

**Habitat Area of Particular Concern  
Candidate Proposal Submission Form (Version 2)**

**Name of Proposal Developer(s):**

The Ocean Conservancy

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**Title of HAPC Proposal:**

Georges Bank Northern Edge HAPC Proposal

**Abstract / Brief Statement of Proposal:**

The title of this proposal is the Georges Bank Northern Edge HAPC. Georges Bank is a relatively shallow water bank off the Coast of New England. The Northern Edge of Georges Bank is unique habitat area influenced by strong oceanographic currents and a substrate comprised of gravel/cobble and coarse sand with interspersed boulder piles and sand deposits. Benthic assemblages within the area include bryzoa, hydrozoa, anemones, calcareous worm tubes, and soft coral species that include *Primnoa* and *Paragorgia*. These structure and shelter provided by these unique habitat characteristics are well-recognized as important to the survival of many juvenile groundfish species, most notably Atlantic cod. The importance of these features to Atlantic cod is demonstrated by the fact that the NEFMC designated a portion of the Northern Edge as an HAPC for cod in the late 1990's. The purpose of this proposal is to expand the existing HAPC designation westward to encompass more gravel, cobble, and boulder-pile habitat features known to improve the survival of juvenile cod and other species. The unique oceanographic characteristics and habitat features found in the area satisfy many of the HAPC designation criteria, including importance of ecological function, sensitivity to human-induced environmental degradation, and rarity of habitat type.

**Coordinates of Georges Bank Northern Edge HAPC (Version 2):**

Point 1: 67 deg 40 min Longitude, 42 deg 5 min Latitude

Point 2: 67 deg 20 min Longitude, 42 deg 10 min Latitude

Point 3: 67 deg 9 min Longitude, 42 min 10 min Latitude

Point 4: 66 deg 45 min Longitude, 41 deg 45 min Latitude

Point 5: 67 deg 40 min Longitude, 41 deg 45 min Latitude

**Signature of Primary Proposer Representative:** \_\_\_\_\_

## **Habitat Area of Particular Concern Proposal**

### **Topic 1: Statement of Proposal**

The title of this proposal is the Georges Bank Northern Edge HAPC. Georges Bank is a relatively shallow water bank off the Coast of New England. The Northern Edge of Georges Bank is unique habitat area influenced by strong oceanographic currents and a substrate comprised of gravel/cobble and coarse sand with interspersed boulder piles and sand deposits. Benthic assemblages within the area include bryzoa, hydrozoa, anemones, calcareous worm tubes, and soft coral species that include *Primnoa* and *Paragorgia*. These structure and shelter provided by these unique habitat characteristics are well-recognized as important to the survival of many juvenile groundfish species, most notably Atlantic cod. The importance of these features to Atlantic cod is demonstrated by the fact that the NEFMC designated a portion of the Northern Edge as an HAPC for cod in the late 1990's. The unique oceanographic characteristics and habitat features found in the area satisfy many of the HAPC designation criteria, including importance of ecological function, sensitivity to human-induced degradation, and rarity of habitat type.

### **Topic 2: Objectives of Proposal**

The objective of the Georges Bank Northern Edge HAPC is to expand the existing cod HAPC to encompass more of the gravel, cobble, and boulder habitat known to be important to juvenile cod and other species. The relationship between juvenile cod and complex, hard-bottom habitat with emergent epifauna has been well-studied and documented. Given the fact that the Georges Bank cod population is overfished, subject to overfishing, and suffering from a decade of below-average recruitment, this HAPC designation is critically needed to help improve the poor condition of this once prolific stock. Expanding the existing boundary of the Georges Bank cod HAPC will improve the Council's ability to minimize adverse impacts caused by fishing gear in the area and protect this critically important and vulnerable Essential Fish Habitat. This proposal also satisfies a specific request from the Council to develop HAPC proposals that include juvenile cod EFH.

