New England Fishery Management Council
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Habitat Area of Particular Concern Candidate Proposal Submission Form

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Title of HAPC Proposal: New England Seamounts and Deep-Sea Corals

Abstract / Brief Statement of Proposal:

Seamounts are rare and special ecosystems that provide habitat for species that are vulnerable to fishing pressure because they are long-lived and slow to mature. Initial exploration of seamounts suggests that as many as a third of species found there are unique to seamounts or are rare in other marine ecosystems (De Forges et al. 2000). Volcanic activity has formed a chain of seamounts across the Atlantic that include the seamounts in this proposal.

Seamounts are coming under increased fishing pressure with the development of new fishing technology that allows bottom trawlers to fish at greater depths (Stone et al. 2003). To prevent loss of this refuge for slow-growing fish and corals, the New England seamounts within the United States Exclusive Economic Zone ("EEZ") should be designated as essential fish habitat ("EFH") and protected by a Habitat Area of Particular Concern ("HAPC") that includes the Bear, Physalia, Retriever, and Mytilus seamounts. The use of bottom-tending mobile gear that disrupts seamount habitat should be prohibited in this HAPC.

Coordinates of Candidate HAPC (Please provide in latitude and longitude to the scale of degree/minutes/seconds or decimal degrees):

The proposed boundary for this HAPC is as follows: northwest corner at 40.16^{o} N, 68.00^{o} W; southwest corner at 39.16^{o} N, 68.00^{o} W; northeast corner at 40.16^{o} N, 65.86^{o} W (longitude of the EEZ boundary); southeast corner at 39.16^{o} N, 66.63^{o} W (longitude of the EEZ boundary) (Auster HAPC 2005). See Figure 1, below.

Signature of Primary Proposer or Representative: __*Valerie Suzdak*_____

Date: 12 May 2005

Topic 1: Brief Statement of Proposal

New England Seamounts and Deep-Sea Corals

Seamounts are rare and special ecosystems that provide habitat for species that are vulnerable to fishing pressure because they are long-lived and slow to mature. Initial exploration of seamounts suggests that as many as particularly a third of the species found there are unique to seamounts or are rare in other marine ecosystems (De Forges et al. 2000). Volcanic activity has formed a chain of seamounts across the Atlantic that include the seamounts in this proposal.

Seamounts are coming under increased fishing pressure with the development of new fishing technology that allows bottom trawlers to fish at greater depths (Stone et al. 2003). To prevent the loss of this refuge for slow-growing fish and corals, the New England seamounts within the United States Exclusive Economic Zone ("EEZ") should be designated as essential fish habitat ("EFH") and protected by a Habitat Area of Particular Concern ("HAPC") that includes the Bear, Physalia, Retriever, and Mytilus seamounts. The use of bottom-tending mobile gear that disrupts seamount habitat should be prohibited in this HAPC.

Topic 2: Objectives of Proposal

This proposal would protect the New England Seamounts, Bear, Physalia, Retriever, and Mytilus, from any mobile commercial fishing gear that intentionally or inadvertently touches the bottom. The proposal would benefit habitat by protecting its physical structure and ecological function.

Seamounts support ecological communities with a high level of biodiversity that includes deep-sea corals and a wide array of ocean species that rely on them. Deepwater corals, sponges, and their associated communities provide essential fish habitat for seamount species in the form of shelter from predators, increased food, nurseries, and spawning areas. Corals are extremely sensitive to disturbance, especially from bottom-tending fishing gear. While these seamounts are not currently fished, the Council has an important and limited opportunity to protect this habitat before it is disturbed.

Topic 3: Justification for Council Action

International Recognition of Seamounts

Across the world, nations are beginning to recognize that seamounts need protecting from the impacts of bottom trawling. Tasmania has protected 14 seamounts and New Zealand has protected 19. The Galapagos Islands have 24 protected seamounts (Alder and Wood 2004).

Seamounts in U.S. waters have also been protected as vulnerable and important habitat for many species (Johnston and Santillo 2004). In February 2005 the North Pacific Council took action that designated 16 seamounts in the EEZ off the coast of Alaska as HAPC. No bottom contact fishing gear is allowed in the HAPC. This action requires

approval by the Secretary of Commerce to be implemented in August 2006 (NPFMC 2005). The Northwestern Hawaiian Islands have the largest area of protected seamounts at 341,000 km² and 66 seamounts.

Recognition of New England Seamounts as Essential Fish Habitat

In New England, there has been confusion over the authority of the council to protect these sensitive areas as HAPCs. These areas should be designated as EFH under the authority of the Red Crab and Northeast Multispecies ("Groundfish") FMPs. In the alternative presented here, the Council and the agency have the authority to amend the Fishery Management Units ("FMU"s) under their jurisdiction to include and protect seamount species and habitat.

Oceana proposes that the Council recognize that Bear and Physalia Seamounts are EFH for red crab (*Chaceon quinquedens*). The Council defines the geographic range of this species from the Norfolk canyon in the south to the Hague Line in the north, which includes the seamount area. In July 2002, red crab was caught on Bear seamount during trawl surveys conducted by Moore and colleagues. Bear Seamount's close proximity to the continental slope allows the potential for species to cross easily between the two (See Figure 2 below).

Bear seamount's temperature ranges between 15°C at 200 meters to 3°C at 1100 meters. Over Bear seamount the temperature peaked at 24°C. These temperatures fall within the EFH designations for the red crab. The depth for red crab larvae, juveniles and adults is from 200-1800 meters. Bear seamount rises to 1100 meters and Physalia to 900 meters. Bear seamount is also home to several species that red crabs prey on such as sponges, hydroids, polychaetes, myctophids and *Nezumia* (Moore et al. 2003B, Moore et al. 2004 and Steimle et al. 2001).

The inclusion of sponges, hydroids and tunicates in their diet suggests that red crabs prey upon epifauna attached to solid surfaces (Steimle et al. 2001 referencing Farlow 1980). Other New England seamounts are not well-studied but seamounts are known to be "stepping stones" for species dispersal (Gubbay 2003) and Physalia seamount, which is next to Bear seamount, should therefore also be considered for EFH designation.

The Council also has the authority to protect these seamounts as HAPC because they are part of the Northeast Multispecies ("Groundfish") FMU (Fishery Management Unit). Section 2.4.5 of the 1998 Omnibus Habitat Amendment provides that:

> The management unit for the Northeast Multispecies FMP is the multispecies (finfish) fishery that occurs from eastern Maine through southern New England, encompassing all commercial and recreational harvesting sectors in New England and all fish species that factor into a fishery within a trip, from trip to trip and from season to season, except those species that are subject to other fishery management plans under the Magnuson-Stevens Fishery Conservation and Management Act.

By specifying that the FMU includes "*all fish species that factor into a fishery . . .*" the definition sweeps in all fish species that groundfish vessels might catch. Because the groundfish fishery may expand out to seamounts in the future, groundfish vessels might catch deep-sea corals and other members of the seamount community. Therefore, these species are part of the FMU.

