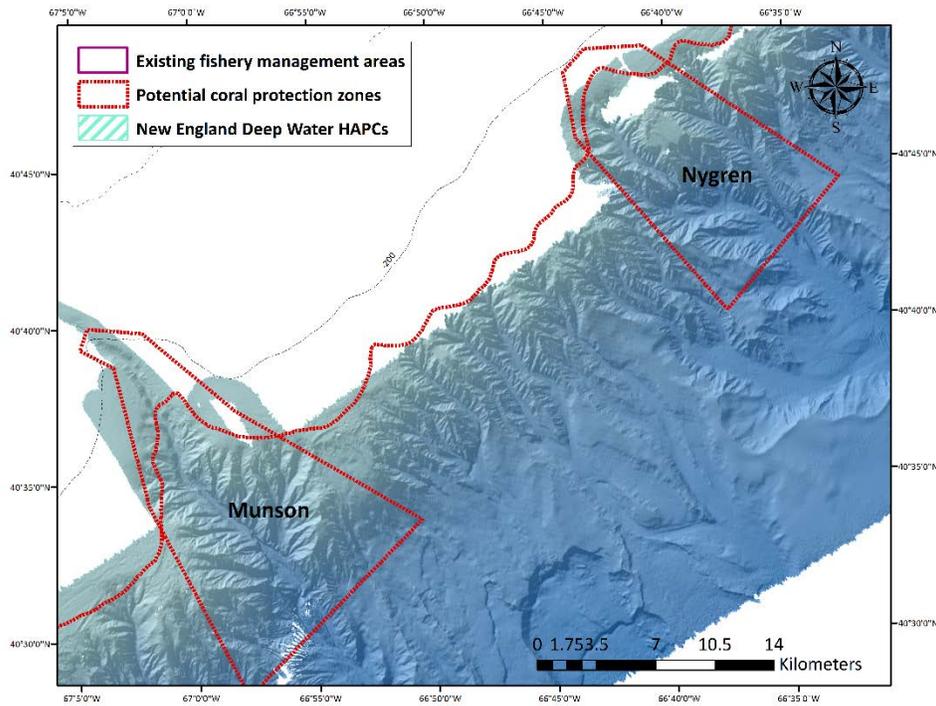
than the area surrounding it and would be expected to have similar hard substrates and corals.

#### 4.2.20 Maps of discrete zones

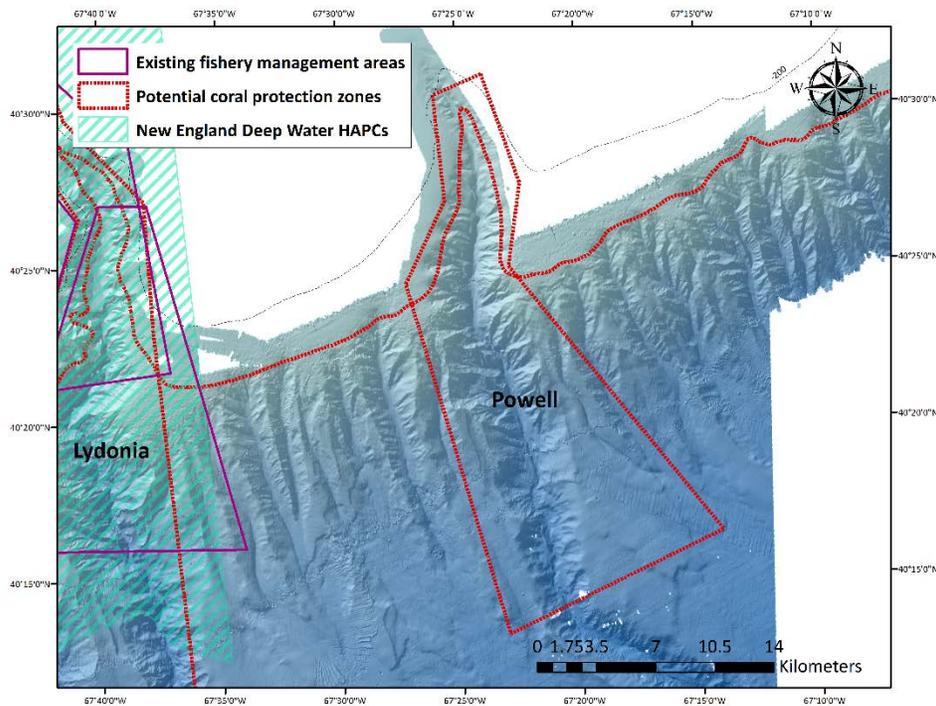
**Map 2 – Heezen Canyon discrete deep-sea coral protection zone. The overlapping HAPC (hatched) and 400m broad zone are shown for reference.**



