Labrador Shelf Offshore Area Strategic Environmental Assessment Update

Chapter 8

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8.0 SENSITIVE AREAS

There are several areas in Newfoundland and Labrador that are formally protected under federal, provincial, international and/or other legislation or programs because they are considered to be important for ecological, historical, social, or economic reasons (Figure 8-1). These and a number of additional areas and places recognized for their importance, located within the Labrador Shelf SEA Update Area, are identified as sensitive areas. For the purposes of the SEA Update, the term sensitive area is defined as:

- *An area that is afforded some level of protection (for the primary purpose of conservation) under provincial or federal legislation (i.e. Newfoundland and Labrador Wilderness and Ecological Reserves Act [ecological reserves], DFO Oceans Act [MPAs], DFO Fisheries Act [Marine Refuges and Ecologically Significant Areas], Parks Canada Canada National Marine Conservation Areas Act (2002) [National Marine Conservation Areas], Parks Canada National Parks Act, 2000 [National Parks and National Historic Sites], ECCC Migratory Birds Convention Act [Migratory Bird Sanctuaries], ECCC Canada Wildlife Act [National Wildlife Areas and Marine National Wildlife Areas]); or*
- *An area that may be under consideration for such legislative protection (e.g., candidate area or area of interest); or*
- *An area that is known to have particular ecological and/or cultural importance and is not captured under federal or provincial regulatory framework (e.g., corals, spawning, nursery, rearing, or migratory areas, areas of high productivity, IBAs, EBSAs, SBAs, Vulnerable Marine Ecosystems (VMEs) and areas of traditional harvesting activities).*

The identification of an area as a sensitive area within the Labrador Shelf SEA Update Area, in itself, does not automatically imply that this area will require the application of enhanced mitigation or restrictions on activities. The timing, spatial extent, and nature of proposed oil and gas activities, in addition to prohibitions and mitigation prescribed by legislation, will determine the level of restriction mitigation that will be required. Further discussion regarding sensitive areas and the regulatory mechanisms in place will be provided in the sections below.

8.1 REGULATORY FRAMEWORK

There are multiple regulatory instruments from the federal government of Canada that enable protection of Canada's lands and waters (e.g., *Oceans Act* and *Canada Wildlife Act*). A summary of applicable legislation is provided below in Table 8.1.

Marine fisheries are administered by DFO through the federal *Fisheries Act*. Management of marine mammals, including SAR, is controlled by DFO under the *Marine Mammals Regulations* of the *Fisheries Act*. Species at risk are administered under SARA, which lists the species and provides measures to protect listed species.