### **Topic 3: Justification for Council Action**

#### Rarity of Habitat Type:

The gravel, cobble, boulder habitats with emergent epifauna found within the proposed Georges Bank Northern Edge HAPC are rare relative to other habitat features found Georges Bank. Sediment mapping by Poppe et al and SMAST show that the Georges Bank area is dominated by sand substrates and that hard bottom habitats are relatively rare. The gravel and cobble substrates are interspersed across the bank are known to provide critical habitat for juvenile codfish and other species. The presence of gravel/cobble/boulder substrates and the unique oceanographic currents known to influence the area are a unique feature of the Northern Edge. The rarity and importance

of these habitat types is demonstrated by the NEFMC's designation of similar substrates in the area as a cod HAPC.

#### Importance of Historic Ecologic Function:

The historical importance of the ecological function of Georges Bank as a whole, and the proposed Georges Bank Northern Edge Cod HAPC, have been recognized for centuries with fleets from across the Atlantic coming to fish the rich, productive grounds on Georges Bank. The report entitled *Fishing Grounds of the Gulf of Maine* identified Georges Bank, including the Northern Edge, as a principle fishing ground for a number of groundfish species. The Northern Edge was found to hold Atlantic codfish year-round. Haddock were also known to aggregate along the Northern Edge. Halibut were also found along the Northern Edge during July and August. (Rich 1929). These early reports demonstrate the historical ecological importance of the Northern Edge of Georges Bank.

#### Importance of Current Ecologic Function:

The proposed Georges Bank Northern Edge cod HAPC area contains a broad diversity of substrates and benthic assemblages. The substrate in the area is characterized by strong oceanographic currents and a substrate dominated by gravel and coarse sand with interspersed boulder piles and sand deposits. Sediment mapping by Poppe et al. (1989) identifies these features originally and the presence of boulder and cobble features in the area have been confirmed by video surveys conducted by the University of Massachusetts Dartmouth School for Marine Science and Technology. (SMAST 2002). (Figures 1 and 2). The U.S. Geological Survey has mapped a gravel pavement that covers an area of more than 3,000 square kilometers along the northern part of the bank. The pavement forms a residual deposit where strong tidal and storm currents winnow sand from coarse glacial sediment. The gravel is an important habitat for the spawning and survival of several fish species. Distribution patterns of juvenile cod indicate that gravel habitat is where they are best able to avoid predators and find food. Therefore, gravel may be essential for their survival and recruitment to the fishery. (USGS Fact Sheet 2003).

Benthic assemblages within the area include bryzoa, hydrozoa, anemones, calcareous worm tubes, and soft coral species that include *Primnoa* and *Paragorgia*. These structure-forming habitat features are known to improve survivorship of juvenile Atlantic cod. They have also been shown to be vulnerable to adverse impacts caused by trawling and dredging. (USGS FACT Sheet 2001).

Current understanding of the important ecological function of the northern edge of Georges Bank is also demonstrated by additional factors, including 1) EFH designations within the proposed area, and 2) the existing HAPC designation for a portion of the proposed area.

### EFH Designations:

The Council's original Omnibus EFH Amendment identified Essential Fish Habitat features for four life stages of managed groundfish species (eggs, larvae, juveniles, and adults). According to those original designations, habitat features contained within the proposed Georges Bank Northern Edge HAPC have been identified as EFH for juvenile and/or adult stages of several groundfish species, including Atlantic cod, haddock, herring, American plaice, pollock, white hake, winter flounder, witch flounder, yellowtail flounder, and halibut. (NEFMC 1998). EFH for all of these species (except herring) has been determined to be moderately to high vulnerable to impacts from bottom-tending mobile gear (NEFMC 2004, p. I-522). As such, designating this area as an HAPC would meet the Council's stated objective to include EFH designations for more than one managed species in order to maximize the benefits of designations.

### HAPC Designation:

In its 1998 Omnibus Habitat Amendment, the NEFMC formally recognized the ecological importance of this proposed area by designating of a portion of it as an HAPC for Atlantic cod. (NEFMC 1998). In justifying the original designation, the Council conducted an extensive review of the literature concerning habitat features in the area. A summary of that review is provided below.