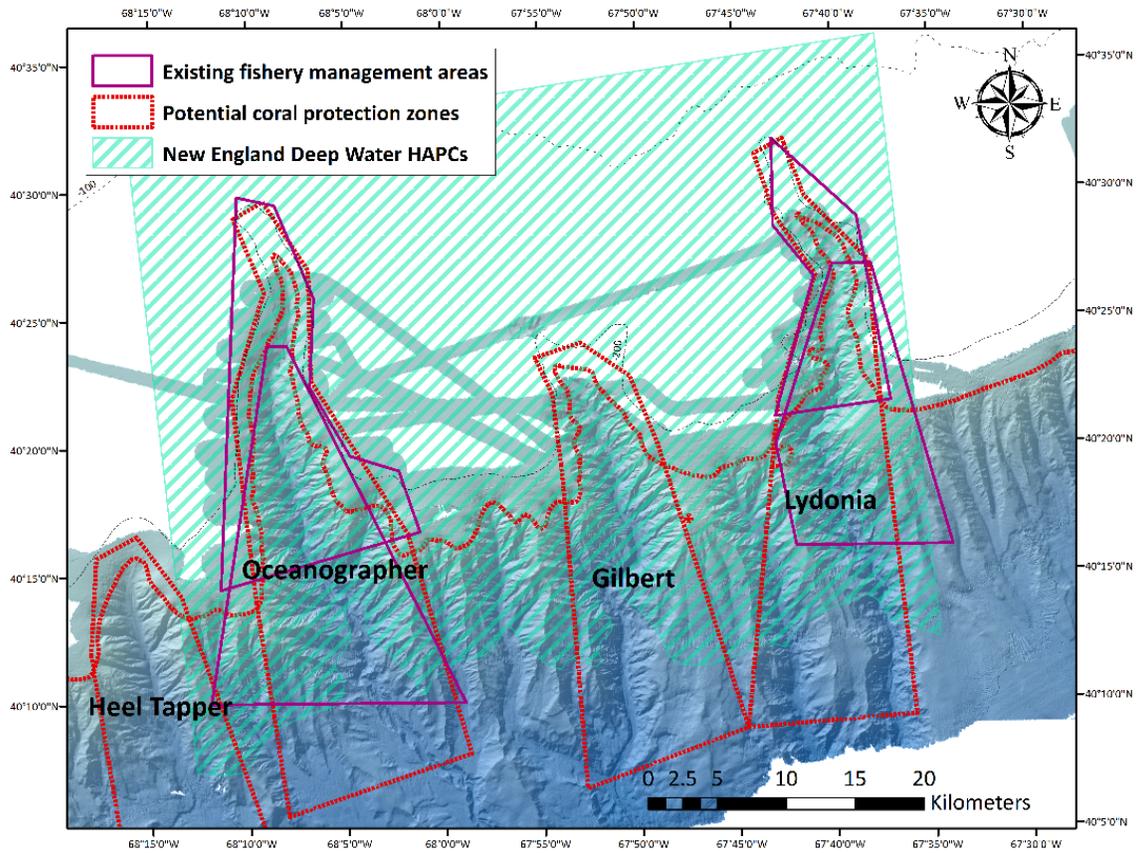
**Map 3 – Nygren and Munson Canyon discrete deep-sea coral protection zones. The overlapping 400m broad zone is shown for reference.**



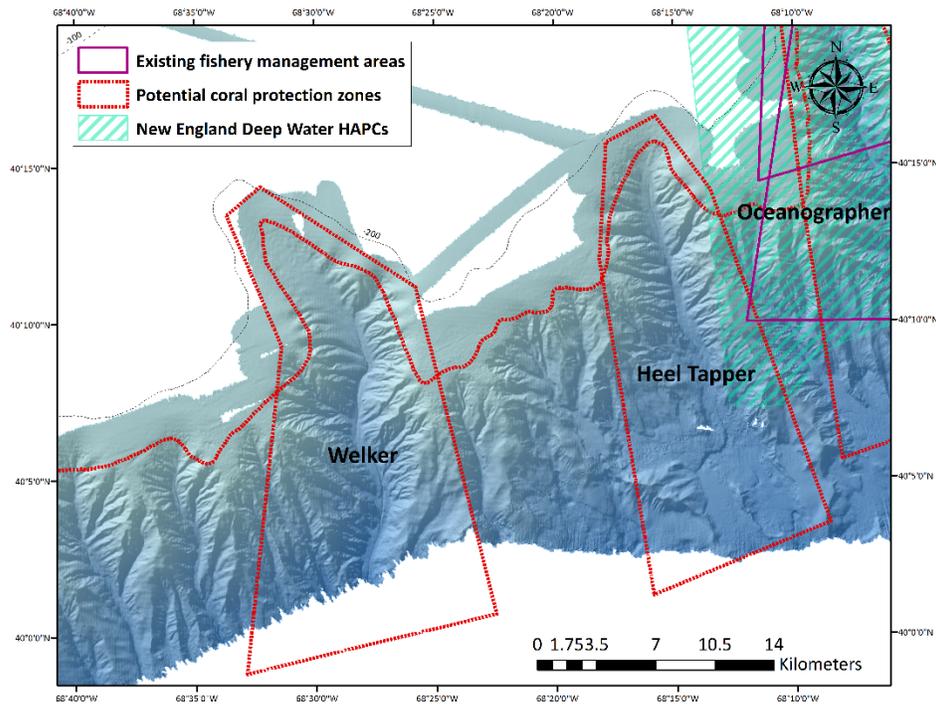
**Map 4 – Powell Canyon discrete deep-sea coral protection zone. The overlapping 400m broad zone is shown for reference.**