Figure 2. (Moore et al. 2003A)

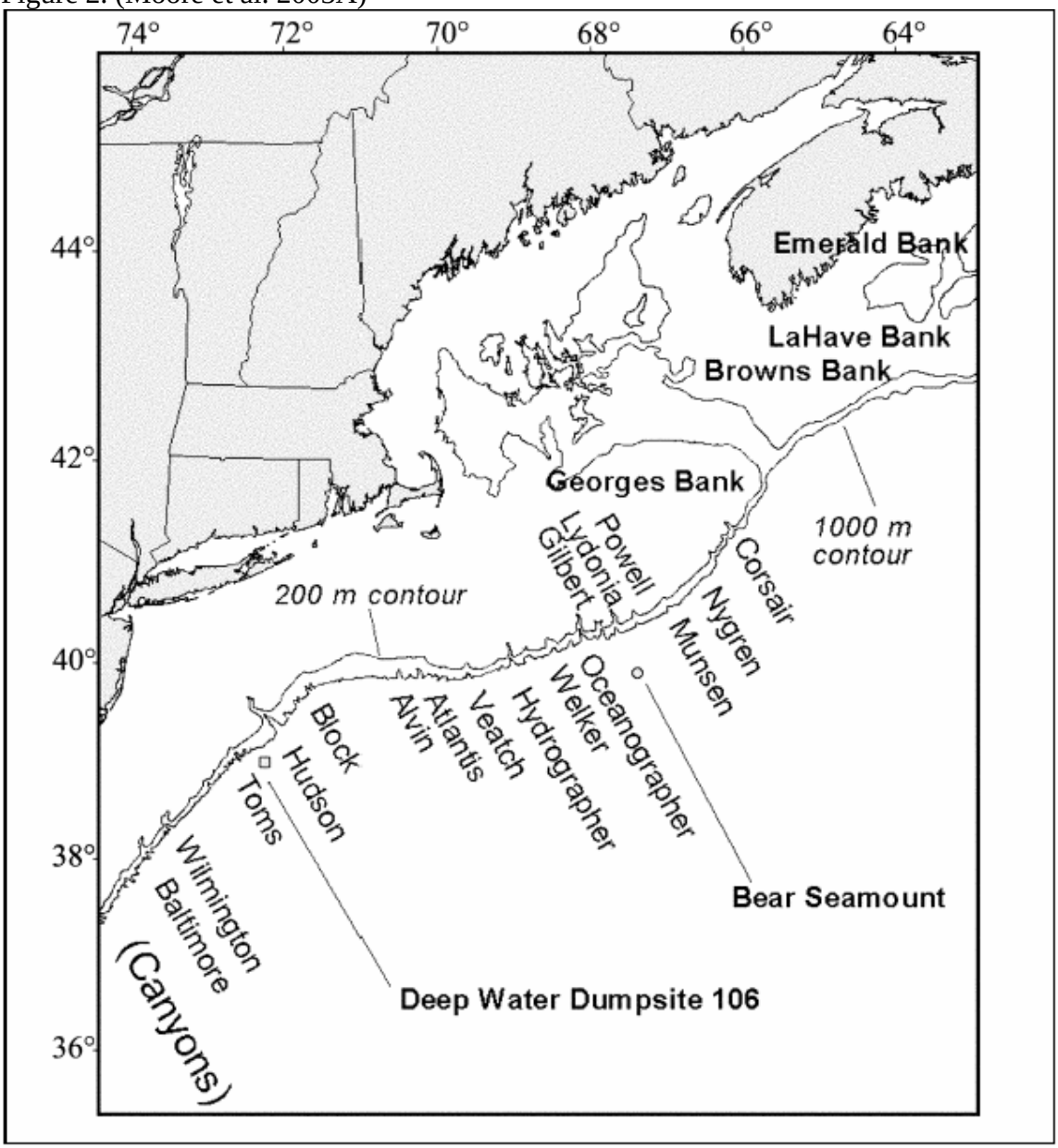


Figure 1. Principal area of study showing named undersea features in this report and the 200 and 1000 meter contour lines.

Since seamount species are part of the FMU, the agency has the authority to identify EFH for them. 50 C.F.R. § 600.805(b)(1). Oceana proposes that as part of the second Omnibus Habitat Amendment, the Council identify EFH for deep-sea corals and associated species in the seamount proposal areas, and then protect this EFH as HAPC.

Furthermore, because the scope of the current Omnibus Amendment extends to all habitat-related facets of FMPs under the Council's jurisdiction, it is within the scope of the amendment to adjust FMUs, as necessary, to include seamounts. The broad definitions of *fish*, *fishery*, and *fishing* set forth in the Magnuson-Stevens Act, 16 U.S.C. §§ 1802(12)-(13), (15), as well as the broad definition of FMU set forth in the agency's regulations, 50 C.F.R. § 600.10, grant the Council ample authority to include in the FMU any species that may be encountered by vessels fishing under the jurisdiction of one of its FMPs, designate EFH for that species, and create a HAPC.

Criterion 1B: Importance of *Current* Ecological Function

Oceana is proposing that the New England Seamounts, Bear, Physalia, Retriever, and Mytilus be designated EFH for deep-water species and that the seamounts be protected as HAPC. This section describes the importance of the current ecological function and strong evidence for designation as EFH.

While the Council has not yet designated the seamounts as EFH (except for EFH for red crab), it is appropriate to reconsider that omission in the current rulemaking. Prior EFH designations were arbitrarily limited to the depth of NMFS trawl surveys. These arbitrary cutoffs should not restrict EFH designations. Because an area is not designated EFH does not mean it is not of significant importance for marine species. The best available scientific evidence shows that seamounts are EFH for deep-water species. Because of their important ecological function, especially for endemic species, the New England seamounts satisfy the criteria for EFH designation set forth at 50 C.F.R. § 600.815(a)(1) and should be so designated.

Seamounts support diverse communities of benthic fauna that create **essential habitat** for deep-sea fishes and crustaceans (Moore et al. 2003B). Many species found on seamounts are either endemic or located on only a few seamounts (Stocks 2004). Seamounts typically host assemblages of benthic fauna that are distinct from surrounding slope areas (Koslow et al. 2000).

Moore et al. (2003B) completed 20 hauls on Bear Seamount in December 2000 from the NOAA vessel R/V Delaware II. The study found several rare species including species of fish that were thought to not exist in the Northwest Atlantic. Table 1.0 (below) shows the species found on Bear Seamount previously thought to be at least 1500 km away.

From the combined trawl surveys several hundred species have been documented to live on or above Bear Seamount. Table 1.1 (below) is a sample of some of the species found on the seamount. Appendix I and II provide a full list of species found in the surveys.

Bear seamount is home to the cold water reef-building coral, *Lophelia pertusa*. Several species closely associated with *Lophelia*, including the octocoral *Swiftia* and polychaete tubeworms, were observed as well. *Lophelia* has been associated with highly diverse habitats across the north Atlantic (Jensen and Frederiksen 1992; Mortensen et al. 1995; Rogers 1999). Bear Seamount provides such unique habitat and conditions that it supports species that are not generally associated with the nearby Continental Slope (Moore et al. 2003B). Seamounts have a distinct benthic fauna which is dominated by

scleractinian, antipatharian and gorgonian corals (Koslow et al. 2000). Based on the findings at Bear Seamount, the New England seamounts provide an important ecological function as hotspots of biodiversity and home to several coral species, which provide shelter and appropriate spawning sites for a wide range of marine life.

