Eastern Scotian Slope Canyons IMMA

Area Size

8 944 km²

Qualifying Species and Criteria

Sei Whale – *Balaenoptera borealis*

Criterion A; B (2)

Blue Whale – *Balaenoptera musculus*

Criterion A; B (2); C (2)

Fin Whale – *Balaenoptera physalus*

Criterion A; B (2)

Long-finned Pilot Whale – *Globicephala melas*

Criterion B (2)

Northern Bottlenose Whale – *Hyperoodon ampullatus*

Criterion B (1, 2); D (1)

Atlantic White-sided Dolphin – *Leucopleurus acutus*

Criterion B (2)

Humpback Whale – *Megaptera novaeangliae*

Criterion B (2)

Sowerby's Beaked Whale – *Mesoplodon bidens*

Criterion B (2); C (2)

Sperm Whale – *Physeter macrocephalus*

Criterion A; B (2); C (2)

Cuvier's Beaked Whale – *Ziphius cavirostris*

Criterion C (2)

Criterion D (2) Marine Mammal Diversity

Balaenoptera borealis, Balaenoptera musculus, Balaenoptera physalus, Delphinus delphis, Globicephala melas, Hyperoodon ampullatus, Leucopleurus acutus, Megaptera novaeangliae, Mesoplodon bidens, Physeter macrocephalus, Stenella coeruleoalba, Ziphius cavirostris

Other Marine Mammal Species Documented

Grampus griseus, Tursiops truncatus

Summary

The Eastern Scotian Slope Canyons IMMA is located along the continental slope southeast of Nova Scotia. The area spans roughly 120 km along the Scotian Slope, and up to about 110 km perpendicular to the shelf. It includes three large submarine canyons, the Gully, Shortland Canyon and Haldimand, as well as inter-canyon areas spanning depths from 200 m to 3,200 m. This area encompasses the core breeding grounds and feeding areas of the small resident Scotian Shelf population of northern bottlenose whales (*Hyperoodon ampullatus*). The IMMA also serves as a feeding area for blue whales (*Balaenoptera musculus*) and sperm whales (*Physeter macrocephalus*), and sustains a high diversity of marine mammals (at least 13 species). Within this area are endangered blue whales and sei whales (*Balaenoptera borealis*), as well as vulnerable fin (*Balaenoptera physalus*) and sperm whales. The area includes the Gully Marine Protected Area, which provides good protection for marine mammals, as well as parts of the Eastern Canyons Marine Refuge, which protects the seafloor.

Figure 1: Group of northern bottlenose whales (*Hyperoodon ampullatus*) sighted in the Gully submarine canyon, part of the Eastern Scotian Slope Canyons IMMA. These individuals are part of the Scotian Shelf population, considered Endangered under the Canadian Species at Risk Act, and reside in the Gully and surrounding areas year-round. Photo credit: Whitehead Lab, Dalhousie University.