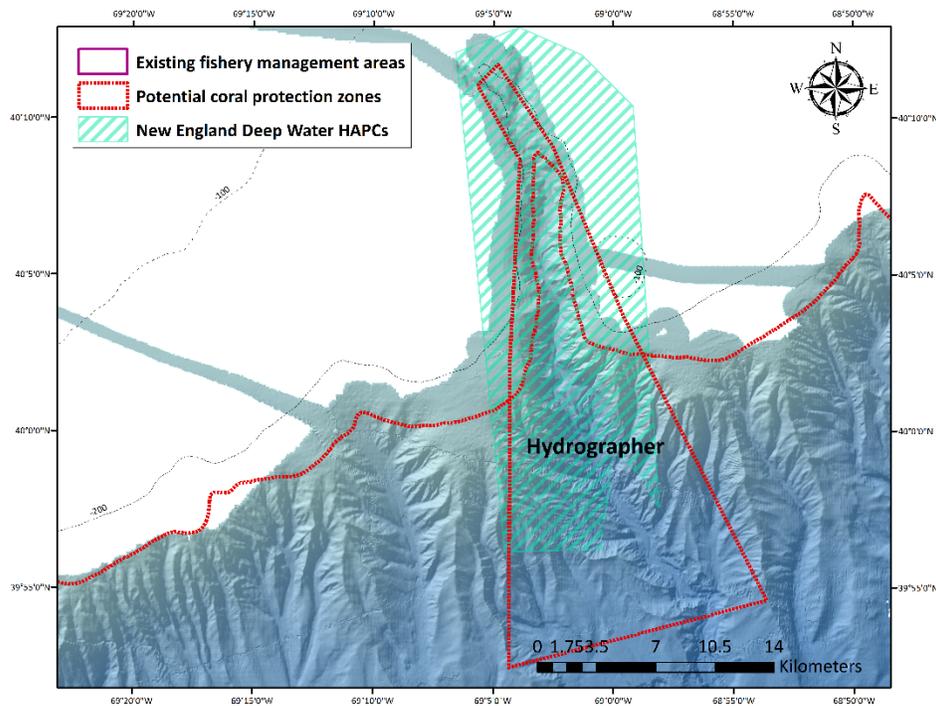
**Map 5 – Lydonia, Gilbert, and Oceanographer Canyon discrete deep-sea coral protection zones. The overlapping HAPC (hatched) and 400m broad zone are shown for reference. The existing monkfish (deeper) and tilefish (shallower) management areas in Lydonia and Oceanographer canyons are outlined in purple. Tilefish GRAs are closed to all mobile bottom-tending gears and the monkfish areas are closed to fishing on a monkfish day at sea.**



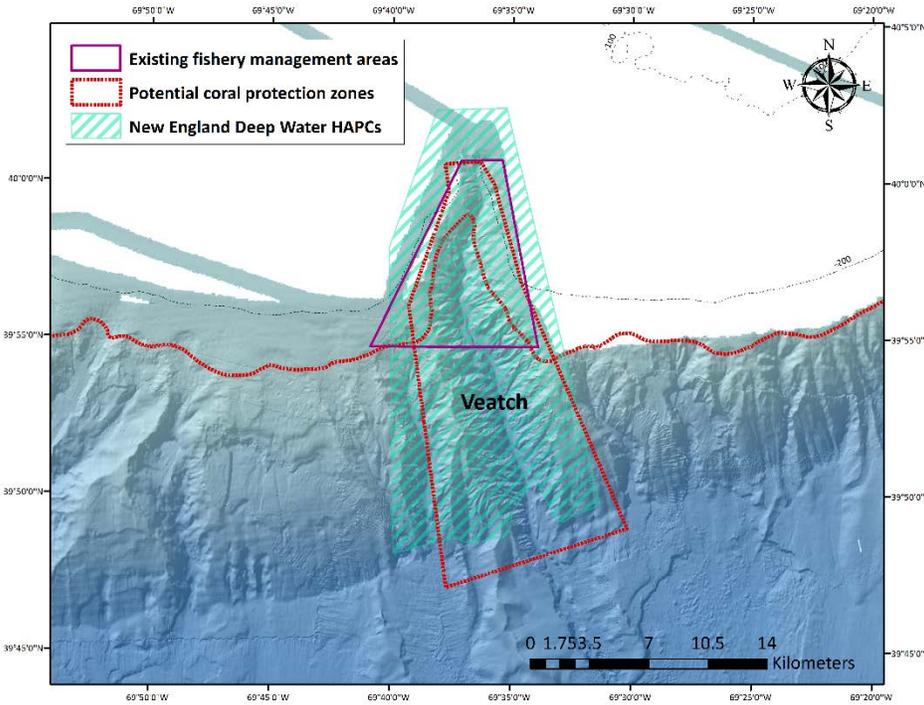
**Map 6 – Heel Tapper and Welker Canyon discrete deep-sea coral protection zones. The overlapping 400m broad zone is shown for reference.**



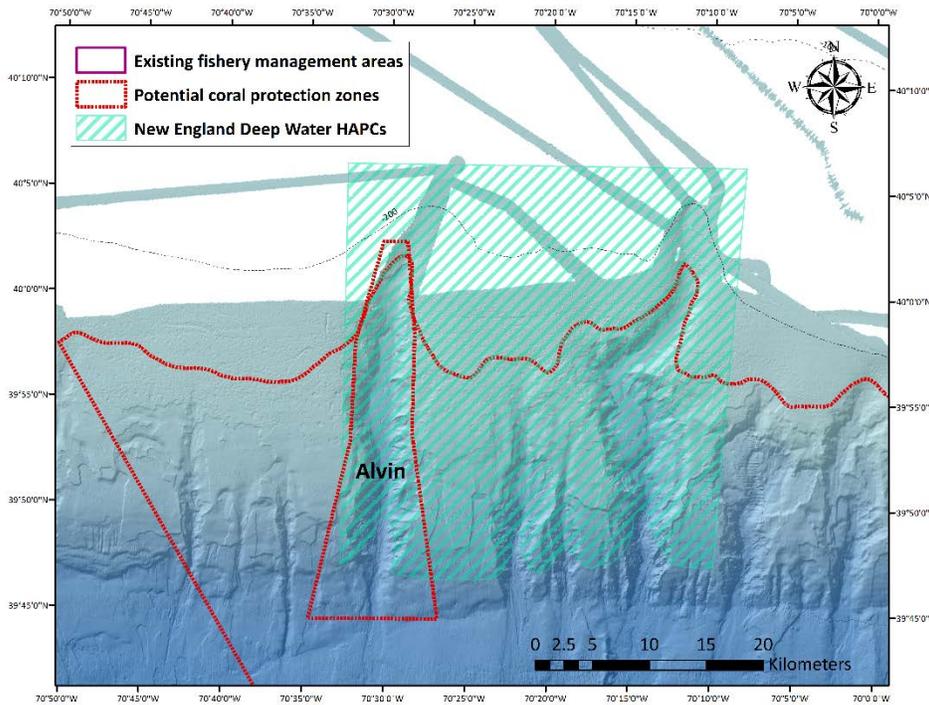
**Map 7 – Hydrographer Canyon discrete deep-sea coral protection zone. The overlapping HAPC (hatched) and 400m broad zone are shown for reference.**



