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

Name of Proposal Developer(s):

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Title of HAPC Proposal:

Cashes Ledge HAPC

Abstract / Brief Statement of Proposal:

The title of this proposal is the Cashes Ledge HAPC. Cashes Ledge is a submarine mountain chain located in the central Gulf of Maine. The peak of this submarine mountain chain (Ammen Rock) rises to within 80 to 100 feet of the ocean surface. This topographic feature in the middle of the Gulf of Maine creates a unique environment where nutrient-rich waters from the Gulf of Maine current rise up into the photic zone. The result is an incredibly diverse habitat area with a relatively intact ecosystem including high densities of phytoplankton, lush kelp forests, a diverse invertebrate community, and an assemblage of predatory fish, marine mammals, and seabirds. Cashes Ledge is also known to contain one of the deepest seaweed communities in the world. The ocean currents and internal waves surrounding Cashes Ledge give rise to a self-recruiting system. 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.

Coordinates of Cashes Ledge Candidate HAPC (Version 2):

Point 1: 42 deg 35 min Longitude, 69 deg 10 min Latitude
Point 2: 43 deg 05 min Longitude, 69 deg 10 min Latitude
Point 3: 43 deg 05 min Longitude, 68 deg 45 min Latitude
Point 4: 42 deg 35 min Longitude, 68 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 Cashes Ledge HAPC. Cashes Ledge is a submarine mountain chain located in the central Gulf of Maine. The peak of this submarine mountain chain (Ammen Rock) rises to within 80 to 100 feet of the ocean surface. This topographic feature in the middle of the Gulf of Maine creates a unique environment where nutrient-rich waters from the Gulf of Maine current rise up into the photic zone. The result is an incredibly diverse habitat area with a relatively intact ecosystem including high densities of phytoplankton, lush kelp forests, a diverse invertebrate community, and an assemblage of predatory fish, marine mammals, and seabirds. Cashes Ledge is also known to contain one of the deepest seaweed communities in the world. The ocean currents and internal waves surrounding Cashes Ledge give rise to a self-recruiting system. 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 this proposal is to designate Cashes Ledge and the surrounding areas as a Habitat Area of Particular Concern. Cashes Ledge contains unique biological, geologic, and oceanographic conditions that warrant designation. The Cashes Ledge area contains unique kelp forests and other habitat features that are vulnerable to damages caused by fishing gear and other anthropogenic stresses. The area also contains Essential Fish Habitat for a number of Council-managed species, including Gulf of Maine cod. This proposal seeks to formally recognize the biological and ecological importance of unique habitat features found on Cashes Ledge and to assure these unique characteristics are carefully considered when future management decisions are made by the NEFMC other regulatory agencies.

Topic 3: Justification for Council Action

Rarity of Habitat Type:

The rarity of the Cashes Ledge area lies in the fact that it is a series of rocky pinnacles jutting up from the deep basins in the middle of the Gulf of Maine. Upwelling and internal waves deliver fish and invertebrate larvae to these pinnacles where settlement occurs. The combination of sunlight and nutrient-rich waters fuels the growth of these larvae creating a productive area that supports one of the largest kelp forests and deepest seaweed communities in the world, as well as abundant populations of large predatory fish including cod, pollock, wolffish, and sharks. These unique conditions are found nowhere else in the greater Gulf of Maine/Georges Bank ecosystem, clearly making the Cashes Ledge area a rare habitat type.

Importance of Historic Ecologic Function:

The ecological importance of the Cashes Ledge area has been recognized for over a century. The area was first mapped in the 1800's by Collins and Rathbun (1877). Additionally, the report entitled *Fishing Grounds of the Gulf of Maine* identified Cashes Ledge as a principle fishing ground for a number of groundfish species. Cod and cusk were reported to be present year-round while hake, haddock, herring, and halibut were present seasonally. (Rich 1929). Research done in the 1980's and early 1990's suggests that the key factor in making Cashes Ledge so productive from a fisheries perspective may be its capacity for self-recruitment due to oceanographic gyres.