Table 1.0 Species found on Bear Seamount (Moore et al. 2004)

Species Scientific Name	**Common Name**	**Nearest Known Location (at least 1500 km from Bear Seamount)**
Hydrolagus pallidus	Chimaera	Eastern Atlantic
Bathypterios dubios	Spiderfish	Eastern Atlantic
Diastobranchur capensis	Cutthroat Eel	Southern Hemisphere
Syscenus atlanticus	Isopod	Iceland
Apristurus microps	Smalleye Catshark	Eastern Atlantic or Grand Banks
Normichthys operosus	Multipore Searsid	Eastern Atlantic or Grand Banks
Heterophotus opisthoma		Florida
Gigantura indica	Telescope Fish	Florida
Stemnosudis rothschildi		Caribbean
Stylephorus chordate	Tube-Eye	Florida
Brotulotaenia crassa	Violet Cuskeel	Bahamas or Corner Rise
Bathygadus favosus		Florida
Coryphaenoides guentheri	Gunther's Grenadier	Eastern Atlantic
Nezumia suilla		Cuba
Gaidropsarus argentatus	Arctic Rockling	Grand Banks
Gyrinomimus n.sp.	Whalefish	Caribbean
Epigonus telescopus	Bulls-Eye	Eastern Atlantic or Corner Rise
Kali indica		Gulf of Mexico

Multiple coral species have also been found on the New England Seamounts. These species are known for being long-lived and once destroyed do not easily regenerate. According to Koslow et al. (2000), "The risk of severe depletion, and even extinction, of elements of the benthic fauna is increased by their highly specific habitat requirements, localized distributions and high levels of endemism."

The New England Seamount chain is perpendicular to two major currents, the Deep Western Boundary Current and the Antarctic Bottom Water. Because seamounts change the flow of currents around them, they may affect the aggregations of benthic and pelagic organisms (Moore et al. 2003B). Koslow et al. (2000) emphasized that "the benthic fauna of seamount is typically distinct from that found on the surrounding seafloor, because the intensification of currents leads to a fauna dominated by suspension feeders, including scleractinian, antipatharian and gorgonian corals."

Table 1.1 Additional species found on Bear Seamount
(Moore et al. 2003B, Moore et al. 2004)

Species Scientific Name
Lophelia Pertusa
Vaughanella margaretata
Paragorgia sp.
Polychaete in tubes within Lophelia
Ophiomusium lymani
Gorgonian
Porcellanaster ceruleus
Caryophyllia ambrosia ambrosia
Swifta
Serrivomer beanie
Sigmops elongatum
Chauliodus sloani
Photostomias guernei
Myctophidae
Ceratoscopelus warmingi
Diaphus dumerili
Hygophum hygomii
Lepidophanes guentheri

The long chain of New England seamounts may connect fish populations across the Atlantic by providing isolated patches of essential habitat that serve as "stepping stones" (Gubbay 2003, Moore et al. 2004). As seen in Figure 2.0, several deep-sea fish that were previously found only in the eastern Atlantic the chimaera *Hydrolagus pallidus* and the spiderfish *Bathypterios dubios* are also found on Bear Seamount.

Fish appear to aggregate on seamounts, possibly because of particular current patterns and higher concentrations of zooplankton than in surrounding waters (Johnston and Santillo 2004, Rogers 1994). Seamounts are prominent features in the seafloor topography that attract disproportionate numbers of large predatory fish compared to other open ocean ecosystems (Worm et al. 2003, Rogers 1994).

Criterion 2: Sensitivity to Anthropogenic Stresses

The expansion of deep-sea fishing threatens cold-water corals and seamount ecosystems. The Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern United States in 2001 agreed with the conclusions of many scientists worldwide- trawling causes significant impacts on benthic habitat. The moving of boulders from otter trawls and the destruction of biological structures were of greatest concern because the effects could last for years. The panel concluded that "the most significant potential effects of otter trawls identified included long-term changes in bottom structure and long-term changes in benthic trophic function or ecosystem function."

The NRC report (2002) on bottom trawling stated: "Many studies indicate that stable communities of low mobility, long-lived species are more vulnerable to acute and chronic physical disturbance [trawling] than are communities of short-lived species in changeable environments. Habitat complexity is reduced by towed bottom gear that removes or damages biological and physical structures. The extent of the initial effects and the rate of recovery depend on the stability of the habitat. The more stable biogenic, gravel, and mud habitats experience the greatest changes and have the slowest recovery rates."

Seamount ecosystems experience low levels of natural disturbance and are highly susceptible to anthropogenic stresses. Seamounts have complex concentrations of suspension feeding invertebrates such as gorgonians and sponges that are highly vulnerable to physical disturbances from mobile fishing gear. Trawling in deep-water ecosystems can severely affect benthic fauna because of the accidental removal of fauna as bycatch or the destruction of fauna as trawling gear sweeps by (Koslow et al. 2000). Experimental trawling on seamounts showed that unfished areas had 106% more biomass and 46% greater species diversity (Koslow et al. 2001). The impact of fishing on these habitats gives cause for great concern (Moore et al. 2003B).

Long-lived fish and invertebrates are found on seamounts and are especially susceptible to overfishing. The roundnose grenadier, caught in four stations on Bear Seamount during the Moore et al. (2003B) dive, can live as long as 70 years and does not mature until approximately 14 years old (Roberts 2002).

Criterion 3: Extent of Current or Future Development Stresses

As bottom trawlers are able to reach into deeper waters, they threaten New England seamounts. Bottom trawling in Georges Bank disturbed the gravel substrate causing the area to have less emergent epifauna, small fish, and brittle stars (Collie et al. 2000). Forty percent of the trawling in the world occurs in waters deeper than the continental shelves (Johnston and Santillo 2004). A study of Tasmanian seamounts found that 95% of the bottom was bare rock in a heavily fished area, compared to only 10% on an unfished seamount (Koslow et al. 2000). If the fragile and long-lived species that are unique to seamounts are destroyed it will take hundreds of years to regenerate – if ever. While currently there is no bottom trawling occurring on the New England seamounts, it is important to protect them for their ecological value.

Criterion 4: Rarity of the Habitat Type

There are only four seamounts located in the EEZ in New England waters: Bear, Physalia, Retriever, and Mytilus. These seamounts are part of a chain that stretches across the North Atlantic Ocean. The chain also includes additional New England Seamounts beyond the EEZ, Corner Rise seamounts, the mid-Atlantic Ridge and the Azores. The New England Seamount chain has thirty major volcanic peaks starting from Georges Bank to the eastern end of Bermuda. Very few seamounts are found in U.S. waters of the Northwest Atlantic.

Seamounts host biological communities that are notably different from those found in neighboring areas of the continental shelf and slope (Boehlert 1987, Rogers 1994, Worm

et al. 2003). Marine life that is rare in other ocean regions may rely on the highly diverse habitats found on seamounts (Boehlert 1987). These habitats offer rare combinations of depth, light levels, currents, and food availability that support unique assemblages of species. Even adjacent seamounts can host different species with highly localized distributions (De Forges et al. 2000).