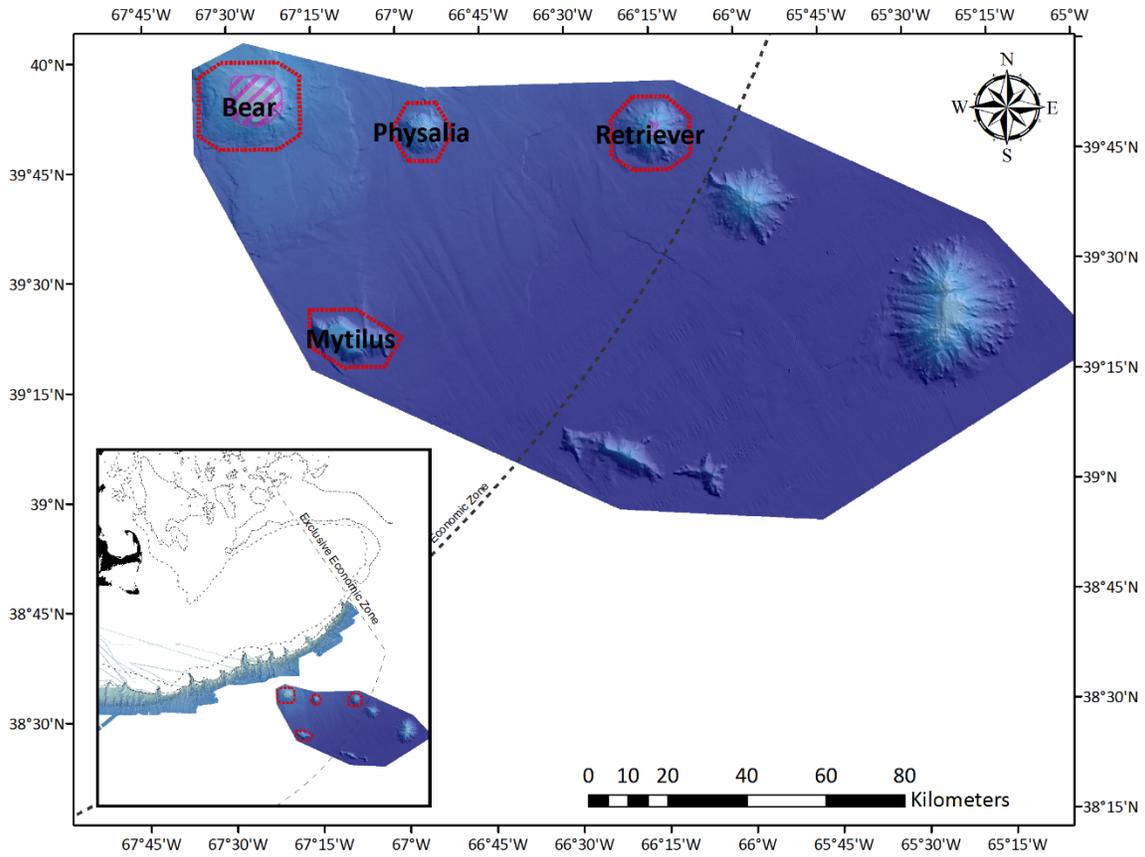
**Map 8 – Veatch Canyon discrete deep-sea coral protection zone. The overlapping HAPC (hatched) and 400m broad zone are shown for reference. The Tilefish GRA, which is closed to all mobile bottom-tending gears, is outlined in purple near the head of the canyon.**



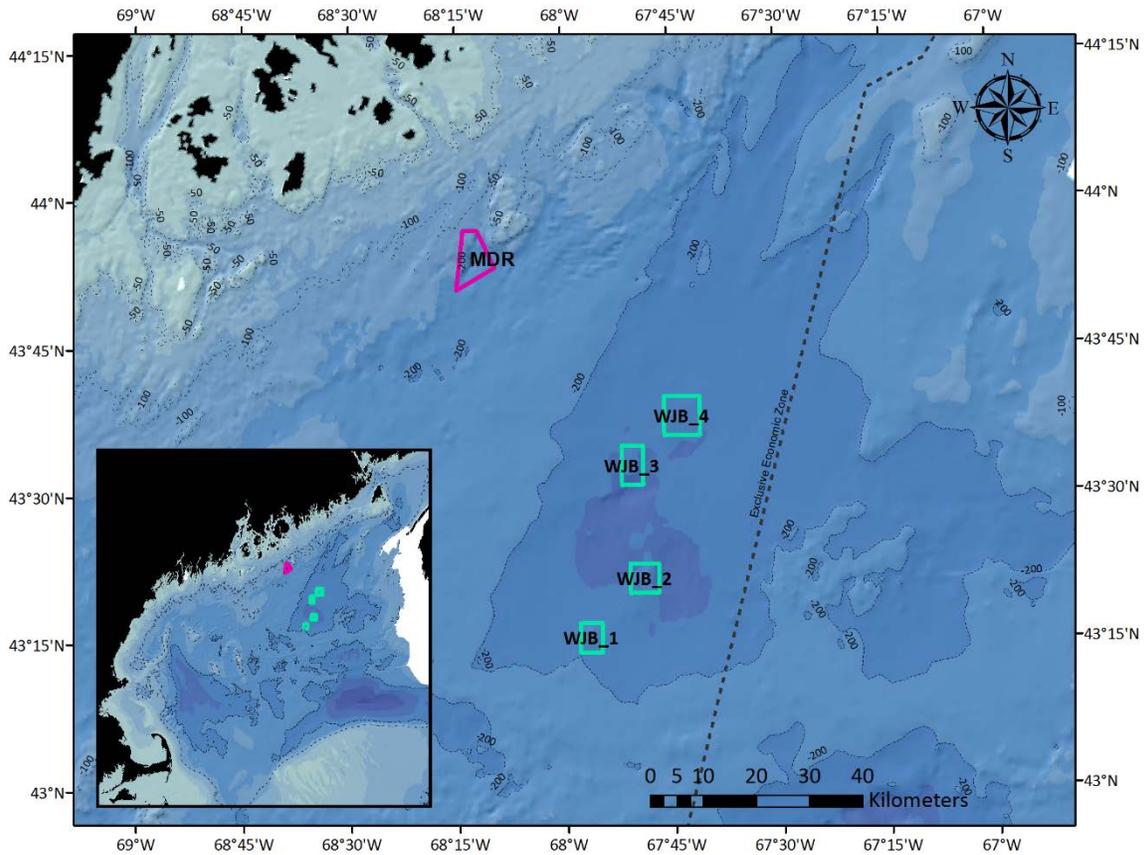
**Map 9 – Alvin Canyon discrete deep-sea coral protection zone. The overlapping HAPC (hatched) and 400m broad zone are shown for reference.**