One of the unique features of Cashes Ledge, particularly Ammen Rock, was its relatively intact ecosystem. Intensive scientific studies conducted between 1986 and 1991 revealed a number of structural and functional characteristics indicative of an intact ecosystem and robust food web. (Witman and Sebens 1992, Steneck 1997, Witman 1996, Steneck and Carlton, 2001) This was in stark contrast to the dysfunctional food web of the nearshore areas. (Steneck 2004). For example, predatory fish (cod, pollock, and wolfish) were abundant and large compared to the nearshore areas. This led to high predation rates reducing decapod and sea urchin populations allowing a dense kelp forest canopy to develop. (Steneck 2004). All this past research activity underscores the fact that an extensive baseline on the ecology Cashes Ledge exists (from about 1986 – 1993) on the: 1) distribution, abundance and diversity of macrobenthic invertebrates and algae, 2) abundance of demersal fish at the shallow peaks of the ledge, 3) rates of fish predation on benthic invertebrates, diets of cod and wolffish 4) temperature variation 5) structure and productivity of the water column during the summer and 6) internal wave activity.

The unique ecological function of kelp forests, including those known to occur on Cashes Ledge is well-recognized. Kelp forest ecosystems provide structure and refuge that support a wide array of organisms including fishes, crabs, sea urchins, mollusks, and other algae, making them one of the most diverse and productive ecosystems in the world. (Mann 1973). In particular, the Cashes Ledge area is known to contain one of the deepest cold water, rock-dwelling algal communities in the world. (Vadas and Steneck 1988).

Finally, the Cashes Ledge area has been identified as an area believed to contain deep-water corals. Wigely (1968) describes Paragorgia as a common component of the gravel fauna of the Gulf of Maine and stated that representative gravel fauna occurred on "Cashes Ledge, parts of the Great South Channel, the northeast part of Georges Bank, western Browns Bank, Jeffreys Ledge, and numerous other smaller banks in the Gulf of Maine region". The presence of deep-water corals in the area is another unique characteristic of the Cashes Ledge area.

Importance of Current Ecologic Function:

Several unique features contribute to the ecological importance of the Cashes Ledge area. Cashes Ledge is located centrally within the Gulf of Maine and is strongly influenced by

the Gulf of Maine gyre. Productivity in the Cashes Ledge area is noteworthy because the area generates and receives internal waves that drive thick, plankton-rich layers down to the ledge (Witman et al. 1993). Dense aggregations of filter-feeding invertebrates such as horse mussels, sea anemones, and sponges thrive on the productivity of the area and flourish along many of the peaks that distinguish the area. (Witman and Sebens 1988, Lesser et al. 1994, Genovese and Witman, 1999, Hill et al. 2002)

The unique ecological features of Cashes Ledge also include the presence of one of the largest continuous kelp beds in the Gulf of Maine on Ammen Rock. Recent scientific studies have also documented that the Cashes Ledge area continues to contain an unusually high abundance of large bodied predators such as cod, wolffish, pollock, and sharks (Steneck 1997, Steneck and Carlton 2001, Steneck et al 2002). It is believed that the cod that settle on or near Ammen Rock/Cashes Ledge may have higher survival rates because of the abundance of food. Food is concentrated in this area due to the deep-water kelp forests (Vadas and Steneck, 1998), and the high water flow from nutrient-rich internal waves and other strong-current producing forces. (Witman et al. 1993, Leichter and Witman 1997, Genovese and Witman 1999).

In addition to the findings of these studies, the NEFMC itself has recognized the ecological importance of the Cashes Ledge area. Habitats within the proposed Cashes Ledge HAPC have been designated as Essential Fish Habitat for a number of Council-managed species, including juvenile and/or adult life stages of Atlantic cod, haddock, pollock, monkfish, American plaice, white hake, witch flounder, and halibut. (NEFMC 1998). Additionally, the Council has already recognized the important ecological functions provided by habitat features within the Cashes Ledge area by designating a portion of the proposed Cashes Ledge HAPC as a Level 3 habitat closure. (NEFMC 2004). One purpose of this proposed HAPC is to extend the boundaries of the Cashes Ledge Habitat Closed Area in order to include deeper water habitats and ridges associated with Cashes Ledge.

The Cashes Ledge area has also been an integral part of the Council's efforts to rebuild the Gulf of Maine cod stock. Framework 33 to the Northeast Multispecies FMP (May 2000) implemented a seasonal closure on Cashes Ledge for July through October (and November if necessary). Parties to the settlement negotiations on the FW-33 lawsuit also recognized its importance to GOM cod recovery and agreed to extend the closure year-round. Most recently, parts of the area were designated as a year-round mortality closure as part of Amendment 13 to the Northeast Multispecies FMP. These mortality closures in the Cashes Ledge area demonstrate the critical importance of the Cashes Ledge area to the productivity and sustainability of regional groundfish stocks, most notably, Gulf of Maine cod.