Topic 4: HAPC Boundary (Maps)

Coordinates of Candidate HAPC (Please provide in latitude and longitude to the scale of degree/minutes/seconds or decimal degrees):

The proposed boundary for this HAPC is as follows: northwest corner at 40.16^{o} N, 68.00^{o} W; southwest corner at 39.16^{o} N, 68.00^{o} W; northeast corner at 40.16^{o} N, 65.86^{o} W (longitude of the EEZ boundary); southeast corner at 39.16^{o} N, 66.63^{o} W (longitude of the EEZ boundary) (Auster HAPC 2005). [Figure 1 (next page)]

Topic 5: Supportive Data

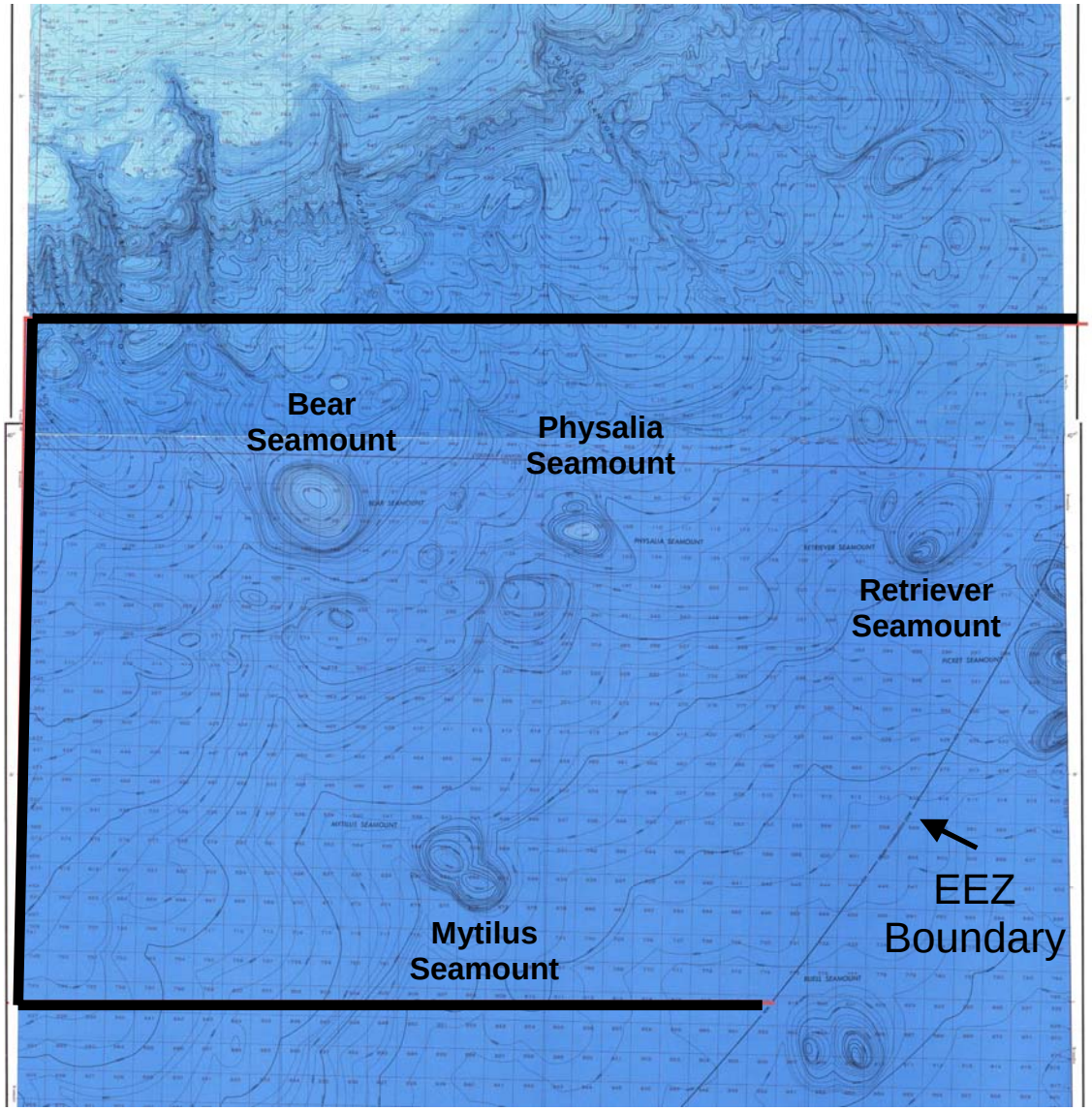
See references below.

Topic 6: Potential and Existing Threats

The main threat to seamounts and deep-water corals is bottom trawling. Although there is currently no fishing on the New England seamounts, this type of destructive fishing practice threatens to destabilize essential seamount ecosystems and the array of benefits they provide to marine species.

Moore et al. (2004) observed that "commercial fishers, however, have considered these seamounts as potential sites for fishery resources, such as orange roughy, and proposed exploratory fishing of these seamounts." Roundnose grenadier, a commercially fished species in other parts of the world has been found on Bear seamount, indicating the potential for these seamounts to be opened to commercial fishing.

Figure 1. Location map of the proposed New England Seamounts HAPC. The map is based on NOAA Bathymetric maps NOS NJ 19-3 (Bear Seamount) and NOS NK 19-12 (Lydonia Canyon) (Auster HAPC 2005).



Discretionary Topics

Foreseeable Impacts of Proposal

New England Seamounts should be closed to all types of bottom-tending mobile gear. This prohibition would protect essential fish habitat and fragile deep-sea corals against the threat of future fishery expansion, with no immediate economic impact as there is no bottom trawling currently occurring in the HAPC area.

Alternatives

A. Using Discretionary Authority to Protect the Seamounts and Deep-Sea Corals

Epifauna on seamounts is dominated by suspension feeders, which are mainly deep-sea corals (Auster et al. 2005). The Council can protect deep-sea corals and seamounts as habitat under the Magnuson-Stevens Act even without considering seamount species as part of the FMUs regulated by the NEFMC. This alternative for seamount protection would be similar to the action taken by the Council in Monkfish Amendment 2 to protect Lydonia and Oceanographer canyons. Under 50 C.F.R. § 600.805(b)(1) – "An FMP may describe, identify and protect the habitat of species not in an FMU; however, such habitat may not be considered EFH for the purposes of section 303(a)(7) and 305(b) of the Magnuson-Stevens Act."

NMFS supported this authority in its Response to Comments on the EFH regulations:

> Comment C: One commenter said that NMFS should delete from Sec. 600.805(b) the language saying that a Council may describe, identify, and protect the habitat of species not in a fishery management unit, but such habitat may not be considered EFH. The commenter said that under the Magnuson-Stevens Act, Councils may only develop FMPs for identified species and may not describe, identify, or protect the habitat of other species. The commenter also said that Councils have no authority under the Magnuson-Stevens Act to protect the habitat of any fish.
>
> Response C: The preamble to the interim final rule at 62 FR 66534 notes that the Magnuson-Stevens Act does not preclude Councils from identifying habitat (other than EFH) of a fishery resource under its authority even if the species is not managed under an FMP. Council actions to protect the habitats of managed or non-managed species is limited to protecting habitats from fishing activities.