*Several sources document the importance of gravel cobble substrate to the survivability of newly settled juvenile cod (Lough et al. 1989; Valentine and Lough 1991; Gotceitas and Brown 1993; Tupper and Boutilier 1995; Valentine and Schmuck 1995). A substrate of gravel or cobble allows sufficient space for newly settled cod to find shelter and avoid predation (Lough et al. 1989; Valentine and Lough 1991; Gotceitas and Brown 1993; Tupper and Boutilier 1995; Valentine and Schmuck 1995). Particular life history stages or transitions are sometimes considered "ecological bottlenecks" if there are extremely high levels of mortality associated with the life history stage or transition. Extremely high mortality rates attendant to post-settlement juvenile cod are attributed to high levels of predation (Tupper and Boutilier 1995). Increasing the availability of suitable habitat for post-settlement juvenile cod could ease the bottleneck, increasing juvenile survivorship and recruitment into the fishery.*

These studies clearly demonstrate the importance of the gravel/cobble features found on the northern edge of Georges Bank to the survivorship of juvenile codfish. The purpose of the proposed Georges Bank Northern Edge HAPC is to expand the boundaries of the existing cod HAPC to include additional gravel/cobble habitat that are known to improve survivorship of juvenile cod. The expansion of the existing HAPC is well supported by available sediment mapping data. Additionally, the Council's own Habitat Tech Team specifically recommended consideration of the proposed expansion in order to better protect complex, hard-bottom habitat and other sensitive features. (NEFMC 2003).

### Sensitivity to Anthropogenic Stresses:

Numerous studies and reports have documented the sensitivity of benthic habitats characterized by complex substrates with emergent epifauna to impacts caused by fishing gear. In its 2002 report, the National Research Council found that trawling and dredging changes the physical and biological structure of ecosystems and therefore can have potentially wide-ranging consequences. Mobile Gear reduces benthic habitat complexity by removing or damaging the actual physical structure of the seafloor, and it causes changes in species composition. The reduction of physical structure in repeatedly trawled areas results in reduced productivity of benthic habitats and lower overall biodiversity. (NRC 2002).

In addition to the broader-scale analyses conducted by the NRC, a Northeast region-specific analysis was also conducted. In 2001, the Northeast Region Essential Fish Habitat Steering Committee convened a panel workshop of experts in benthic ecology, fishery ecology, geology, and fishing gear technology and operations. The purpose of the workshop was to evaluate existing scientific research on the effects of fishing gear on benthic habitats, to assess the degree of impacts caused by various fishing gear types, and to offer recommendations on measures to minimize those adverse impacts. The Workshop participants concluded, among other things, that otter trawls and dredges were the fishing gears of greatest concern and that high energy gravels substrates containing attached biological organisms were most susceptible to impacts. Identified impacts to this habitat types included 1) changes in physical and biological structure, 2) removal of attached epifauna, and 3) changes in abundance of benthic prey species (NEFSC 2002).

The NEFMC has also reviewed numerous studies on impacts to marine habitats caused by various fishing gear types and incorporated the findings into regional Fishery Management Plan Amendments. A summary of those studies is provided below.

Auster and Langton (1999) reviewed 22 studies from a wide geographic range and concluded that mobile fishing gear reduces habitat complexity by: (1) directly removing epifauna or damaging epifauna leading to mortality, (2) smoothing sedimentary bedforms and reducing bottom roughness, and (3) removing taxa which produces structure (i.e., taxa which produce burrows and pits).

Auster et al. (1996) conducted three studies of mobile fishing gear in the Gulf of Maine and concluded that mobile fishing gear alters the seafloor, and reduces habitat complexity, sedimentary structures, and emergent epifauna. Collie (1998) reviewed studies from New England and concluded that hard bottom benthic habitats (e.g. boulders and gravel pavement) experience significant impacts of mobile bottom-tending fishing gear.

A number of recent studies have linked the survival of juvenile Atlantic cod with the type of habitat where the juvenile cod settle. Survivorship is greater in habitats of higher

complexity, including gravel and cobble habitats with abundant sponges or seagrass, and less in habitats of lower complexity such as smoothed sand. Bottom tending mobile fishing gear, like trawls and dredges has also been found to reduce habitat complexity, thereby reducing the survival rate of juvenile cod. (Lindholm, Auster, Ruth, and Kauffman 2001).

