



New England Fishery Management Council

50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116  
Frank Blount, *Chairman* | Paul J. Howard, *Executive Director*

Habitat Area of Particular Concern Candidate Proposal Submission  
Form

**Name of Proposal Developer(s):** Valerie Suzdak and Eric Bilsky

**Affiliation:** Oceana

**Telephone / FAX / Email:** Tel: 202.467.1910/Fax: 202.833.2070/vsuzdak@oceana.org

**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° N, 68.00° W; southwest corner at 39.16° N, 68.00° W; northeast corner at 40.16° N, 65.86° W (longitude of the EEZ boundary); southeast corner at 39.16° N, 66.63° 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 km<sup>2</sup> 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 quinque-dens*). 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)

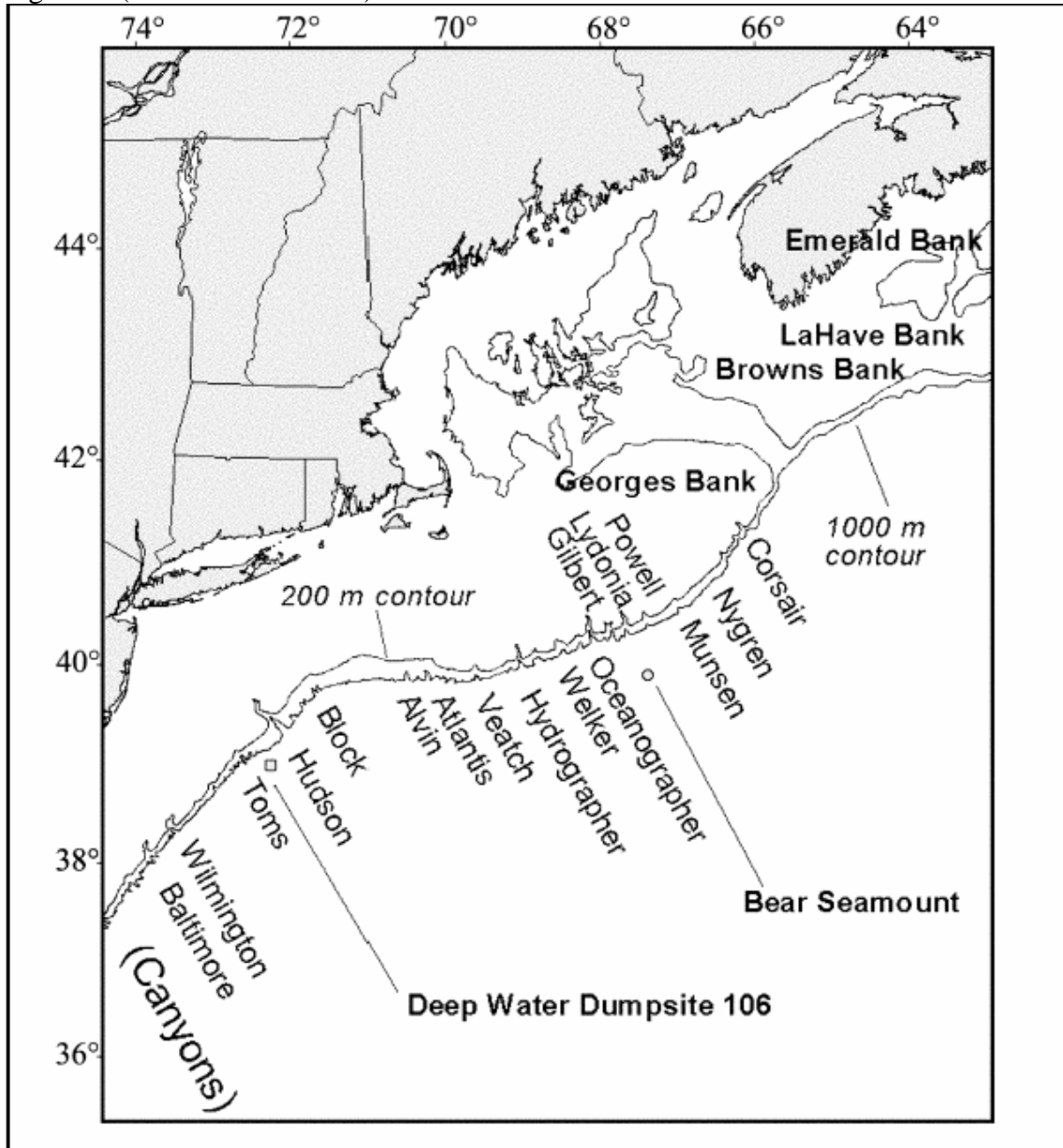


Figure 1. Principal area of study showing named undersea features in this report and the 200 and 1000 meter contour lines.