Sensitivity to Anthropogenic Stresses:

The proposed Cashes Ledge HAPC contains a wide array of habitat types, including bedrock outcrops, hard-bottom areas with emergent epifauna, and deeper mud basins. The hard bottom areas with emergent epifauna, including kelp forests, sea anemones, and

sponges are particularly sensitive to anthropogenic stresses, including impacts caused by fishing gear.

Impacts to benthic habitat features have been widely studied, both in the Northeast region and across the Atlantic. 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 diminished 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 gravel 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. These studies and others clearly demonstrate that benthic habitat features region-wide and within the proposed Cashes Ledge HAPC are sensitive to anthropogenic stresses, including impacts caused by fishing gear. A summary of those studies is provided below.

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. Jennings and Kaiser (1998) concluded that fishing activities lead to changes in the structure of marine habitats and influence the diversity, composition, biomass, and productivity of the associated biota. They further concluded these effects vary according to gears used, habitats fished and the magnitude of natural disturbance, but tend to increase with depth and the stability of the substrate.

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). They also concluded that for fixed gear, the area impacted per unit effort is smaller than for mobile gear, but the types of damage to emergent benthos appear to be similar. These studies and others clearly demonstrate that benthic habitat features region-wide and within the proposed Cashes Ledge HAPC are sensitive to anthropogenic stresses, including impacts caused by fishing gear.

These impacts are especially important to consider in this proposal given that juvenile and adult life stages of several Council-managed species have been determined to be moderately to highly vulnerable to impacts from mobile fishing gear. According to analyses presented in Amendment 13, the following species have EFH within the proposed Cashes Ledge HAPC American plaice, Atlantic cod, Atlantic halibut, haddock, pollock, white hake, and witch flounder. EFH for all of these species has been determined to be moderately to highly vulnerable to impacts from bottom-tending mobile gears. (NEFMC 2004, p. I-511).

Topic 4: Potential and Existing Threats

The greatest potential threat to the unique habitat features contained in the proposed Cashes Ledge HAPC is impacts caused by fishing gear. Currently, a portion of the proposed Cashes Ledge HAPC is designated as a Level 3 Habitat Closure. This designation prohibits the use of bottom-tending mobile gear. (NEFMC 2004). However, the designation does not prohibit the use of a wide array of other fishing gears, including but not limited to: 1) herring and tuna purse seines, 2) herring mid-water trawls, 3) bottom gillnets, 4) lobster pots, and 5) bottom longlines.

Currently, a significant portion of the proposed Cashes Ledge HAPC is closed to “gear capable of catching groundfish” as part of a mortality closure in the Northeast Multispecies FMP. (NEFMC 2004). However, the closure is part of a groundfish mortality reduction program, not a habitat protection program. As such, this mortality closure may be modified or eliminated in the future if groundfish stocks (including Gulf of Maine cod) are successfully rebuilt to healthy, sustainable levels. If the closure is eliminated, habitat features within the proposed Cashes Ledge HAPC will be vulnerable to significantly increased fishing-related impacts. Spatial analysis of fishing effort from 1995-2001 shows a moderate to high levels of fishing effort by otter trawls and bottom gillnets in areas immediately adjacent to the proposed HAPC. (NEFMC 2004, Figures 1 and 2). As such, the HAPC designation is warranted now to assure the impacts to unique habitat feature within the Cashes Ledge area are carefully considered and minimized as existing regulation change in the future.

Topic 5: HAPC Boundary (Map and Coordinates)

Coordinates:
Point 1: 42 deg 35 min Longitude, 69 deg 10 min Latitude
Point 2: 43 deg 05 min Longitude, 69 deg 10 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 Cashed Ledge 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.

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Genovese, S.J. and J.D. Witman (1999). Interactive effects of flow speed and particle concentration on growth rates of an active suspension feeder. Limnology and Oceanography. 44: 1120-1131.

Hill, M.F., J.D. Witman, and H. Caswell (2002). Spatio-temporal variation in Markov chain models of subtidal community succession. Ecology Letters 5: 666-675.

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Lesser, M.P., J.D. Witman, and K.P. Sebens (1994). Effects of flow and seston availability on scope for growth of benthic suspension fedding invertebrates in the Gulf of Maine. Biol. Bull. 187: 319-335.

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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.

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.