Specific areas on the northern edge of Georges Bank have been extensively studied and identified as important areas for the survival of juvenile cod (Lough et al. 1989; Valentine and Lough 1991; Valentine and Schmuck 1995). These studies provide reliable information on the location of areas most important to juvenile cod and the type of substrate found in those areas. These areas have also been studied to determine the effects of bottom trawling on benthic megfauna (Collie et al 1996; Collie et al. 1997). Gravel cobble substrates not subject to fishing pressure support thick colonies of emergent epifauna, but bottom fishing, especially scallop dredging, reduces habitat complexity and removes much of the emergent epifauna (Collie et al. 1996; Collie et al. 1997). Acknowledging that a single tow of a dredge across pristine habitat will have few long-term effects, Collie et al. (1997) focus on the cumulative effects and intensity of trawling and dredging as responsible for the long-term changes in benthic communities.

#### **Topic 4: Potential and Existing Threats**

The most pressing existing threat to the unique habitat features included in the proposed Georges Bank Northern Edge HAPC is the chronic impacts caused by trawling and dredging activities in the area. While existing groundfish mortality closures and habitat closures adopted by the NEFMC provide protection for the portion of the proposed area contained within the existing cod HAPC, habitat features located immediately adjacent to the closures continue to experience intense fishing effort. Analysis of the spatial distribution of fishing effort shows that the habitat immediately adjacent to the existing closed areas moderate to high levels of fishing activity by otter trawls and scallop dredges. (NEFMC 2004). (Figures 3 and 4) Because trawls and dredges are known to reduce habitat complexity and function, continued fishing at this level of intensity is the greatest existing threat to habitat features in the proposed areas. In addition, the intensity of fishing effort by otter trawls in this area is likely to increase in the near future in response to recent efforts by the NEFMC to encourage fishing effort in the Georges Bank area.

Potential threats to the unique habitat features in the proposed area include oil and gas exploration and pipeline construction. A 2002 Report by the U.S. Department of Interior Minerals Management Service reveals that from 1976-1982 ten test wells were drilled on Georges Bank and leases were awarded to a number of energy companies. (USDOI 2000). Additionally, the Blue Atlantic energy company has submitted a proposal to construct a 1 billion cubic foot per day natural gas pipeline from Nova Scotia to the Northeastern U.S. Proposed routes for this pipeline would cross Georges Bank. The proposed HAPC is warranted because the area is threatened by both fishing and non-fishing related activities.

**Topic 5: HAPC Boundary (Map and Coordinates)**

Point 1: 67 deg 40 min Longitude, 42 deg 5 min Latitude

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**Topic 6: Discretionary Topics**

We have not included recommendations for management measures associated with this HAPC proposal at this time. We believe the HAPC evaluation process should consider a full range of alternative measures, including area-specific closures, gear requirements, and effort reductions. We request that the Council develop a range of alternatives for this HAPC proposal and that the analysis include evaluation of Level I, II, and III habitat closures (as defined in Amendment 13 to the Groundfish FMP). Additionally, we request that the impacts analysis specifically evaluate the potential benefits to habitat function, fish productivity, and overall ecosystem health. Analyses of habitat closures in recent FMP Amendments focused almost exclusively potential adverse socio-economic impacts of various habitat closures. We urge the Council to provide a comprehensive assessment of the Georges Bank Northern Edge HAPC proposal to provide the public and decision-makers the data necessary to make well-informed decisions.

**Topic 7: Supportive Data and Other Information** (copies available upon request)

Auster, P.J. et al. (1996). The impacts of mobile fishing gear on seafloor habitats of the Gulf of Maine (northwest Atlantic): implications for conservation of fish populations. *Reviews in Fisheries Science* 4(2): 185-202.

Auster, P.J. and R.W. Langton (1999). The effects of fishing on fish habitat. In L.R. Benaka, editor. *Fish Habitat: Essential fish habitat and rehabilitation*. American Fisheries Society, Symposium 22, Bethesda, MD.