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)

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

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

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° N, 68.00° W; southwest corner at 39.16° N, 68.00° W; northeast corner at 40.16° N, 65.86° W (longitude of the EEZ boundary); southeast corner at 39.16° N, 66.63° W (longitude of the EEZ boundary) (Auster HAPC 2005). [Figure 1 (next page)]

#### **Topic 5: Supportive Data**

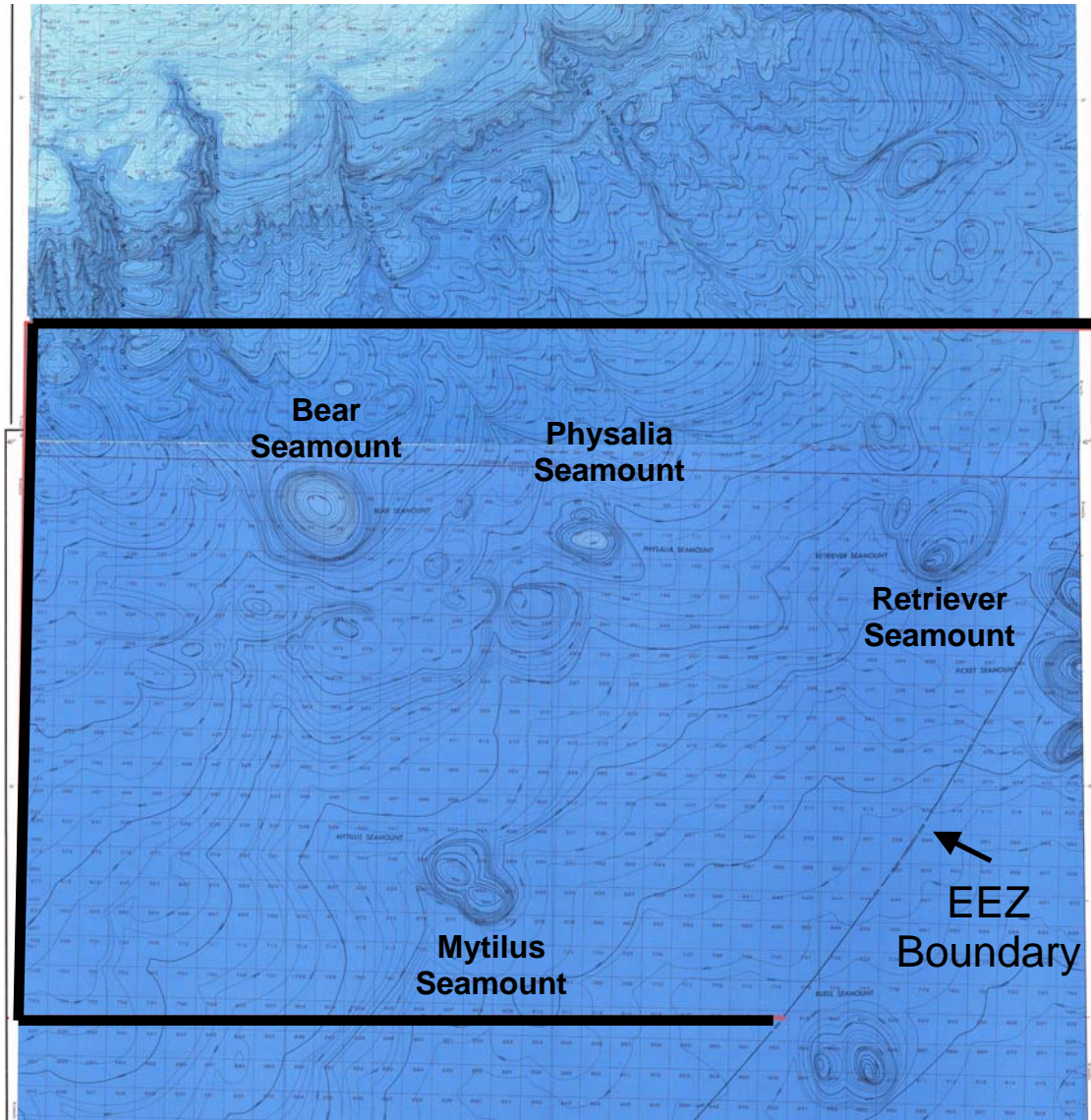
See references below.