Comment C (67 FR 2348 (2002)).

The NEFMC also has broad discretion to implement area-based gear restrictions in deep-sea coral areas to minimize the bycatch of deep-sea corals to the extent practicable. 16 U.S.C. 1851(a)(9) and 1853(a)(11). According to the Magnuson-Stevens Act, deep-sea corals are included in its definition of "fish." 16 U.S.C. §1802(12). Therefore, deep-sea corals are species within the definition of "bycatch" under the Act and the NEFMC and NMFS have authority to regulate fishing in order to reduce bycatch of deep-sea corals.

The Fisheries Service has interpreted existing statutory authority to support the New England Council's broad statutory authority to reduce bycatch of deep-sea corals, as well as other non-commercially managed species. As seen in the Fisheries Service's Response to Comments on the National Standard One Guidelines, bycatch includes marine species with no commercial value:

> *Comment 4*. One commenter observed that national standard 9 applies not only to commercially valuable species, but also to all finfish, shellfish, and invertebrate species with no commercial value.
>
> *Response*. NMFS agrees. The definition of ''fish'' in the Magnuson-Stevens Act includes finfish, shellfish, and invertebrate species, and all other forms of marine animal and plant life except marine mammals and birds; by extension, bycatch applies to these forms of marine life.

See. 63 Fed. Reg. 24224 (1998)(National Standard One Guidelines).

Habitat may be protected for precautionary reasons. As the recent Monkfish Amendment 2 final rule stated:

> "…due to the potential expansion of the offshore monkfish fishery resulting from the implementation of the Offshore Fishery Program in the SFMA… canyon closure areas are considered to be a necessary precautionary measure to limit the potential interaction between monkfish trawl and gillnet gear and the 18 species of coral known to inhabit these two canyons."

70 Fed. Reg. 21932 (April 28, 2005) (response to comment 3)

Because of the potential for bottom trawling to expand into deeper waters, the seamounts are at risk and the closures should be viewed as a precautionary measure to limit the interaction between bottom tending mobile gear and deep-sea corals.

Independent of any other authority, the Council has broad discretion to regulate fishing and close areas to fishing, as long as this action is consistent with National Standards and other applicable law. Under section 303(b) of the Magnuson-Stevens Act - "Discretionary Provisions" - NMFS and the New England Council may "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." 16 U.S.C. §1853(b)(2). Therefore, the New England Council can create, and regulate certain fishing activities, in deep-sea coral protection areas such as the seamounts.

B. A Comprehensive Proposal to Protect Important Habitat Areas from the Adverse Impacts Caused by Bottom Trawling and Scallop Dredging for New England and the Mid-Atlantic Regions

The North Pacific Regional Fishery Management Council (NPFMC), in February, of this year, unanimously approved sweeping habitat protections for the entire Aleutian Islands area of the North Pacific. The approach used by the NPFMC is a paradigm shift in

fisheries management for US waters that protects large areas of habitat from the adverse effects of bottom trawling, while at the same time maintaining healthy fisheries and access to important fishing grounds. The NPFMC, using science and an open public process, identified important fishing grounds and sensitive habitat areas, and used this information to designate areas open to continued bottom trawling, designate coral and sponge conservation areas closed permanently to bottom trawling, and closed to bottom trawling all other areas that have not been trawled in the past seven years. This new management approach can be used by both the NEFMC and the MAFMC to protect a wide range of important habitats while maintaining vibrant sustainable fisheries.

A modified version of this approach can be used by both the NEFMC and the MAFMC to address the impacts of trawling and dredging on the sensitive and important habitat areas in the region.

Oceana Proposal for New England and the Mid-Atlantic:

Immediately close to bottom tending mobile gears all areas that have not been trawled or dredged in the past seven years. All known areas of cold water coral and sponge, sensitive juvenile cod habitat, and other areas of high ecological value, should be permanently closed to bottom-tending mobile gear. These known sensitive habitat areas should be designated as “habitat conservation areas”, HAPC’s, or some other designation that makes clear that these special areas are permanently protected. Immediately designate the area that will be left open to the use of mobile bottom tending gear as the “open trawl area”. The remaining area that is neither “open trawl area” or “habitat conservation zone” can only be designated as one of those two categories after there has been a through scientific assessment of the area and a determination has been made of expected impacts to the habitat from bottom trawling and dredging. This entire management approach will be monitored by the use of VMS. Another critical component is to establish a rigorous scientific mapping and habitat assessment program to increase our knowledge of the unfished area and monitor the bycatch of cold water corals in the “open trawl area.” If significant bycatch of corals is evident, an immediate habitat assessment of that area must be completed and its designation changed to “habitat conservation area” if warranted.

Mapping:

Data on both habitat and fishing effort, from all sources, will be entered into a Geographic Information System (GIS) database, which is then used to make specific and detailed maps of the precise locations of sensitive habitat and the areas swept by bottom trawls over the past seven years. This will result in an accurate map of the “open bottom trawl zone.”

Non-mobile and mid-water gears will not be affected by this proposal and will be allowed continued use pursuant to current regulations.

The Oceana Approach provides responsible stewardship of public resources by protecting essential habitat while maintaining vibrant sustainable fisheries.

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Appendix I: List of species found on or over Bear seamount prior 2000 (Moore et al. 2003B).

TABLE 1. Taxa seen or sampled from Bear Seamount prior to 2000.

PROTISTA
Globose syringaminid? xenophyophore
PORIFERA
Unidentified sponges (>5 spp.)
CNIDARIA
Cerianthid anemone
Unidentified large light-colored anemone
Desmophyllum cristagalli scleractinian coral
Lepidisis sp.unbranched spiral whip coral
Primnoa sp. gorgonian coral
Pinnate antipatherian corals
Anthophilum sp. sea pen
SIPUNCULIDA
Unidentified sipunculid worm
ANNELIDA
Hyalinoecia sp. polychaete worm
ARTHROPODA
Neolithodes sp. stone crab
Unidentified spider crab assoc. w/ urchin
ECHINODERMATA
Solaster sp. sunstar
Porania sp. sea star
Neomorphaster sp. small 5-arm sea star
Ophiomusium lymani brittle star
Unidentified light brittle stars
Echinus affinis urchin
Echinothuriid pancake urchin
Unidentified 5-arm bathycrinid crinoid
Peniagone sp. sea cucumber
UROCHORDATA
Large transparent unstalked tunicate
PISCES
Hydrolagus pallidus chimaera*
Apristurus sp. deepwater catshark*
Bathyraja sp. skate
Unidentified notacanthid spiny eel
Unidentified halosaur
Serrivomer beanii sawpalate eel*
Diastobranchus capensis cuthroat eel*
Unidentified cutthroat eel
Unidentified alepocephalid smoothhead
Bathypterois dubius spiderfish*
Coryphaenoides sp. grenadier
Unidentified morid codling
Anoplogaster cornuta fangtooth*
Antigonia capros deepbody boarfish*
Sebastes sp. redfish
Zoarces atlanticus eel-pout

* identified by J. A. Moore, from commercial trawl 1997.