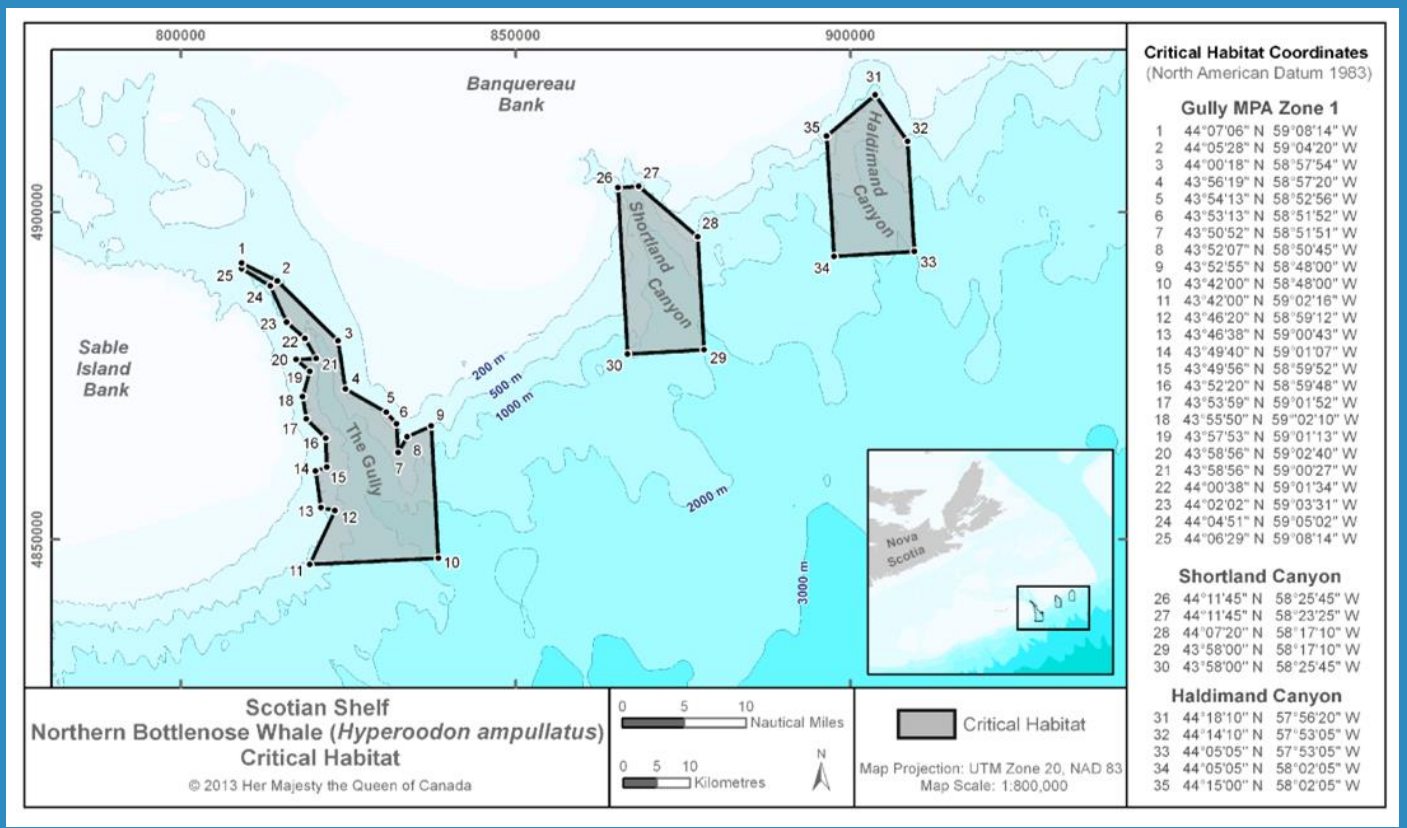

Figure 2: Boundaries of the Scotian Shelf northern bottlenose whale (*Hyperoodon ampullatus*) Critical Habitat identified and protected under the Canadian Species at Risk Act, which include Zone 1 of the Gully Marine Protected Area, Shortland Canyon, and Haldimand Canyon. Excerpt from DFO (2016).

Figure 3: A Sowerby's beaked whale (*Mesoplodon bidens*) sighted in the Eastern Scotian Slope Canyons IMMA. Photo credit: Marina Milligan.

Description:

The Eastern Scotian Slope Canyons IMMA is located along the continental slope southeast of Nova Scotia. It includes three large submarine canyons covering 120 km along the edge of the Scotian Shelf: the Gully, Shortland Canyon and Haldimand Canyon, as well as intervening waters. The Gully is steep-sided about 65 km long and is the largest submarine canyon in the western North Atlantic. The canyons drop from the Scotian Shelf (generally from 100-200 m deep) to over 1,000 m deep, and over 2,000 m deep in the Gully. The IMMA includes a shallower (200-500 m deep) fan-shaped extension of the Gully to the northwest. The IMMA includes the Gully MPA, which was established in 2004 and protects cetaceans within it from fishing activity, oil and gas development and other threats. Shortland and Haldimand Canyons are included in the Eastern Canyons Marine Refuge, created in 2022, which provides protection for the seafloor.

Criterion A: Species or Population Vulnerability

Four of the species that regularly occur in this area and qualify for other criteria in this IMMA are considered threatened with extinction according to the global IUCN Red List. The blue whale (*Balaenoptera musculus*) and sei whale (*Balaenoptera borealis*) are listed as Endangered on the Red List globally (Cooke, 2018a,b), and the fin whale (*Balaenoptera physalus*; Cooke. 2018c) and sperm whale (*Physeter macrocephalus*; Taylor et al. 2019) are both listed as Vulnerable on the Red List globally.

Figure 4: An Endangered blue whale (*Balaenoptera musculus*) surfacing in the Gully submarine canyon within the Eastern Scotian Slope Canyons IMMA. Photo credit: Whitehead Lab, Dalhousie University.

Additionally, the Canadian Species at Risk Act (SARA – the Canadian legislation for protection of at-risk species) lists the Scotian Shelf population of northern bottlenose whales (*Hyperoodon ampullatus*) as Endangered (DFO, 2016).

Criterion B: Distribution and Abundance Sub-criterion B1: Small and Resident Populations

While multiple populations of northern bottlenose whales occur in the North Atlantic Ocean, the Scotian Shelf population is a very small resident population occurring at the extreme southern limit of the species' range. The Eastern Scotian Slope Canyons area encompasses the core important habitat of this population, which is resident in the area throughout the year, with some photo-identified individual animals showing high levels of long-term site fidelity over 30 years (Wimmer & Whitehead, 2005; Feyrer et al., 2021). Passive acoustic monitoring detections recorded the presence of northern bottlenose whales in the Gully submarine canyon on all recording days, and show regular northern bottlenose whale foraging within and between these canyons (Stanistreet et al. 2021, Feyrer et al. 2024). Mark-recapture analyses using photo-identification, which include heterogeneity in identification, estimate that the population numbers about 143 animals (95% CI: 129 to 156 animals; O'Brien & Whitehead, 2013), although a more recent unpublished analysis indicates that in 2023 it had risen to about 210 (95% CI: 150 to 287; Feyrer et al., in prep.). These animals are genetically distinct from other populations in the North Atlantic (Feyrer et al., 2019).