#### **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.

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

\* 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.

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

<sup>1</sup> 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.

<sup>2</sup> For some very abundant animals (euphausiids, *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		ECHINODERMATA (Continued)	
<i>Sysceus atlanticus</i>	27	<i>Ophiomusim lymani</i>	>141
Bopyrid isopod (in <i>Glyphocrangon</i> )	1	Ophiacanthidae sp.	1
Hyperiid amphipods indet.	>49	<i>Ophiacantha</i> sp.	4
<i>Hyperia galba</i>	2	<i>Amphiophiura saurura</i>	8
<i>Phronima</i> sp.	2	<i>Homophiura tessellata</i>	9
Unidentified large red amphipod 1		<i>Ophiocten gracilis</i>	7
<i>Colossendeis colossea</i>	22	<i>Ophiura ljunghmani</i>	36
<i>Scalpellum</i> sp. 1		Simple-armed basket star	1
<i>Plesiopeneaus edwardsianus</i>	10	<i>Echinus affinis</i>	159
<i>Acanthephyra</i> sp. (4 spp.)	>78	<i>Echinus</i> sp.	3
<i>Glyphocrangon sculpta</i>	>10	<i>Zygothuria lactea</i>	4
<i>Notostomus</i> sp.	4	<i>Phorosoma placenta</i>	20
<i>Pasiphaea</i> sp. (3 spp.)	>51	<i>Hygrosoma petersi</i>	9
<i>Gennadas</i> sp. (3–4 spp.)	>41		
<i>Sergestes</i> sp. (10 spp.)	>130	UROCHORDATA	
Homolids	2	Stalked tunicates	9
<i>Oplophorus</i> sp.	1	Thaliacean salps	>9
<i>Systellaspis</i> sp.	2	<i>Pyrosoma</i> sp.	>3
Euphausiids	>53	PISCES	
<i>Pandalus carinatus</i>	1	<i>Hydrolagus affinis</i>	4
<i>Stylopandalas</i> sp.	7	<i>Apristurus manis</i>	14
<i>Polycheles granulatus</i>	12	<i>Apristurus profundorum</i>	5
<i>Steromastis nana</i>	6	<i>Etmopterus princeps</i>	2
Polychelid spiny form	2	<i>Raja bigelowi</i>	2
<i>Munidopsis</i> sp.	8	<i>Aldrovandia</i> sp. indet.	13
<i>Galathaea rostrata</i>	1	<i>Aldrovandia affinis</i>	48
<i>Munidopsis curvirostra</i>	1	<i>Aldrovandia oleosa</i>	1
Mysids	>69	<i>Aldrovandia phalacra</i>	171
<i>Gnathophausia zoea</i>	>24	<i>Halosauropsis macrochir</i>	4
<i>Parapagurus pilosimanus</i>	46	<i>Notacanthus chemnitzii</i>	4
<i>Neolithodes grimaldii</i>	1	<i>Polyacanthonotus challengerii</i>	1
Copepod parasite on <i>Synbranchus</i> eel	1	<i>Polyacanthonotus rissoanus</i>	3
ECHINODERMATA		<i>Ilyophis brunneus</i>	2
Crinoid fragments	2	<i>Diastobranthus capensis</i>	1
Elassipodid holothurian	6	<i>Synaphobranchus</i> sp.	17
<i>Psychropotes depressa</i>	1	<i>Synaphobranchus kaupii</i>	90
<i>Plutonaster agassizi</i>	6	<i>Derichthys serpentinus</i>	1
<i>Psilaster andromeda florae</i>	1	<i>Nessorhamphus ingolfianus</i>	2
<i>Cheiraster sepius</i>	6	<i>Nemichthys scolopaceus</i>	10
<i>Persephonaster</i> sp.	2	Congridae larvae	7
<i>Ceramaster granularis</i>	1	<i>Acromycter perturbator</i>	1
<i>Mediaster bairdi</i>	15	<i>Ariosoma</i> sp. Larvae	16
<i>Pseudarchaster parelii</i>	2	<i>Venefica procera</i>	2
<i>Neomorphaster forcipatus</i>	95	<i>Serrivomer beanii</i>	27
<i>Chondraster grandis</i>	3	<i>Eurypharynx pelacanooides</i>	11
<i>Henricia</i> sp.	1	<i>Bathylagus berycooides</i>	1
<i>Pteraster</i> sp.	1	<i>Bathylagus euryops</i>	12
<i>Solaster benedicti</i>	1	<i>Dolichopteryx</i> sp.	2
<i>Zoroaster</i> sp.	1	<i>Alepocephalus agassizi</i>	8
<i>Brisingia costata</i>	1	<i>Alepocephalus australis</i>	13
<i>Freyella microspina</i>	2	<i>Alepocephalus bairdii</i>	1
<i>Freyella elegans</i>	1		
<i>Asteroschema</i> sp.	2		