Steneck, R. S. (1997). Fisheries-induced biological changes to the structure and function of the Gulf of Maine Ecosystem. Plenary Paper. pages 151 - 165 in Wallace, G. T., and Braasch, E. F. (eds). Proceedings of the Gulf of Maine Ecosystem Dynamics Scientific Symposium and Workshop. RARGOM Report, 97 - 1. Regional Association for Research on the Gulf of Maine. Hanover, NH.

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Steneck, R. S., M.H. Graham, B.J. Bourque, D. Corbett, J.M. Erlandson, J.A. Estes, and M.J. Tegner (2002). Kelp forest ecosystem: biodiversity, stability, resilience and their future. Environmental Conservation. 29 (4): 436 - 459.

Steneck, R.S., J. Vavrinec, and A.V. Leland (2004). Accelerating trophic-level dysfunction in kelp forest ecosystems of the western north Atlantic. Ecosystems (2004) 7:323-332.

Vadas, R. L. and R. S. Steneck (1988). Zonation of deep water benthic algae in the Gulf of Maine. *J. Phycol.* 24: 338 - 346.

Wigely, R. (1968). Benthic invertebrates of the New England fishing grounds. Underwater Naturalist 5(1): 8-13.

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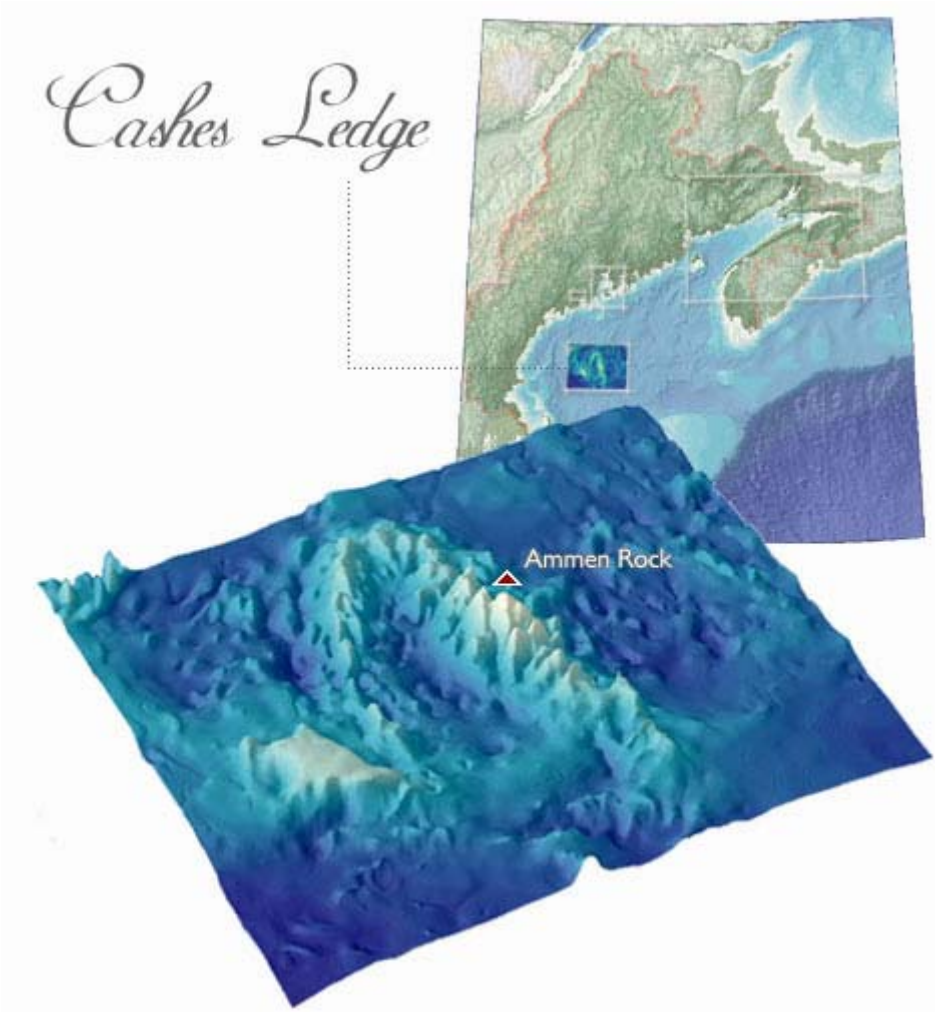

*** Courtesy of the Gulf of Maine Research Institute**