Appendix I cont.: Species found on or over to Bear seamount in 2000 (Moore et al. 2003B).

TABLE 2. Taxa collected on or over Bear Seamount during NMFS cruise DE00-11 from 2–7 Dec 2000.

PROTISTA	
Agglutinated foraminiferans (3+ spp.)[1]	>20[2]
PORIFERA	
Boring sponge (in gorgonian base)	1
Demospongae fragments	>6
Small stoloniferous sponge	>4
Geodia sp.	1
Hexactinellid fragments	>6
CNIDARIA	
Scyphozoans (8+ spp.)	>89
Poralia rufescens	1
Siphonophore pieces	>8
Marrus orthocanna	1
Knobby pink anemone	2
Small white anemone	3
Amphianthus or *Stephanauge* sp.	2
Thecate hydroid attached to *Lophelia*	1
Epizoanthus paguriphilus	46
Caryophyllia ambrosia	10
Flabellum alabastrum	7
Vaughanella margaretata	1
Lophelia pertusa	5
Acanthogorgia angustiflora	2
Paragorgia sp.	5
Swiftia? sp.	1
Lepidisis sp.	>5
Anthoptilum grandiflorum	9
Funiculina sp.	1
Anthomastis agassizii	4
CHAETOGNATHA	
Chaetognaths	>3
NEMERTEANS	
Nectonemertes mirabilis	2
Dinonemertes cf. *investigatoris*	1
ANNELIDA	
Polychaete burrowing in wood	3
Polychaete in tubes within *Lophelia*	2
ANNELIDA (Continued)	
Serpulid with large triangular tubes	>4
Serpulid with small round tubes	>40
MOLLUSCA	
Nudibranch	1
Calliotropis bairdii	5
Pleurotomella sp.	1
Gastropod sp. 1	1
Gastropod sp. 2	1
Gastropod sp. 3	11
Bivalve sp. 1	1
Heteropods	>10
Pteropods	>20
Clione sp.	1
CEPHALOPODS	
Lampadioteuthis megaleia	1
Abralia veranyi	1
Abraliopsis hoylei	5
Pyroteuthis margaritifera	1
Pterygioteuthis gemmata	1
Pterygioteuthis giardi	1
Taningia danae	1
Octopoteuthis megaptera	1
Gonatus fabricii	2
Histioteuthis sp.	4
Histioteuthis dofleini	1
Histioteuthis reversa	2
Bathyteuthis abyssicola	1
Brachioteuthis sp.	1
Illex illecebrosus	2
Chiroteuthis sp.	2
Chiroteuthis spoeli	1
Chiroteuthis veranii	2
Mastigoteuthis sp.	5
Mastigoteuthis agassizi	8
Mastigoteuthis magna	25
Cranchiidae indet.	1
Taonius pavo	2
Teuthowenia megalops	5
Stauroteuthis syrtensis	2
Eledonella pygmaea	1
Macrotritopus defilippi	2
Graneledone verrucosa verrucosa	2
Vampyroteuthis infernalis	2

[1] In a few instances, taxonomic experts indicated the number of species they could distinguish, without necessarily giving the explicit species names and these numbers of species are indicated below in parentheses following the taxonomic group name.

[2] For some very abundant animals (euphausids, *Cyclothone*, and *Pasiphaea*), only a small number of representative specimens were counted and kept, and for some or fragmentary animals (e.g. *Ophiomusium lymani* and *Lepidisis*) not all individuals were determinable. These are noted with a > sign before the actual number counted.

TABLE 2. (Continued). Taxa collected on or over Bear Seamount during NMFS cruise DE00-11 from 2–7 Dec 2000.

ARTHROPODA	
Syscenus atlanticus	27
Bopyrid isopod (in *Glyphocrangon*)	1
Hyperiid amphipods indet.	>49
Hyperia galba	2
Phronima sp.	2
Unidentified large red amphipod 1	
Colossendeis colossea	22
Scalpellum sp. 1	
Plesiopeneaus edwardsianus	10
Acanthephyra sp. (4 spp.)	>78
Glyphocrangon sculpta	>10
Notostomus sp.	4
Pasiphaea sp. (3 spp.)	>51
Gennadas sp. (3–4 spp.)	>41
Sergestes sp. (10 spp.)	>130
Homolids	2
Oplophorus sp.	1
Systellaspis sp.	2
Euphausids	>53
Pandalus carinatus	1
Stylopandalas sp.	7
Polycheles granulatus	12
Steromastis nana	6
Polychelid spiny form	2
Munidopsis sp.	8
Galathaea rostrata	1
Munidopsis curvirostra	1
Mysids	>69
Gnathophausia zoea	>24
Parapagurus pilosimanus	46
Neolithodes grimaldii	1
Copepod parasite on *Synbranchus* eel	1

ECHINODERMATA	
Crinoid fragments	2
Elasipodid holothurian	6
Psychropotes depressa	1
Plutonaster agassizi	6
Psilaster andromeda florae	1
Cheiraster sepitus	6
Persephonaster sp.	2
Ceramaster granularis	1
Mediaster bairdi	15
Pseudarchaster parelii	2
Neomorphaster forcipatus	95
Chondraster grandis	3
Henricia sp.	1
Pteraster sp.	1
Solaster benedicti	1
Zoroaster sp.	1
Brisingia costata	1
Freyella microspina	2
Freyella elegans	1
Asteroschema sp.	2

ECHINODERMATA (Continued)	
Ophiomusim lymani	>141
Ophiacanthidae sp.	1
Ophiacantha sp.	4
Amphiophiura saurura	8
Homophiura tessellata	9
Ophiocten gracilis	7
Ophiura ljungmani	36
Simple-armed basket star	1
Echinus affinis	159
Echinus sp.	3
Zygothuria lactea	4
Phorosoma placenta	20
Hygrosoma petersi	9

UROCHORDATA	
Stalked tunicates	9
Thaliacean salps	>9
Pyrosoma sp.	>3

PISCES	
Hydrolagus affinis	4
Apristurus manis	14
Apristurus profundorum	5
Etmopterus princeps	2
Raja bigelowi	2
Aldrovandia sp. indet.	13
Aldrovandia affinis	48
Aldrovandia oleosa	1
Aldrovandia phalacra	171
Halosauropsis macrochir	4
Notacanthus chemnitzi	4
Polyacanthonotus challengeri	1
Polyacanthonotus rissoanus	3
Ilyophis brunneus	2
Diastobranchus capensis	1
Synaphobranchus sp.	17
Synaphobranchus kaupii	90
Derichthys serpentinus	1
Nessorhamphus ingolfianus	2
Nemichthys scolopaceus	10
Congridae larvae	7
Acromycter perturbator	1
Ariosoma sp. Larvae	16
Venefica procera	2
Serrivomer beanii	27
Eurypharynx pelacanoides	11
Bathylagus berycoides	1
Bathylagus euryops	12
Dolichopteryx sp.	2
Alepocephalus agassizi	8
Alepocephalus australis	13
Alepocephalus bairdii	1

TABLE 2. (Continued). Taxa collected on or over Bear Seamount during NMFS cruise DE00-11 from 2–7 Dec 2000.