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

PISCES (continued)		PISCES (continued)	
<i>Alepocephalus cf. umbriceps</i>	1	<i>Lobianchia gemellari</i>	2
<i>Bajacalifornia megalops</i>	1	<i>Myctophum affine</i>	3
<i>Mirognathus normani</i>	1	<i>Nannobranchium atrum</i>	1
<i>Narceus stomias</i>	1	<i>Nannobranchium lineatum</i>	7
<i>Rouleina atrita</i>	1	<i>Nannobranchium mcdonaldi</i>	3
<i>Maulisia</i> sp.	2	<i>Nannobranchium lineatum</i>	7
<i>Cyclothone</i> sp. indet.	332	<i>Nannobranchium mcdonaldi</i>	3
<i>Cyclothone pallida</i>	1	<i>Notoscopelus resplendens</i>	2
<i>Cyclothone microdon</i>	>308	<i>Symbolophorus veranyi</i>	1
<i>Gonostoma bathyphilum</i>	32	<i>Dicrolene intronigra</i>	2
<i>Gonostoma elongatum</i>	58	<i>Penopus microcephalus</i>	1
<i>Chauliodus sloani</i>	34	<i>Porogadus miles</i>	4
<i>Argyropelecus aculeatus</i>	16	<i>Bassogigas gilli</i>	1
<i>Argyropelecus hemigymnus</i>	4	<i>Bathygadus favosus</i>	5
<i>Sternoptyx diaphana</i>	18	<i>Coryphaenoides alateralis</i>	2
<i>Sternoptyx pseudobscura</i>	1	<i>Coryphaenoides carapinus</i>	36
<i>Valenciennellus tripunctulatus</i>	1	<i>Coryphaenoides rupestris</i>	89
<i>Vinciguerria nimbaria</i>	1	<i>Macrourus berglax</i>	25
<i>Malacosteus niger</i>	7	<i>Nezumia longebarbata</i>	5
<i>Aristostomias titmani</i>	1	<i>Nezumia sclerorhynchus</i>	1
<i>Bathophilus pawneeii</i>	1	<i>Nezumia suilla</i>	2
<i>Borostomias antarcticus</i>	1	<i>Sphagemacrurus grenadae</i>	4
<i>Leptostomias longibarba</i>	1	<i>Trachonurus sulcatus</i>	2
<i>Melanostomias bartonbeani</i>	2	<i>Antimora rostrata</i>	20
<i>Photostomias gueneri</i>	4	<i>Gaidropsarus ensis</i>	2
<i>Stomias boa ferox</i>	20	<i>Gaidropsarus argenteus</i>	1
<i>Stomias affinis</i>	1	<i>Halargyreus johnsoni</i>	15
<i>Bathypterois phenax</i>	28	<i>Dibranchius tremendus</i>	1
<i>Bathypterois quadrifilis</i>	16	<i>Cryptopsaras couesii</i>	2
<i>Scopelosaurus lepidus</i>	1	<i>Melamphaes microps</i>	1
<i>Bathysaurus ferox</i>	3	<i>Melamphaes suborbitalis</i>	4
<i>Arctozenus rissoi</i>	1	<i>Poromitra megalops</i>	3
<i>Paralepis</i> sp.	2	<i>Scopelogadus beanie</i>	23
<i>Paralepis coregonoides</i>	1	<i>Scopeloberyx opisthopterus</i>	33
Myctophidae indet.	97	<i>Anoplogaster cornuta</i>	1
<i>Benthoosema glaciale</i>	73	<i>Cottunculus thomsoni</i>	1
<i>Ceratoscopelus maderensis</i>	18	<i>Howella brodei</i>	1