Collie, J.S. et al (1996). Scallop dredging on Georges Bank: Photographic evaluation of effects on benthic epifauna. *International Council for the Exploration of the Sea. Mini-Symposium on Ecosystem Effects of Fisheries*. ICES CM 1996/Mini:9. p. 14.

Collie, J.S. et al. (1997). Effects of bottom fishing on the benthic megafauna of Georges Bank. *Marine Ecology Progress Series* 155:159-172.

Gotceitas, V. and J.A. Brown (1993). Substrate selection by juvenile Atlantic cod (*Gadus morhua*) effects of predation risk. *Oecologia* 93:31-37.

Lough et al. (1989). Ecology and distribution of juvenile cod and haddock in relation to sediment type and bottom currents on eastern Georges Bank. *Marine Ecology Progress Series*. MEPS 56:1-12.

Lindholm, J.B., P.J. Auster, and L.S. Kauffman (1999). Habitat-mediated survivorship of juvenile (year 0) Atlantic cod *Gadus morhua*. *Marine Ecology Progress Series*. MEPS 180:247-255.

Lindholm, J.B., P.J. Auster, M. Ruth, and L.S. Kauffman (2001). Modelling the effects of fishing and implications for the design of marine protected areas: juvenile fish responses to variations in seafloor habitat. *Conservation Biology*. Vol. 15, no. 2, 424-437. (April 2001).

NEFMC (1998). Essential Fish Habitat Omnibus Amendment, Volume 1. EFH Source documents. New England Fisheries Management Council in consultation with the National Marine Fisheries Service.

NEFMC (2003). Draft Environmental Impact Statement for the Essential Fish Habitat Components of Amendment 13 to the Northeast Multispecies Fishery Management Plan. New England Fishery Management Council and National Marine Fisheries Service, March, 2003.

NEFMC (2004). Final Environmental Impact Statement for Amendment 13 to the Northeast Multispecies Fishery Management Plan (p. I-478). New England Fishery Management Council and National Marine Fisheries Service, May 2004.

NEFSC (2002). Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern United States. Northeast Region Essential Fish Habitat Steering Committee. Northeast Fisheries Science Center Reference Document 02-01. February 2002.

NRC (2002). Effects of trawling and dredging on seafloor habitat. National Academy of Sciences, Washington, D.C.

Poppe, L.J., J.S. Schlee, B. Butman, and C.M. Lane (1989). Map showing distribution of surficial sediment, Gulf of Maine and Georges Bank. U.S. Geological Survey Miscellaneous Investigations Series, Map 1-1986-A.

Rich, Walter, H. (1929). *Fishing Grounds of the Gulf of Maine*. Department of Commerce, Bureau of Fisheries, Report of the United States Commissioner of Fisheries.

SMAST (2002). University of Massachusetts School for Marine Science and Technology. Substrate Mapping in the scallop beds on Georges Bank.

Tupper, M. and R.G. Boutilier (1995). Effects of habitat on settlement, growth, and post-settlement survival of Atlantic cod (*Gadus morhua*). *Can J Fish Aquat Sci* 52:1834-1841.

USDOI (2000). Atlantic Outer Continental Shelf, Georges Bank Compilation of Continental Offshore Stratigraphic Test (COST) and Industry Exploration Drilling, 1976-1982. United States Department of the Interior, Minerals Management Service. OCS Report MMS 2000-040.

USGS Fact Sheet (2003). Geology and the Fisheries of Georges Bank. United States Geological Survey Fact Sheet. Last updated December 2003.

USGS Fact Sheet (2001). Habitat Geology Studies on and near Georges Bank, off New England. USGS Fact Sheet FS-061-01. July, 2001.

Valentine, P.C. and R.G. Lough (1991). The influence of geological and oceanographic environmental factors on the abundance and distribution of fisheries resources of the northeastern United States continental shelf: The seafloor environment and the fishery of eastern Georges Bank. Open File Report 91-439, US Geol. Surv. P. 25.