PISCES (continued)	
Alepocephalus cf. *umbriceps*	1
Bajacalifornia megalops	1
Mirognathus normani	1
Narcetes stomias	1
Rouleina attrita	1
Maulisia sp.	2
Cyclothone sp. indet.	332
Cyclothone pallida	1
Cyclothone microdon	>308
Gonostoma bathyphilum	32
Gonostoma elongatum	58
Chauliodus sloani	34
Argyropelecus aculeatus	16
Argyropelecus hemigymnus	4
Sternoptyx diaphana	18
Sternoptyx pseudobscura	1
Valenciennellus tripunctulatus	1
Vinciguerria nimbaria	1
Malacosteus niger	7
Aristostomias tittmani	1
Bathophilus pawneei	1
Borostomias antarcticus	1
Leptostomias longibarba	1
Melanostomias bartonbeani	2
Photostomias guerneri	4
Stomias boa ferox	20
Stomias affinis	1
Bathypterois phenax	28
Bathypterois quadrifilis	16
Scopelosaurus lepidus	1
Bathysaurus ferox	3
Arctozenus rissoi	1
Paralepis sp.	2
Paralepis coregonoides	1
Myctophidae indet.	97
Benthosema glaciale	73
Ceratoscopelus maderensis	18
Ceratoscopelus warmingii	5
Diaphus brachycephalus	1
Diaphus dumerili	9
Diaphus rafinesquii	4
Hygophum taaningi	1
Lampadena speculigera	1
Lampanyctus photonotus	4
Lobianchia dofleini	30

PISCES (continued)	
Lobianchia gemellari	2
Myctophum affine	3
Nannobrachium atrum	1
Nannobrachium lineatum	7
Nannobrachium mcdonaldi	3
Nannobrachium lineatum	7
Nannobrachium mcdonaldi	3
Notoscopelus resplendens	2
Symbolophorus veranyi	1
Dicrolene intronigra	2
Penopus microcephalus	1
Porogadus miles	4
Bassogigas gilli	1
Bathygadus favosus	5
Coryphaenoides alateralis	2
Coryphaenoides carapinus	36
Coryphaenoides rupestris	89
Macrourus berglax	25
Nezumia longebarbata	5
Nezumia sclerorhynchus	1
Nezumia suilla	2
Sphagemacrurus grenadae	4
Trachonurus sulcatus	2
Antimora rostrata	20
Gaidropsarus ensis	2
Gaidropsarus argenteus	1
Halargyreus johnsoni	15
Dibranchus tremendus	1
Cryptopsaras couesii	2
Melamphaes microps	1
Melamphaes suborbitalis	4
Poromitra megalops	3
Scopelogadus beanie	23
Scopeloberyx opisthopterus	33
Anoplogaster cornuta	1
Cottunculus thomsoni	1
Howella brodei	1
Anthias nicholsi larva	1
Platyberyx opalescens	1
Lycodes atlanticus	6
Melanostigma atlanticum	1
Chiasmodon niger	4
Kali indica	1
Glyptocephalus cynoglossus larvae	3
Poecilopsetta beani larva	1

Appendix II: List of species from the trawl surveys in July 2002 (Moore et al. 2004).

Table 2: Preliminary list of taxa collected on or from waters around Bear Seamount during cruise DE02-06 f RV "Delaware II". Pelagic taxa were from stations within 10 km of Bear Seamount. Species listed with a + after the number of individuals indicate that additional specimens were captured in the wings of the net, but not counted.

Species	Number of indivduals	Species	Number of indivduals	Species	Number of indivduals
CNIDARIA		*Brachioteuthis* sp.	4	*Notostomus* sp.	7
Atolla sp.	26	*Illex illecebrosus*	10	*Notostomus vescus*	1
Pelagia noctiluca	17 +	*Ornithoteuthis antillarum*	5	*Pandalus* sp.	1
Periphylla sp.	1	*Chiroteuthis* sp.	2	Parapandalus richardi	2
Stigiomedusa sp.	1	*Chiroteuthis mega*	8	*Pasiphaea* sp.	1
Allantactis parasitica	1	*Chiroteuthis veranyi*	4	*Parapasiphaea* sp.	2
Epizoanthus paguriphilus	3	*Mastigoteuthis* sp.	2	*Parapasiphaea sulcatifrons*	30
Caryophyllia cornuformis	1	*Mastigoteuthis agassizi*	32	*Sergia* sp.	125
Flabellum alabastrum	3	*Mastigoteuthis hjorti*	2	Sergestidae	1
Solenosmilia variabilis	3	*Mastigoteuthis magna*	42	*Sergestes* sp.	137
Enallopsammia rostrata	2	*Cranchia scabra*	2	Unidentified shrimp	12
Paragorgia sp.	1	*Helicocranchia pfefferi*	2	Unidentified euphausids	18
Paramuricea sp.	1	*Megalocranchia* sp.	5	*Bentheuphausia amblyops*	1
Keratoisis sp.	2	*Leachia* sp.	1	Decapod sp.1	1
Swiftia pallida	1	*Leachia atlantica*	1	*Chaceon* megalops	7
Lepidisis sp.	1	*Taonius pavo*	8	*Chaceon quinquidens*	1
Radicipes gracilis	1	*Teuthowenia megalops*	8	*Heterocarpus*-like	1
Antipatherian	1	*Bolitaena pygmaea*	4	Majid crab	2
Pennatula aculeata	3	*Japetella diaphana*	1	Lithodid	1
		Haliphron atlanticus	9	*Neolithodes grimaldii*	1
NEMERTEA		*Tremoctopus violacius ?*	1	*Parapagurus pilosimanus*	3
Dinonemertes investigatoris	2	*Vampyroteuthis infernalis*	12	*Pagurus sp.*	1
				Polychelid juvenile	4
MOLLUSCA (except Cephalopoda)		**ARTHROPODA**		*Polycheles granulatus*	3
		Small white pycnogonid	1	*Steromastis nana*	1
Carinaria lamarki	3	*Colossendeis colossea*	11	*Munidopsis curvirostra*	1
Pterotrachea coronata	9	Unid. Crustaceans	9	*Gnathophausia* sp.	28
Pterotrachea hippocampus	1	Amphipod	9	*Ganthophausia ingens*	10
Pterotrachea scutata	10	Large red amphipod	20		
Cavolina sp.	4	*Lanceola* sp.	3	**ECHINODERMATA**	
Diacria sp.	1	Small dark amphipod	1	Commatulid crinoid calyx	3
Oxygiris sp.	1	*Eurysthenes grillus*	3	*Pseudostichopus* sp.	1
pteropod sp. 4	3	*Cystisoma* sp.	24	*Plutonaster agassizi*	2
Clio sp.	1	*Phronima* sp.	826 +	*Paragonaster subtilis*	2
Corolla spectabilis	14 +	*Phrosima* sp.	33	*Cheiraster* sp.	22
		Themisto sp.	15	*Cheiraster sepitus*	4
CEPHALOPODA		Flabelliferan isopod sp.1	2	*Floriaster maya*	1
Abralia redfieldi	1	Flabelliferan isopod sp.2	1	*Hippasteria phrygiana*	1
Abraliopsis atlantica	1	*Syscenus atlanticus*	10	*Mediaster bairdi*	2
Abraliopsis hoylei pfefferi	17	*Gigantocypris* sp.	1	*Neomorphaster forcipatus*	31
Enoploteuthis leptura	2	*Scalpellum* sp.	7	*Chondraster grandis*	1
Pyroteuthis margaritifera	3	Aristeidae	1	*Freyella* sp.	1
Pterygioteuthis gemmata	9	*Acanthephyra* sp.1	27	*Homophiura abyssorum*	17
Ancistrocheirus lesueurii	3	*Acanthephyra* sp.2	50	*Homophiura tessellata*	1
Octopoteuthis sicula	21	*Acanthephrya cartirostris*	1	*Ophiura ljungmani*	18
Octopoteuthis megaptera	2	*Acanthephyra purpurea*	449 +	*Amphiophiura saururo*	15
Ancistroteuthis lichtensteini	1	*Benthesicymus bartletti*	7	*Asteroschema clavigera*	1
Onychoteuthis cf. *banksii*	2	*Funchalia* sp.	2	*Asteroschema* sp.	2
Discoteuthis laciniosa	2	*Funchalia villosa*	7	*Ophiomusium lymani*	109
Gonatus fabricii	1	*Gennadas* sp.	12	*Ophiacantha* sp.	14
Histioteuthis corona	6	*Janecella* sp.	44	*Echinus affinis*	12
Histioteuthis reversa	47	*Janecella gracilorostris*	1	*Salenocidaris varispina*	4