<i>Ceratoscopelus warmingii</i>	5	<i>Anthias nicholsi</i> larva	1
<i>Diaphus brachycephalus</i>	1	<i>Platyberyx opalescens</i>	1
<i>Diaphus dumerili</i>	9	<i>Lycodes atlanticus</i>	6
<i>Diaphus rafinesquii</i>	4	<i>Melanostigma atlanticum</i>	1
<i>Hygophum taaningi</i>	1	<i>Chiasmodon niger</i>	4
<i>Lampadena speculigera</i>	1	<i>Kali indica</i>	1
<i>Lampanyctus photonotus</i>	4	<i>Glyptocephalus cynoglossus</i> larvae	3
<i>Lobianchia dofleini</i>	30	<i>Poecilopsetta beani</i> 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 individuals	Species	Number of individuals	Species	Number of individuals
<b>CNIDARIA</b>					
<i>Atolla</i> sp.	26	<i>Brachioteuthis</i> sp.	4	<i>Notostomus</i> sp.	7
<i>Pelagia noctiluca</i>	17 +	<i>Illex illecebrosus</i>	10	<i>Notostomus vescus</i>	1
<i>Periphylla</i> sp.	1	<i>Ornithoteuthis antillarum</i>	5	<i>Pandalus</i> sp.	1
<i>Stigiomedusa</i> sp.	1	<i>Chiroteuthis</i> sp.	2	<i>Parapandalus richardi</i>	2
<i>Allantactis parasitica</i>	1	<i>Chiroteuthis mega</i>	8	<i>Pasiphaea</i> sp.	1
<i>Epizoanthus paguriphilus</i>	3	<i>Chiroteuthis veranyi</i>	4	<i>Parapasiphaea</i> sp.	2
<i>Caryophyllia cornuformis</i>	1	<i>Mastigoteuthis</i> sp.	2	<i>Parapasiphaea sulcatifrons</i>	30
<i>Flabellum alabastrum</i>	3	<i>Mastigoteuthis agassizi</i>	32	<i>Sergia</i> sp.	125
<i>Salenosmilia variabilis</i>	3	<i>Mastigoteuthis hjorti</i>	2	Sergestidae	1
<i>Enallopsammia rostrata</i>	2	<i>Mastigoteuthis magna</i>	42	<i>Sergestes</i> sp.	137
<i>Paragorgia</i> sp.	1	<i>Cranchia scabra</i>	2	Unidentified shrimp	12
<i>Paramuricea</i> sp.	1	<i>Helicocranchia pfefferi</i>	2	Unidentified euphausiids	18
<i>Keratoisis</i> sp.	2	<i>Megalocranchia</i> sp.	5	<i>Bentheuphausia amblyops</i>	1
<i>Swiftia pallida</i>	1	<i>Leachia</i> sp.	1	Decapod sp.1	1
<i>Lepidisis</i> sp.	1	<i>Leachia atlantica</i>	1	<i>Chaceon megalops</i>	7
<i>Radicipes gracilis</i>	1	<i>Taonius pavo</i>	8	<i>Chaceon quinquidens</i>	1
Antipatherian	1	<i>Teuthowenia megalops</i>	8	<i>Heterocarpus</i> -like	1
<i>Pennatula aculeata</i>	3	<i>Bolitaena pygmaea</i>	4	Majid crab	2
<b>NEMERTEA</b>					
<i>Dinonemertes investigatoris</i>	2	<i>Japetella diaphana</i>	1	Lithodid	1
<b>MOLLUSCA</b>					
(except Cephalopoda)		<i>Haliphron atlanticus</i>	9	<i>Neolithodes grimaldii</i>	1
<i>Carinaria lamarki</i>	3	<i>Tremoctopus violaceus</i> ?	1	<i>Parapagurus pilosimanus</i>	3