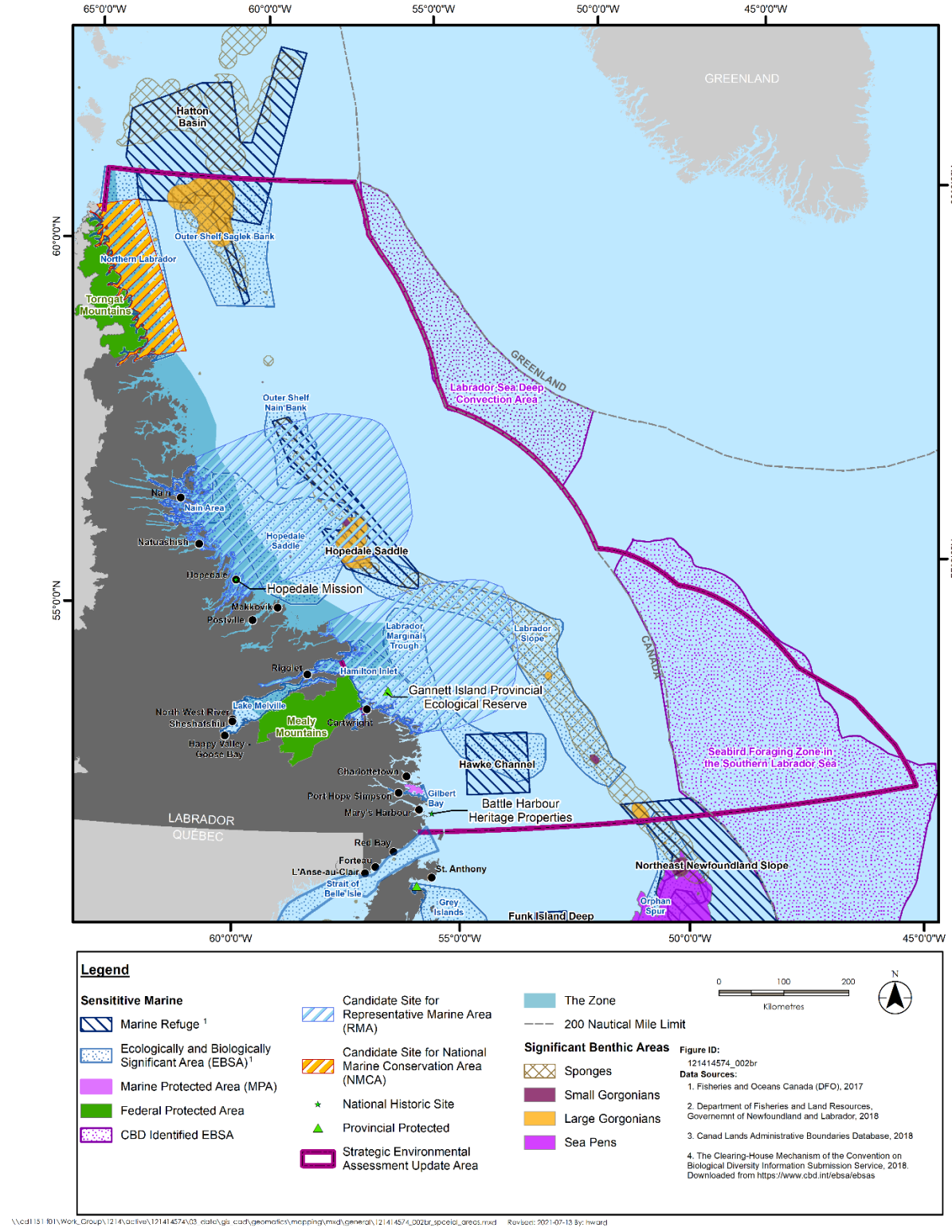

Figure 8-1 Sensitive Areas within the Labrador Shelf SEA Update Area

Table 8.1 Federal Legislation to Protect Areas within Canada

Legislation / Regulation	Type of Area	Department / Agency
Oceans Act, 1996, c.31	Marine Protected Areas	DFO
Fisheries Act, 1985, c.43	Fisheries Closure Areas, Marine Refuges	DFO
Migratory Bird Convention Act	Migratory Bird Sanctuary	ECCC
Canada National Parks Act, 2000, c.32	National Park	Parks Canada
Canada Wildlife Act, R.S., 1985, c. W-9	National Wildlife Area	ECCC
Canada National Marine Conservation Areas Act (2002)	National Marine Conservation Area	Parks Canada
Canada Wildlife Act, R.S., 1985, c. W-9	Marine National Wildlife Areas	ECCC

Migratory birds, including SAR, are solely or jointly managed (depending on the species) between Canada and the US through ECCC-CWS. Current legislation and agreements regarding migratory birds include the Convention for the Protection of Migratory Birds (1916), *Migratory Birds Convention Act* and the North American Waterfowl Management Plan (ECCC-CWS and United States Fish and Wildlife Services (USFWS) 1986; ECCC-CWS, USFWS, and the Mexican Secretariat of the Environment, Natural Resources, and Fisheries 1998). Waterfowl are managed according to “flyways” denoting wintering and summering habitat connected by international migration corridors. The Labrador region falls within the Atlantic Flyway.

Provincial parks are administered under the *Provincial Parks Act* (1970), while sensitive areas such as ecological reserves are administered under the provincial *Wilderness and Ecological Reserves Act* (1980). National parks are administered under the *National Parks Act* (2000). MPAs are administered under the *Oceans Act* (1996), which includes *Gilbert Bay Marine Protected Regulations (2005)* outlining the regulations applicable to Gilbert Bay, an MPA within the Labrador Shelf SEA Update Area.

Parks Canada is responsible for not only National Parks and National Historic Sites, but also with setting up a national system of MPAs to represent each of the 29 marine regions identified within its system plan. The *Canada National Marine Conservation Areas Act (2002)* (CNMCAA) enables Parks Canada to manage a system of National Marine Conservation Areas (NMCAs) that is representative of the Atlantic, Arctic and Pacific Oceans, and the Great Lakes. Parks Canada is responsible for administering public lands in NMCAs and for administering and managing all aspects of NMCAs not assigned by law to any other Minister of the Crown. NMCAs are managed through collaboration and are based on a shared management model that respects the legislative mandates of other federal departments and the authority of provincial and territorial governments and Indigenous peoples. Parks Canada plans to develop national regulations under the CNMCAA over the coming years.

