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E.F. "Terry" Stockwell III, *Chairman* | Thomas A. Nies, *Executive Director*

MEMORANDUM

DATE: **April 7, 2015**

TO: Habitat Committee

FROM: Tom Nies, Executive Director

SUBJECT: **Rationale for the Georges Bank Cod Habitat Area of Particular Concern (HAPC)**

At the Habitat Committee meeting in March 2015, the Committee asked staff to summarize the original rationale for the Georges Bank Cod HAPC. This memo provides a brief overview of the development of this HAPC in the original Omnibus Habitat Amendment (OHA) and Phase 1 of Omnibus Habitat Amendment 2 (OHA2). This is not intended to be a comprehensive summary of all Georges Bank Cod HAPC issues. No attempt was made to evaluate the supporting research or to seek out additional research on the issue.

This summary is based on a review of the documents available in the office. Prior to 2005, most meeting documents were distributed on paper. Many are no longer available as they were shipped to the archives.

1. Omnibus Habitat Amendment (OHA)

The Georges Bank Cod HAPC was first adopted in OHA, submitted by the Council in October, 1998. OHA used guidance in an interim final rule for selecting HAPCs:

> "(9) Identification of habitat areas of particular concern. FMPs should identify habitat areas of particular concern within EFH. In determining whether a type, or area of EFH is a habitat area of particular concern, one or more of the following criteria must be met:
>
> (i) The importance of the ecological function provided by the habitat.
>
> (ii) The extent to which the habitat is sensitive to human-induced environmental degradation.
>
> (iii) Whether, and to what extent, development activities are, or will be, stressing the habitat type.
>
> (iv) The rarity of the habitat type."

Overview of Rationale

The Georges Bank Cod HAPC was selected because of the importance of gravel/cobble substrate to the survival of newly settled juvenile cod. Juvenile cod are subject to high mortality from predation. While pelagic juveniles are widely distributed, by late July/August, demersal juveniles are only found on gravel/cobble on the northeastern part of the bank. As a result of the presence of gravel/cobble, the HAPC met the first criterion in that the habitat provides an important ecological function.

Specific areas on the northeast part of Georges Bank were extensively studied as important areas for the survival of juvenile cod and these studies provided reliable information on the location of the most important areas. Gravel/cobble not subject to fishing supports thick colonies of emergent epifauna, but bottom fishing – particularly scallop dredging - reduces habitat complexity and removes epifauna. The studies focused on cumulative effects and not on single tows. Based on this body of work, OHA concluded the HAPC met the second criterion.

In addition, the relative abundance of prey species is higher in areas of emergent epifauna. Protected areas promote increased survival and provide readily available prey.

OHA did not compare the GB Cod HAPC to the third and fourth HAPC criteria. The western boundary was chosen to match the border of CAII.

Supporting Information

This section summarizes research that was used to support the HAPC.

Lough et al. (1989) used survey data and video from submersibles to document the distribution of juvenile cod on Georges Bank. They found that while pelagic juvenile cod are widely distributed on GB during June, by late July and August demersal juvenile cod were only found on the northeastern edges of GB[1], and the largest aggregations were affiliated with an area described as "gravel pavement". They offered the hypotheses that these areas afforded protection from predators (because the mottled surface makes it difficult to see juvenile cod) and increased prey for juvenile cod. Valentine and Lough (1991) provided more detailed maps of substrate in the area of the HAPC and linked those substrates to cod, scallop, and herring distributions. Tupper and Boutilier (1995) performed an experiment off Canada that showed that juvenile cod suffered less predation mortality in gravel substrate ("…postsettlement survival and subsequent juvenile densities were higher in-more structurally complex habitats."). Increasing availability of suitable habitat may ease an "ecological bottleneck" and could increase juvenile survival and recruitment into the fishery. Collie et al. (1996) and Collie et al. (1997) documented the effects of trawls and dredges on epifauna and megafauna by comparing trawled locations to undisturbed locations. Both studies found significant differences between fished and unfished areas.