<i>Pterotrachea coronata</i>	9	<i>Vampyroteuthis infernalis</i>	12	<i>Pagurus</i> sp.	1
<i>Pterotrachea hippocampus</i>	1	<b>ARTHROPODA</b>			
<i>Pterotrachea scutata</i>	10	Small white pycnogonid	1	Polychelid juvenile	4
<i>Cavolina</i> sp.	4	<i>Colossendeis colosseae</i>	11	<i>Polycheles granulatus</i>	3
<i>Diacria</i> sp.	1	Unid. Crustaceans	9	<i>Steromastis nana</i>	3
<i>Oxygiris</i> sp.	1	Amphipod	9	<i>Munidopsis curvirostra</i>	1
pteropod sp. 4	3	Large red amphipod	20	<i>Gnathophausia</i> sp.	28
<i>Clio</i> sp.	1	<i>Lanceola</i> sp.	3	<i>Gnathophausia ingens</i>	10
<i>Corolla spectabilis</i>	14 +	Small dark amphipod	1	<b>ECHINODERMATA</b>	
<b>CEPHALOPODA</b>					
<i>Abrolia redfieldi</i>	1	<i>Eurystheneus grillus</i>	3	Commatulid crinoid calyx	3
<i>Abroliaopsis atlantica</i>	1	<i>Cystisoma</i> sp.	24	<i>Pseudostichopus</i> sp.	1
<i>Abroliaopsis hoylei pfefferi</i>	17	<i>Phronima</i> sp.	826 +	<i>Plutonaster agassizi</i>	2
<i>Enoplateuthis leptura</i>	2	<i>Phrasima</i> sp.	33	<i>Paragonaster subtilis</i>	2
<i>Pyroteuthis margaritifera</i>	3	<i>Themisto</i> sp.	15	<i>Cheiraster</i> sp.	22
<i>Pterygioteuthis gemmata</i>	9	Flabelliferan isopod sp.1	2	<i>Cheiraster sepius</i>	4
<i>Ancistrocheirus lesueurii</i>	3	Flabelliferan isopod sp.2	1	<i>Floriaster maya</i>	1
<i>Octopoteuthis sicula</i>	21	<i>Syscenus atlanticus</i>	10	<i>Hippasteria phrygiana</i>	1
<i>Ancistroteuthis megaptera</i>	2	<i>Gigantocypris</i> sp.	1	<i>Mediaster bairdi</i>	2
<i>Ancistroteuthis lichtensteini</i>	1	<i>Scalpellum</i> sp.	7	<i>Neomorphaster forcipatus</i>	31
<i>Onychoteuthis cf. banksii</i>	2	Aristeidae	1	<i>Chondraster grandis</i>	1
<i>Discoteuthis laciniosa</i>	2	<i>Acanthephyra</i> sp.1	27	<i>Freyella</i> sp.	1
<i>Gonatus fabricii</i>	1	<i>Acanthephyra</i> sp.2	50	<i>Homophiura abyssorum</i>	17
<i>Histioteuthis corona</i>	6	<i>Acanthephyra purpurea</i>	449 +	<i>Homophiura tessellata</i>	1
<i>Histioteuthis reversa</i>	47	<i>Benthesicymus bartletti</i>	7	<i>Ophiura ljunghmani</i>	18
		<i>Funchalia</i> sp.	2	<i>Amphiophiura saurura</i>	15
		<i>Funchalia villosa</i>	7	<i>Asteroschema davigera</i>	1
		<i>Gennadas</i> sp.	12	<i>Asteroschema</i> sp.	2
		<i>Janecella</i> sp.	44	<i>Ophiomusium lymani</i>	109
		<i>Janecella graciliorstris</i>	1	<i>Ophiacantha</i> sp.	14
				<i>Echinus affinis</i>	12
				<i>Salenocidaris varispina</i>	4