**Map 10 – The four seamount deep-sea coral protection zones, Bear, Physalia, Retriever, and Mytilus. Note the HAPCs in the shallower areas of Bear and Retriever Seamounts in the pink cross hatching, which encompass areas shallower than 2000 meters. Additional seamounts shown are east of the EEZ boundary.**



**Map 11 – Mt. Desert Rock (labeled MDR) and Western Jordan Basin (labeled WJB\_1-WJB\_4) deep-sea coral protection zones.**



### 4.3 Management measures in broad and discrete coral zones

The following range of management measures would potentially apply to all coral zones. Different measures could be used in broad vs. discrete zones, or in different discrete zones, depending on the fisheries that occur there and the degree of precaution desired. Note that broad and discrete zones could be used in combination, with different types of measure applied in each. For example, a mobile bottom tending gear restriction could be applied across all zones, but exemptions to this restriction might only be allowed in the broad zone, not in the discrete zones.

#### 4.3.1 Fishing restriction options for coral zones

These options would determine the level of fishing restrictions applied to the coral zones.

##### 4.3.1.1 Prohibit bottom-tending gears

This option would prohibit the use of bottom-tending fishing gears in deep-sea coral zones, but would allow the use of gears that do not contact the seabed. Note that the lobster trap fishery, which is managed by ASMFC, would not be subject to this restriction.

**4.3.1.1.1 Suboption: Exempt the red crab fishery from coral zone restrictions**

This option would exempt the red crab fishery from bottom-tending gear restrictions, and could be applied to a broad zone and possibly also to the discreet zones.

**4.3.1.2 Prohibit us of mobile bottom-tending gears**

This option would prohibit the use of mobile bottom-tending fishing gears in deep-sea coral zones, but would allow the use of fixed gears and any gears that do not contact the seabed.

**4.3.2 Framework provisions for deep-sea coral zones**

These options would allow management measures for coral zones to be developed via framework action. Note that boundary issues, including creation of new coral zones, modification of the boundaries of existing coral zones, or removal of coral zones, would not be frameworkable.

**4.3.2.1 Option A: Change fishing restrictions**

This option would include changes to the types of fishing gears restricted from use in deep-sea coral zones.

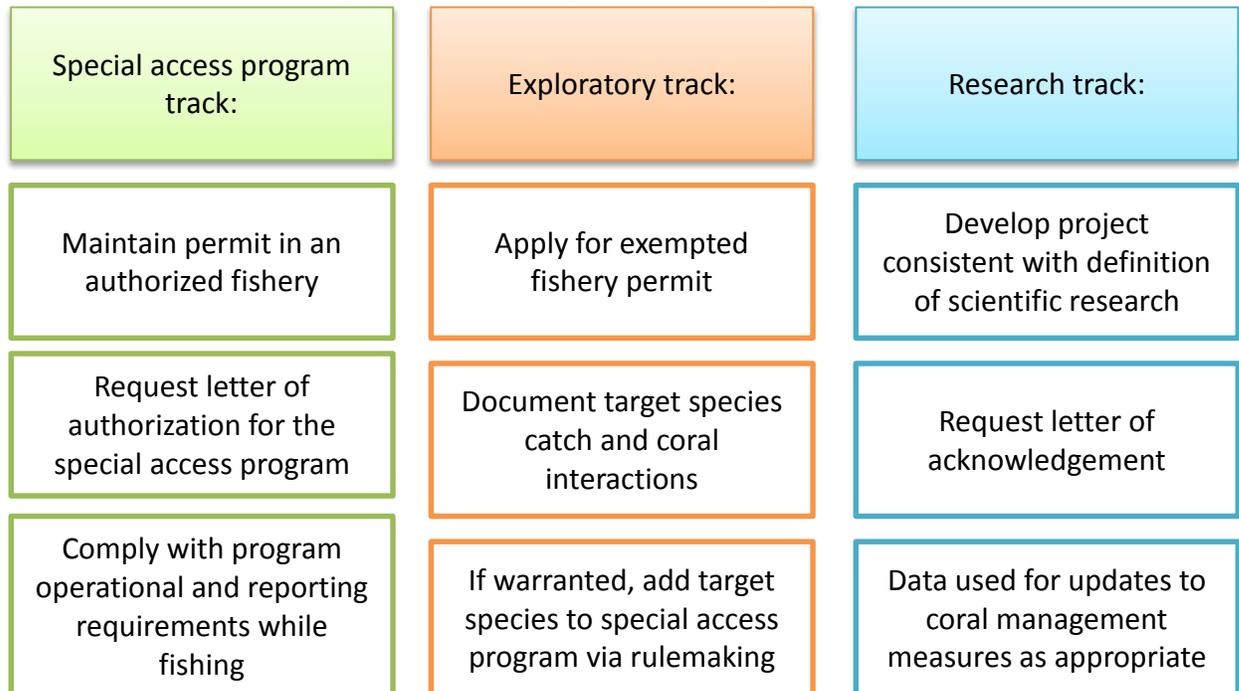
**4.3.2.2 Option B: Change exemption fishery requirements**

This would include changes to management measures associated with exemption programs, such as permit and observer requirements, and move-along provisions.