Sub-criterion B2: Aggregations

Sighting rates during surveys run from 10-12 m research sailing vessels between 1988-2023 from June to early September indicate that the number of groups observed per hour equivalent in excellent conditions were considerably higher in the canyons (2962 hours effort) than other areas along the edge of the Scotian Shelf (417 hours effort) for the following species: blue whales (0.029 vs 0.014); fin whales (0.030 vs 0.014); pilot whales (*Globicephala melas*; 0.170 vs 0.105); northern bottlenose whales (0.601 vs 0.012); Atlantic white-sided dolphins *Leucopleurus acutus*; 0.117 vs 0.041); humpback whales (*Megaptera novaeangliae*; 0.014 vs 0.007); and Sowerby's beaked whales (*Mesoplodon bidens*; 0.085 vs 0.010) (Whitehead & Feyrer in preparation). Additionally, sperm whales (for which data could not be used for these sighting rates) were acoustically detected at about 30% of listening stations in the canyon areas, and "occasionally" (ca. 10% of listenings) in other parts of the Scotian Shelf (Whitehead et al., 1992). Longer term passive acoustic monitoring efforts using bottom-mounted recorders deployed for months to years at a time also indicate regular presence of multiple beaked and baleen whales (see Criterion D2), including the presence of northern bottlenose whales in the Gully submarine canyon on 100% of recording days (Stanistreet et al., 2021; Feyrer et al., 2024), and sei whales (*Balaenoptera borealis*) on about 50-75% of recording days during the summer months (Macklin, 2022). The enhanced densities in the canyons are likely a result of increased prey densities caused by unusual oceanographic processes, especially in the largest canyon, the Gully (Moors-Murphy, 2014).

Criterion C: Key Life Cycle Activities
Sub-criterion C2: Feeding Areas

Foraging within the Gully and inter-canyon areas by Sowerby's and Cuvier's (*Ziphius cavirostris*) beaked whales is evidenced by recordings of their deep-water echolocation clicks during passive acoustic monitoring studies (Stanistreet et al., 2017; Delarue et al., 2024; Feyrer et al., 2024). Similarly, sperm whale echolocation clicks commonly recorded in the area are almost certainly linked to benthic foraging on species such as monkfish (*Lophius americanus*) (Mullins et al., 1988; Whitehead et al., 1992). Blue whales have been observed engaged in feeding behaviour in the canyons, presumably because the canyon-dependent oceanographic processes aggregate zooplankton in sufficient quantities. Furthermore the eastern Scotian Shelf canyons and inter-canyon areas have been identified as part of important blue whale feeding habitat (DFO, 2018; Lesage et al., 2018) which is supported by krill modelling studies (Plourde et al.. 2016) as well as visual observations and acoustic detections (Moors-Murphy et al., 2019).

Criterion D: Special Attributes
Sub-criterion D1: Distinctiveness

Movement models suggest that about 40% of the Scotian Shelf northern bottlenose whale population uses the Gully during any 5-day period (Feyrer et al., in prep.), with substantial numbers in Shortland Canyon, Haldimand canyon, and other parts of the IMMA at any time (Wimmer & Whitehead, 2005; Stanistreet et al., 2021). The IMMA is at the extreme southern limit of the species' usual range (Whitehead & Hooker, 2012), and the Scotian Shelf population is genetically distinct from other populations in the North Atlantic (Feyrer et al., 2019).

Sub-criterion D2: Diversity

High species diversity within this area generally, and specifically within the Gully submarine canyon, has long been documented (Hooker et al., 1999; Whitehead, 2013). During surveys between June and early September from 1988-2023 using 10-12 m research sailing vessels (3537 equivalent hours in excellent sighting conditions), ten species are represented by 50 or more group sightings: blue whales, common dolphins (*Delphinus delphis*), fin whales, humpback whales, northern bottlenose whales, pilot whales, Sowerby's beaked whales, sperm whales, striped dolphins (*Stenella coeruleoalba*) and white-sided dolphins (Whitehead & Feyrer in prep.). This large species diversity in the area is also supported by long-term passive acoustic monitoring studies that provide evidence of the regular presence of beaked whales throughout the year, including northern bottlenose whales, Sowerby's beaked whales, and Cuvier's beaked whales (Stanistreet et al., 2017; 2021, Delarue et al., 2024; Feyrer et al., 2024); as well as the seasonal occurrence of baleen whales including blue, fin, sei and humpback whales (Kowarski et al., 2017; Moors-Murphy et al., 2019; Davis et al., 2020; Delarue et al., 2022; Macklin, 2022; Wingfield et al., 2022). Thus, at least 13 species use the IMMA on a regular basis.

Supporting Information

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