(Table continued on next page)

(Table 2, continued)

Species	Number of indivduals
Phorosoma placenta	9
Hygrosoma petersi	3
PISCES	
Hydrolagus affinis	2
Apristurus manis	4
Apristurus profundorum	4
Etmopterus gracilispinus	1
Aldrovandia affinis	8
Aldrovandia phalacra	9
Polyacanthonotus rissoanus	1
Diastobranchus capensis	4
Synaphobranchus kaupii	42
Derichthys serpentinus	13
Nessorhamphus ingolfianus	17
Avocettina infans	1
Nemichthys scolopaceus	86
Serrivomer beanii	294
Serrivomer laceolatoides	6
Saccopharynx ampullaceus	1
Eurypharynx pelecanoides	86
Bathylagus euryops	39
Bathylagus greyae	1
Dolicholagus longirostris	61
Melanolagus bericoides	3
Alepocephalus cf. *australis*	17
Alepocephalus bairdii	1
Photostylus pycnopterus	1
Normichthys operosus	4
Bonapartia pedaliota	2
Cyclothone sp.	123 +
Cyclothone braueri	7
Cyclothone microdon	77 +
Sigmops bathyphila	3
Sigmops elongata	735
Argyropelecus aculeatus	252
Argyropelecus affinis	1
Argyropelecus gigas	1
Argyropelecus hemigymnus	45
Argyropelecus lychnus	1
Polyipnus clarus	2
Sternoptyx diaphana	173
Sternoptyx pseudobscura	2
Vinciguerria nimbaria	12
Chauliodus sloani	379
Stomias boa ferox	29
Borostomias antarcticus	6
Bathophilus longipinnis	1
Heterophotus ophistoma	1
Chirostomias pliopterus	2
Echiostoma barbatum	1
Eustomias jimcraddocki	1
Eustomias bibulbosus	1
Eustomias obscurus	2
Eustomias schmidti	2
Flagellostomias boureei	1
Grammatostomias dentatus	2
Leptostomias longibarba	2
Melanostomias bartonbeani	2

Species	Number of indivduals
Photonectes sp.	4
Arististomias lunifer	1
Malacosteus niger	42
Photostomias sp. 1	2
Photostomias guernei	45
Idiacanthus fasciola	1
Gigantura indica	1
Chlorophthalmus agassizi	5
Bathypterois quadrifilis	2
Bathypterois phenax	2
Scopelarchus guentheri	1
Ahliesaurus berryi	2
Scopelosaurus mauli	11
Arctozenus rissoi	12
Lestidium atlanticum	2
Lestrolepis intermedia	3
Macroparalepis brevis	3
Magnisudis atlantica	3
Sudis hyalina	1
Coccorella atlantica	4
Evermannella sp.	1
Omosudis lowei	3
Myctophidae	210
Benthosema glaciale	4
Bolinichthys photothorax	1
Ceratoscopelus maderensis	55
Ceratoscopelus warmingii	285
Diaphus dumerilii	112
Diaphus lucidus	2
Diaphus perspicillatus	2
Diaphus rafinesquii	1
Diaphus splendidus	2
Gonichthys cocco	3
Hygophum hygomii	391
Lampadena luminosa	1
Lampadena speculigera	1
Lampadena urophaos	2
Lampanyctus festivus	1
Lampanyctus sp.	22
Lepidophanes guentheri	174
Lobianchia gemellari	1
Myctophum affine	4
Myctophum selenops	2
Nannobrachium sp.	5
Nannobrachium atrum	1
Nannobrachium cuprarium	2
Nannobrachium lineatum	7
Notoscopelus caudispinosus	5 +
Notoscopelus resplendens	62
Symbolophorus sp.	1
Symbolophorus veranyi	1
Zu cristatus	1
Regalecus glesne	1
Stylephorus chordatus	2
Polymixia lowei	6
Brotulotaenia nigra	1
Brotulotaenia crassa	1
Parabrotula plagiophthalmus	1
Bathygadus favosus	1

Species	Number of indivduals
Coryphaenoides rupestris	40
Macrourus berglax	5
Nezumia longibarbata	1
Trachonurus sulcatus	1
Antimora rostrata	5
Halargyreus johnsonii	5
Laemonema sp.	4
Melanonus zugmayeri	3
Bregmaceros sp.	4
Chaunax sp.	1
Spiniphryne gladisfenae	1
Melanocetus johnsonii	4
Himantolophus albinares	2
Oneirodes sp.	3
Haplophryne mollis	3
Leptacanthichthys gracilispinis	1
Cryptopsaras couesii	9
Gigantactis sp.	1
Haplophryne mollis	1
Melamphaes sp.	21
Melamphaes longivelis	1
Poromitra capito	18
Poromitra crassiceps	1
Poromitra megalops	1
Poromitra sp.	20
Scopeloberyx sp.	19
Scopelogadus beanii	94
Rondeletia bicolor	1
Rondoletia loricata	3
Gyrinomimus n. sp.	1
Cetostoma regani	3
Cetomimus sp.	1
Diretmus argenteus	1
Anoplogaster cornuta	18
Zenopsis conchifera	1
Antigonia capros	9
Peristedion sp.	3
Howella brodiei	5
Brama brama	1
Pterycombus brama	1
Caristius sp.	2
Lycodes terraenovae	2
Chiasmodon niger	9
Kali macrodon	1
Pseudoscopelus scriptus	2
Scombrolabrax heterolepis	2
Diplospinus multistriatus	2
Neolotus tripes	1
Cubiceps pauciradiatus	2
Schedophilus medusophagus	2
Psenes cyanophrys	3
Psenes maculatus	4
Psenes pellucidus	1
Ariomma bondi	45
Ariomma melanum	48