(Table continued on next page )

(Table 2, continued)

Species	Number of individuals	Species	Number of individuals	Species	Number of individuals
<i>Phorosoma placenta</i>	9	<i>Photonectes</i> sp.	4	<i>Coryphaenoides rupestris</i>	40
<i>Hygrosoma petersi</i>	3	<i>Arististomias lunifer</i>	1	<i>Macrourus berglax</i>	5
<b>PISCES</b>		<i>Malacosteus niger</i>	42	<i>Nezumia longibarbata</i>	1
<i>Hydrolagus affinis</i>	2	<i>Photostomias</i> sp. 1	2	<i>Trachonurus sulcatus</i>	1
<i>Apristurus manis</i>	4	<i>Photostomias guernei</i>	45	<i>Antimora rostrata</i>	5
<i>Apristurus profundorum</i>	4	<i>Idiacanthus fasciola</i>	1	<i>Halargyreus johnsonii</i>	5
<i>Etmopterus gracilispinus</i>	1	<i>Gigantura indica</i>	1	<i>Laemonema</i> sp.	4
<i>Aldrovandia affinis</i>	8	<i>Chlorophthalmus agassizi</i>	5	<i>Melanonus zugmayeri</i>	3
<i>Aldrovandia phalacra</i>	9	<i>Bathypterois quadrifilis</i>	2	<i>Bregmaceros</i> sp.	4
<i>Polyacanthonus rissoanus</i>	1	<i>Bathypterois phenax</i>	2	<i>Chaunax</i> sp.	1
<i>Diastobranchius capensis</i>	4	<i>Scopelarchus guentheri</i>	1	<i>Spiniphryne gladiusenae</i>	1
<i>Synphobranchius kaupii</i>	42	<i>Ahliesaurus berryi</i>	2	<i>Melanocetus johnsonii</i>	4
<i>Derichthys serpentinus</i>	13	<i>Scopelosaurus mauli</i>	11	<i>Himantolophus albinares</i>	2
<i>Nessorhamphus ingolfianus</i>	17	<i>Arctozenus rissoi</i>	12	<i>Oneirodes</i> sp.	3
<i>Avocettina infans</i>	1	<i>Lestidium atlanticum</i>	2	<i>Haplophryne mollis</i>	3
<i>Nemichthys scolopaceus</i>	86	<i>Lestrolepis intermedia</i>	3	<i>Leptacanthichthys gracilispinis</i>	1
<i>Serrivomer beanii</i>	294	<i>Macroparalepis brevis</i>	3	<i>Cryptopsaras couesii</i>	9
<i>Serrivomer laceolotoides</i>	6	<i>Magnisudis atlantica</i>	3	<i>Gigantactis</i> sp.	1
<i>Saccopharynx ampullaceus</i>	1	<i>Sudis hyalina</i>	1	<i>Haplophryne mollis</i>	1
<i>Eurypharynx pelecanoides</i>	86	<i>Coccorella atlantica</i>	4	<i>Melamphaes</i> sp.	21
<i>Bathylagus euryops</i>	39	<i>Evermannella</i> sp.	1	<i>Melamphaes longivelis</i>	1
<i>Bathylagus greyae</i>	1	<i>Omosudis lowei</i>	3	<i>Paromitra capito</i>	18
<i>Dalicholagus longirostris</i>	61	Myctophidae	210	<i>Paromitra crassiceps</i>	1
<i>Melanolagus bericoides</i>	3	<i>Benthosema glaciale</i>	4	<i>Paromitra megalops</i>	1
<i>Alepocephalus cf. australis</i>	17	<i>Bolinichthys photothorax</i>	1	<i>Paromitra</i> sp.	20
<i>Alepocephalus bairdii</i>	1	<i>Ceratoscopelus maderensis</i>	55	<i>Scopeloberyx</i> sp.	19
<i>Photostylus pycnopterus</i>	1	<i>Ceratoscopelus warmingii</i>	285	<i>Scopelogadus beanii</i>	94
<i>Normichthys operosus</i>	4	<i>Diaphus dumerilii</i>	112	<i>Rondeletia bicolor</i>	1