**4.3.3 Special Access Programs, exploratory fishing, and research in coral zones**

The Habitat Committee has expressed interest in developing an alternative that would allow for exempted or exploratory fishing in coral zones, and the Council approved this alternative for further development in April 2012. The PDT suggests that a distinction should be made between special access program fishing vs. exploratory fishing vs. research activities. The sections that follow outline considerations associated with each type of program, and ideas are drawn from existing special access programs in the groundfish, scallop, and herring fisheries, the exempted fishing permit process, and the Northwest Atlantic Fishery Organization exploratory fishing program.

**Figure 1 – Major elements of special access and exploratory fishing programs within coral zones**



**4.3.3.1 Special access program fishing**

This alternative would implement a special access program within some or all of the deep-sea coral zones. The objectives of the program would be as follows:

- (1) To allow for continued fishery access to some or all coral areas
- (2) To ensure that such fishing does not conflict with coral conservation objectives

This program would generate sufficient data to understand fishing distributions in coral zones, as well as interactions between fishing and corals. The intention here is to specify in detail the possible the operational requirements for a vessel that wishes to fish within a coral zone.

The main distinction between this program and a categorical exemption from gear restrictions for the red crab fishery (section 4.3.1.1.1) is that this program would have additional reporting requirements and possibly spatial restrictions, while the red crab

fishery operating under a categorical exemption would operate under current restrictions with no additional reporting requirements.

**Which vessels?** A program to allow fishing activities in specified deep-sea coral zones could potentially apply to any vessel that is restricted from operating in a particular coral zone according to the measures selected in section 4.3.1 (fishing restrictions in broad and discrete coral zones). This could include vessels fishing with any type of bottom tending gear, or only those fishing with with mobile bottom-tending gear, depending on the alternative selected. Alternatively, the Council could restrict participation in special access programs to vessels participating in specific fisheries.

**Which areas?** The Council would need to determine where special access program fishing would be allowed. Such activities could be authorized in all designated coral zones, or only in certain types of coral zones. For example, distinctions might be made between whether or not fishing is authorized in broad zones, discrete zones based on coral data and habitat suitability, and/or discrete zones based on habitat suitability only. Areas authorized for a special access fishery could vary by fishery to include only those areas fished currently or in the recent past. Sub-areas of broad zones might also be appropriate.

**Operational requirements:** When fishing in an exempted/special access fishing program in a coral area, vessel operators would be subject to additional requirements. These could include:

1. Gear requirements: The Council may wish to specify gear restrictions that are different from what is currently authorized under the various FMPs in order to better protect corals from fishing impacts. This could include limits on rollers or rockhoppers, for example.
2. Seasonal requirements: This is an element of some existing special access programs and is listed for completeness, but would probably not be necessary here. Corals are almost certain to be equally vulnerable to fishing impacts year round.
3. Total amount of effort or target species landings: The Council could specify the number of trips allowed for each vessel authorized in the special access program in order to limit the total amount of fishing that could occur in coral areas. Or, the Council could consider exemptions from certain fishery regulations when operating in coral zones. For example, trip limits might be counterproductive to conservation objectives if discarding occurs and additional bottom time is therefore required to land the same amount of the target species. Ensuring coral protection should remain the focus though. In the case of corals, effort limitation might not be a useful tool because the impact/recovery relationship is such that the initial impact is most damaging, such that any effort occurring in locations with lots of corals could be problematic from a conservation standpoint. This underscores the importance of only allowing special access fishing to occur in locations where interactions between that type of fishing and the coral types known or thought to occur would be minimal to begin with.

4. Move-along provision if any corals are caught: This type of provision would require the vessel to stop fishing if corals are encountered and move to a new location. The Council could specify a zero or non-zero threshold of coral bycatch that would trigger a move-along clause. NAFO has developed something similar, but apparently these types of thresholds are difficult to develop because coral catch rates vary by gear and area. Whether the threshold is zero or non-zero, this type of provision would require the vessel operator to be able to identify corals in the catch.
5. Coral retention requirement: Would require any corals caught to be retained and brought back to shore for analysis, to determine the species caught.
6. Reporting requirements:
  - a. For vessels that are equipped with one as a requirement of a fishery they participate in, use of a vessel monitoring system with half-hourly polling
  - b. Enhanced documentation of fishing location and catch. For each tow of mobile gear or set of fixed gear:
    - i. Start and end location and depth of all tows
    - ii. Catch weights by species, including target and non-target fishes and invertebrates identified to the lowest taxonomic level possible
    - iii. Alternatively, use an observer.
  - c. File fishing vessel trip reports as usual.

**Letter of authorization:** A special access program would likely require a letter of authorization. The fishing that would occur under the letters of authorization typically needs to meet a range of requirements. These types of information could be included in the request:

1. Vessel identifying information and point of contact
2. Must be filed by the application deadline. A deadline would need to be specified so that vessel owners would know how far in advance they need to request a letter of authorization. In the case of research-related exempted fishery permits, the project proponents are asked to apply 60 days before the permit is to be used. Requests could be submitted on a rolling basis, similar to research-related applications, or only within a certain window each year. If the latter option is selected, the deadline could be 60 days before the start of a particular fishing year, or the deadline might be the same for all fisheries (e.g. November 1 to take effect January 1 of the following year).
3. Target and incidental species expected to be harvested and discarded:
  - a. For species regulated under a federal FMP, it is assumed all size limits, possession limits, and trip limits would still apply. The vessel would need to have a permit to fish under that FMP and comply with any limitations associated with the category of permit held, unless the special access program rules are different.
  - b. For non-target/incidental species including corals and protected species, the application would need to specify a list of species that might be encountered and how catch of those species would be monitored and documented.