Example literature cited (this is not all papers cited in the OHA):

Lough, R.G., P.C. Valentine, D.C. Potter, P.J. Auditore, G.R. Bolz, J.D. Neilson, and R.I. Perry. 1989. Ecology and distribution of juvenile cod and haddock in relation to sediment type and bottom currents on eastern Georges Bank. Mar. Ecol. Prog. Ser. 56:1-12

[1] The areas of the highest juvenile cod densities identified in Lough et al. were all east of the US/Canada border.

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(9): 1834-1841.

Valentine, P.C. and E.A. Schmuck. 1995. Geological mapping of biological habitats on Georges Bank and Stellwagen Bank, Gulf of Maine region. in *Proceedings of 8th Western Groundfish Conference, Workshop on Applications of Sidescan Sonar and Laser Line Systems in Fisheries Research*: Alaska Department of Fish and Game Special Publication.

Collie, J.S., G.A. Escanero, L. Hunke and P.C. Valentine. 1996. Scallop dredging on Georges Bank: photographic evaluation of effects on benthic epifauna. International Council for the Exploration of the Sea. ICES C.M. 1996.

Collie, J.S., G.A. Escanero and P.C. Valentine. 1997. Effects of bottom fishing on the benthic megafauna of Georges Bank. Mar. Eco. Prog. Ser. 155: 159-172.

2. OHA2 – Phase I

OHA2 considered two alternatives for the GB cod HAPC. As an alternative to the existing HAPC (identified as the No Action alternative), an expansion of the HAPC to the west was considered (see **Figure 1** below). This was called the GB/Northern Edge HAPC. Additional rationale was provided for this area. The Council's final choice was the existing GB cod HAPC (the No Action alternative).

The OHA2 Phase I HAPC process is worth describing. The Council solicited proposals for candidate HAPCs and received several responses. In addition to the criteria in the habitat regulations (see above), the Council encouraged the development of HAPC proposals that (in no particular order):

- Will improve the fisheries management in the EEZ.
- Include EFH designations for more than one Council-managed species in order to maximize the benefit of the designations.
- Include juvenile cod EFH.
- Meet more than one of the EFH Final Rule HAPC criteria.

OHA2 Phase I supported the existing GB cod HAPC by summarizing the applicability of the area to the life stages of several species, including cod.

There was a lengthy discussion to support the GB/Northern Edge HAPC considered as an alternative. This alternative proposed expanding the HAPC to the west to encompass more gravel, cobble, and boulder habitat features known to improve the survival of juvenile cod and other species. The boundaries were similar to an alternative considered in Amendment 13. Notably, this alternative was intended to be an HAPC for a range of species, not just cod.

Supporting Information

The discussion of the Northern Edge alternative included more recent research that documented the importance of the area to cod and other species. Lindholm et al. (1999) conducted an experiment that again demonstrated survival of juvenile cod was increased in gravel/cobble habitats. Collie et al. (2005) documented significant increases in abundance and biomass at a site after two years of closure. They concluded recovery time from the effects of trawling and dredging on gravel of habitat was on the order of 10 years. They documented a higher abundance of biomass and benthic megafauna at undisturbed gravel sites, and found that undisturbed sites had a different species composition. Hermsen et al. (2003)

documented higher production of benthic megafauna at undisturbed sites when compared to disturbed sites.

Collie, J.S., Hermsen, J.M., Valentine, P.C., and F.P. Almeida. 2005. Effects of fishing on gravel habitats: assessment and recovery of benthic megafauna on Georges Bank. Pages 235-343 In P. Barnes and J. Thomas [eds.] Benthic habitats and the effects of fishing. American Fisheries Society, Bethesda, MD.

Hermsen, J.M., Collie, J.S., Valentine, P.C. 2003. Mobile fishing gear reduces benthic megafauna production on Georges Bank. Mar. Ecol. Prog. Ser. 260:97-108.

Lindhom, 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).

Lindholm, J.B., P.J. Auster, and L.S. Kaufman. 1999. Habitat-mediated survivorship of juvenile (0-year) Atlantic cod *Gadus morhua*. Mar. Ecol. Prog. Ser. 180: 247-255.

Figure 1 – GB/Northern Edge HAPC alternative considered in OHA2 Phase I (blue shading). The No Action/Council preferred HAPC alternative and existing habitat closure area is hatched.