<i>Bonapartia pedaliota</i>	2	<i>Diaphus lucidus</i>	2	<i>Rondeletia loricata</i>	3
<i>Cyclothone</i> sp.	123 +	<i>Diaphus perspicillatus</i>	2	<i>Gyrinomimus</i> n. sp.	1
<i>Cyclothone braueri</i>	7	<i>Diaphus rafinesquii</i>	1	<i>Cetostoma regani</i>	3
<i>Cyclothone microdon</i>	77 +	<i>Diaphus splendidus</i>	2	<i>Cetomimus</i> sp.	1
<i>Sigmops bathyphila</i>	3	<i>Gonichthys cocco</i>	3	<i>Diretmus argenteus</i>	1
<i>Sigmops elongata</i>	735	<i>Hygophum hygomii</i>	391	<i>Anoplogaster cornuta</i>	18
<i>Argyrolepelecus aculeatus</i>	252	<i>Lampadena luminosa</i>	1	<i>Zenopsis conchifera</i>	1
<i>Argyrolepelecus affinis</i>	1	<i>Lampadena speculigera</i>	1	<i>Antigonia capros</i>	9
<i>Argyrolepelecus gigas</i>	1	<i>Lampadena urophaos</i>	2	<i>Peristedion</i> sp.	3
<i>Argyrolepelecus hemigygnus</i>	45	<i>Lampanyctus festivus</i>	1	<i>Howella brodiei</i>	5
<i>Argyrolepelecus lychnus</i>	1	<i>Lampanyctus</i> sp.	22	<i>Brama brama</i>	1
<i>Polyipnus clarus</i>	2	<i>Lepidophanes guentheri</i>	174	<i>Pterycombus brama</i>	1
<i>Sternoptyx diaphana</i>	173	<i>Lobianchia gemellari</i>	1	<i>Caristius</i> sp.	2
<i>Sternoptyx pseudobscura</i>	2	<i>Myctophum affine</i>	4	<i>Lycodes terraenovae</i>	2
<i>Vinciguerria nimbaria</i>	12	<i>Myctophum selenops</i>	2	<i>Chiasmodon niger</i>	9
<i>Chauliodus sloani</i>	379	<i>Nannobranchium</i> sp.	5	<i>Kali macrondon</i>	1
<i>Stomias boa ferax</i>	29	<i>Nannobranchium atrum</i>	1	<i>Pseudoscopelus scriptus</i>	2
<i>Borostomias antarcticus</i>	6	<i>Nannobranchium cuparium</i>	2	<i>Scombrolabrax heterolepis</i>	2
<i>Bathophilus longipinnis</i>	1	<i>Nannobranchium lineatum</i>	7	<i>Diplospinus multistriatus</i>	2
<i>Heterophotus ophistoma</i>	1	<i>Notoscopelus caudispinosus</i>	5 +	<i>Neolatus tripes</i>	1
<i>Chirostomias pliopterus</i>	2	<i>Notoscopelus resplendens</i>	62	<i>Cubiceps pauciradiatus</i>	2
<i>Echiostoma barbatum</i>	1	<i>Symbolopharus</i> sp.	1	<i>Schedophilus medusophagus</i>	2
<i>Eustomias jimcraddocki</i>	1	<i>Symbolopharus veranyi</i>	1	<i>Psenes cyanophrys</i>	3
<i>Eustomias bibulbosus</i>	1	<i>Zu cristatus</i>	1	<i>Psenes maculatus</i>	4
<i>Eustomias obscurus</i>	2	<i>Regalecus glesne</i>	1	<i>Psenes pellucidus</i>	1
<i>Eustomias schmidti</i>	2	<i>Stylephorus chardatus</i>	2	<i>Ariomma bondi</i>	45
<i>Flagellostomias boureei</i>	1	<i>Polymixia lowei</i>	6	<i>Ariomma melanum</i>	48
<i>Grammatostomias dentatus</i>	2	<i>Bratulotaenia nigra</i>	1		
<i>Leptostomias longibarba</i>	2	<i>Bratulotaenia crassa</i>	1		
<i>Melanostomias bartonbeani</i>	2	<i>Parabrotula plagiophthalmus</i>	1		
		<i>Bathygadus favosus</i>	1		