4. The vessel would need to be in good standing at the time the request is made. This means no open violations, must be current with reporting requirements, etc.
5. A description of any fishing gear to be used would be required. This would include roller gear or other sweep attachments on trawl vessels, number and size of traps in a string, type of line connecting traps in a string, etc. All gear would need to comply with existing regulations for use outside of coral areas.

#### **4.3.3.2 Exploratory fishing**

This alternative would implement an exploratory fishing program within some or all of the deep-sea coral zones. The objectives of an exploratory program would be as follows:

- (1) To allow for exploration of the feasibility (technological, economic) of new fisheries
- (2) To collect data that indicate whether the new fishery conflicts with coral conservation objectives

Steps in the exploratory fishing process would be as follows:

1. Apply for an exempted fishing permit and letter of authorization to conduct research/exploratory fishing
2. Document feasibility of the fishery including evidence that the fishery does not compromise coral conservation objectives
3. Longer term, as appropriate, add the target species to the list of special access program species via rulemaking

**Which vessels?** Presumably, any vessel could apply for an exploratory fishing permit, whether they were currently permitted to operate in regional fisheries or not.

**Which areas?** As above, the Council would need to determine where exploratory fishing activity would be allowed. Such activities could be authorized in all designated coral zones, or only in certain types of coral zones. For example, distinctions might be made between whether or not exempted/exploratory fishing is authorized in broad zones, discrete zones based on coral data and habitat suitability, and/or discrete zones based on habitat suitability only.

**Operational requirements:** When fishing under an exploratory fishing permit in a coral area, vessel operators could be subject to requirements, similar to those for special access fisheries, above. The Regional Administrator would have the discretion to grant exempted permits as he or she saw fit, but the Council could provide guidance as to the types of activities that they would consider appropriate.

1. Gear requirements
2. Seasonal requirements (again, probably not necessary)
3. Total amount of effort permitted
4. Move-along provision if any corals are caught
5. Coral retention requirement

6. Reporting requirements:
  - a. Vessel monitoring system if equipped
  - b. Scientific personnel or NEFOP observer
  - c. Enhanced documentation of fishing location and catch. For each tow of mobile gear or set of fixed gear:
    - i. Start and end location and depth of all tows
    - ii. Catch weights by species, including target and non-target fishes and invertebrates identified to the lowest taxonomic level possible

**Permit requirements:** An application for an exempted fishing permit to conduct market research/exploration could include the following elements. Additional details about these elements are provided above in the special access program section. The Regional Administrator would maintain final discretion regarding the approval of exempted fishing permits. Table 3 contains additional information about exempted fishing permits and other types of research documents. While exploratory fishing activities would not constitute scientific research, some of the requirements of an exempted fishing permit application are appropriate to an exploratory fishing program within deep-sea coral zones.

1. Vessel identifying information and point of contact.
2. Must be filed by the application deadline.
3. Target and incidental species expected to be harvested and discarded:
  - a. Species regulated under a federal FMP
  - b. Non-target/incidental species including corals and protected species
  - c. For target exploratory species not regulated under a federal FMP, the application would need to summarize all available information about the distribution of the species, provide a brief rationale as to why the species is of exploratory fishing interest, and whether or not the species would be retained for sale.
4. The vessel would need to be in good standing
5. A description of any fishing gear to be used

#### **4.3.3.3 Experimental/research activities**

Finally, a third category of activities that might occur in corals zones is scientific research. This type of work would need to fall under the definition of scientific research (see below) and a letter of acknowledgement (distinct from a letter of authorization) would be required. A letter of acknowledgement would be useful to help NMFS and the Council keep track of research activities that may be occurring in coral zones, the results of which could benefit future management decisions.

#### **4.3.3.4 Description of research-related documents currently issued**

Presently, four types of documents are issued by the Northeast Regional Office to vessels participating in scientific research projects: an exempted fishing permit, a temporary possession permit, an exempted educational activity authorization, and/or a letter of acknowledgement (Table 3). Some or all of this information could be requested from special access program participants, exploratory fishing activities, or research activities.

Exemptions that are never granted in research context are exemptions from landing fish smaller than the minimum size limit, permit or reporting requirements, or quotas. Exemptions from these regulations would likely not be appropriate in coral areas, either. Also, exempted permits for research projects are not granted when the research objective is to develop a special access program within a closed area during specified peak spawning periods. This issue would not apply to exempted fishing in the coral zones. Finally, exemptions are never granted that would allow fishing by mobile bottom tending gear in a habitat closed area. An exemption program in coral areas would potentially need to be different in this regard.

In a research context, other types of exemptions are sometimes granted, but receive greater scrutiny. These include applications to fish in the parts of year round closed areas that are not habitat closures, outside of peak spawning periods; exemptions from DAS programs or limits; exemptions from trip or possession limits; exemptions from measures designed to reduce takes of protected species; and exemptions from landing but not selling fish below a minimum size. It doesn't seem that granting these types of exemptions would be necessary for vessels wishing to fish in coral zones.

**Table 3 – Types of research documents issued by NERO. Summarized from Research Documentation: Exempted Fishing Permits, Temporary Possession Permits, Exempted Educational Activity Authorizations, and Letters of Acknowledgement. Updated 23 November 2010, available at <http://www.nero.noaa.gov/permits/>.**

**Exempted Fishing Permit:** Authorizes a fishing vessel of the United States to conduct fishing activities that would be otherwise prohibited under the regulations at 50 CFR part 648 or part 697. Generally issued for activities in support of fisheries-related research, including seafood product development and/or market research, compensation fishing, and the collection of fish for public display. Anyone that intends to engage in an activity that does not meet the definition of scientific research but that would be otherwise prohibited under these regulations is required to obtain an EFP prior to commencing the activity.

**Temporary Possession Permit:** Temporary Possession Permits authorize a federally permitted fishing vessel that is accompanied by an eligible research technician to temporarily retain fish that are not compliant with applicable fishing regulations for the purpose of collecting catch data. Example regulations include minimum fish sizes, species under quota closures, and fish possession limits. All non-compliant fish are returned to the sea as soon as practicable following data collection.

**Exempted Educational Activity Authorization:** An EEAA is a permit issued to accredited educational institutions that authorize, for educational purposes, the target or incidental harvest of species managed under an FMP or fishery regulations that would otherwise be prohibited.

**Letter of Acknowledgement:** An LOA is a letter that acknowledges certain activities as scientific research conducted from a scientific research vessel. Scientific research activities are activities that would meet the definition of fishing under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), but for the statutory exemption provided for scientific research. Such activities are exempt from any and all regulations promulgated under the Magnuson-Stevens Act, provided they continue to meet the definition of scientific research activities conducted from a scientific research vessel. Although the LOA is not required for scientific research, obtaining an LOA serves as a convenience to the researcher, the vessel(s), NMFS, the NOAA Office of Law Enforcement, and the U.S. Coast Guard, to establish that the activity is indeed exempt from the provisions of the Magnuson-Stevens Act.

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To meet the definition of a scientific research vessel the vessel must be conducting a scientific research activity and be under the direction of an appropriate group, e.g. a government agency, university or accredited educational institution, etc.

Scientific research activity includes, but is not limited to sampling, collecting, observing, or surveying the fish or fishery resources within the EEZ. Research topics include taxonomy, biology, physiology, behavior, disease, aging, growth, mortality, migration, recruitment, distribution, abundance, ecology, stock structure, bycatch or other collateral effects of fishing, conservation engineering, and catch estimation of fish species considered to be a component of the fishery resources.

## **5 Considered and rejected alternatives**

In June 2015, the MAFMC approved coral management zones for their region through Amendment 16 to the Atlantic Mackerel/Squid/Butterfish FMP, and is in the process of submitting the amendment to NMFS. Earlier versions of the NEFMC alternatives, which were developed prior to initiation of the MAFMC amendment, included areas with the MAFMC region. The NEFMC coral zone alternatives were modified to remove areas south of the NEFMC/MAFMC boundary, including the Mey-Lindenkohl slope, Baltimore Canyon, Norfolk Canyon, Emery Canyon, Hudson Canyon, Toms Canyon, Lindenkohl Canyon, Wilmington Canyon, Accomac Canyon, and Washington Canyon.

A broad coral zone with a landward boundary based on the 200 m depth contour was considered by the Habitat Committee and rejected, due to concerns about potential fishery impacts of a zone extending into these relatively shallower depths.

Larger discrete coral zones in the Gulf of Maine were not recommended for further analysis at the April 6, 2012 Committee meeting:

- An expanded version of the Mt Desert Rock zone that extended into similar depths and habitats, and also included some shallower areas within state waters
- Larger areas combining areas 1 and 2 and areas 3 and 4 in Western Jordan Basin, that would have encompassed a wider range of deeper and shallower habitat types

The PDT evaluated the following additional canyon and slope areas as possible discrete coral zones, but did not recommend them to the Habitat Committee. The Committee concurred with the PDT's assessment and did not ask for further analysis of these options at their February 23, 2012 meeting. Note that some of these canyons are in the mid-Atlantic region, and have subsequently been evaluated by the MAFMC and their coral FMAT.

- Slope near U.S. – Canadian border
- Slope between Veatch and Hydrographer Canyons
- Slope west of Alvin and Atlantis Canyons
- Slope area between Baltimore and Accomac canyons
- Canyons not recommended based on GIS analysis: Chebacco, Filebottom, Sharpshooter, Dogbody, Shallop, Nantucket, Atlantis, Block, McMaster, Ryan Canyon, Uchupi, and Spencer Canyons
- Canyons not recommended, did not incise shelf enough to conduct GIS analysis: Clipper, South Wilmington, North Heys, South Vries, Warr, Phoenix, and Leonard Canyons

## **6 Description of the affected environment**

### **6.1 Physical setting**

#### **6.1.1 Gulf of Maine**

#### **6.1.2 Continental slope, canyons, and seamounts**

### **6.2 Coral diversity and distribution**

#### **6.2.1 Gulf of Maine**

#### **6.2.2 Continental slope, canyons, and seamounts**

### **6.3 Coral vulnerability to fishing impacts**

### **6.4 Fishery resources**

#### **6.4.1 Gulf of Maine**

#### **6.4.2 Continental slope, canyons, and seamounts**

### **6.5 Fisheries and fishing communities**

#### **6.5.1 Gulf of Maine**

#### **6.5.2 Continental slope, canyons, and seamounts**

### **6.6 Protected resources**

## **7 Environmental impacts of the alternatives**

## **8 Cumulative effects analysis**

## **9 Compliance with the Magnuson Stevens Fishery Conservation and Management Act**

## **10 Compliance with the National Environmental Policy Act**

## **11 Relationship to other applicable laws**

## **12 References**

### **12.1 Glossary**

### **12.2 Literature cited**

Puglise, K. and R. Brock (2003). NOAA and deep-sea corals: background, issues, and recommendations. Unpublished work. National Oceanic and Atmospheric Administration. Silver Spring, MD: 8p.

### **12.3 Index**