Internationally, sensitive areas are designated by NAFO and protected through NAFO’s Conservation and Enforcement Measures. These measures are updated annually and apply to fishing vessels that operate in waters under NAFO jurisdiction. These Conservation and Enforcement Measures outline the current sensitive areas that NAFO has identified. NAFO is responsible for the designation of VMEs, which are

seabed areas vulnerable to bottom contact gear and subsequently closed to bottom fishing. VMEs are considered hotspots of biodiversity and ecosystem functioning in the deep sea, with high vulnerability to disturbance and/or a low recovery potential (e.g., areas of high coral and sponge abundance, seamounts, canyons). VMEs can be considered the international equivalent of SBAs. There are no VMEs identified within the international waters of the Labrador Shelf SEA Update Area.

8.1.1 Federally Designated Sensitive Areas

Federally designated sensitive areas include protected areas designated under federal legislation. The federal government has identified other special or sensitive areas that are not protected by legislation, such as EBSAs (see Section 8.1.1.1) and SBAs (see Section 8.1.1.2).

The following sections describe various federally identified sensitive areas, including those that have already been established as well as a potential area that is currently undergoing a feasibility assessment (Section 8.1.1.6).

8.1.1.1 Ecologically and Biologically Significant Areas

In Canadian waters, DFO has identified 13 bioregions based on oceanographic and bathymetric properties and ecological use to facilitate better ocean management decisions (DFO 2002, 2005a; Government of Canada 2011). The Labrador Shelf SEA Update Area falls within the Newfoundland and Labrador Shelves Bioregion.

EBSAs are identified by DFO to emphasize marine areas with high ecological or biological activity relative to their surrounding environment, facilitating provision of a greater-than-usual degree of risk aversion in management of activities in such areas (DFO 2005a). There are 29 EBSAs within Newfoundland and Labrador Shelves Bioregion, with 13 occurring in the Labrador Shelf SEA Update Area (Wells et al. 2017, 2019). A list of the 13 EBSAs within the Labrador Shelf SEA Update Area, and the details on the reasons for designation of each EBSA, is provided in Table 8.2 and EBSA locations within the Labrador Shelf SEA Update Area are shown in Figure 8-1. EBSAs are not legal designations (i.e., do not meet criteria as “Marine Protected Areas or Other Effective Conservation Measures”). EBSAs are not spatial protection measures and only serve to highlight values within the marine landscape.

Criteria for EBSA designation include:

- Uniqueness (how distinct the ecosystem is compared with surrounding areas);
- Aggregation (which species convene or populate within the area);
- Fitness consequences (how the area is critical to the life history of the species found within it);
- Resilience (what is the ability of the ecosystem to bounce back if it is disturbed);
- Naturalness (how pristine or disturbed by human activities is the area).

Table 8.2 EBSAs within the Labrador Shelf SEA Update Area

EBSA Name	Physical Features	Key Biological Features
Northern Labrador	• Coastal and Offshore EBSA (includes both coastal and offshore waters) • Underwater features include: inner shelf, middle shelf, Saglek Bank; Cape Chidley to Saglek Bay	• Unique migratory area for endangered Eastern Hudson Bay belugas (See Figure 6-3 for the extent of occurrence of this population); important areas for Harlequin Duck and Barrow's Goldeneye (listed as Special Concern under SARA) • Increasingly important summer / fall nearshore feeding habitat and migration corridor for polar bear • Important feeding and summer haul out area for ringed seal; important rearing and feeding areas for Arctic char • Two IBAs, Seven Islands Bay and Galvano Island, are found within this EBSA • Includes coastal habitat along Northern Labrador in Torngat Mountains National Park.
Outer Shelf Saglek Bank	• Offshore EBSA (includes offshore waters) • Underwater features include: Outer shelf of Saglek Bank, Labrador Slope	• Important coral and sponge concentrations • Feeding and migration area for several marine mammal species (whales and seals) • Important aggregation area for several seabird species, including Ivory Gull (listed as Endangered under SARA) • High concentrations of roundnose grenadier (designated as endangered by COSEWIC)
Outer Shelf Nain Bank	• Offshore EBSA (includes offshore waters) • Underwater features include: Outer shelf of Nain Bank, Labrador Slope	• High diversity of species (fish, marine mammals and seabirds); high concentrations of several coral species • Aggregations of several fish functional groups • Juvenile and female hooded seal aggregation area • Aggregations of several seabird species, including Ivory Gull (listed as endangered under SARA) • Summer feeding area for harp seal
Nain Area	• Coastal EBSA (includes coastal waters) • Underwater features include: Webb Bay, Tikkoatokak Bay, Nain Bay, Anaktalik Bay, Voisey Bay, Fraser River	• Major colony of Thick-billed Murre • Aggregations of several waterfowl and seabird species, Common Eider colonies and other seabird colonies • Capelin spawning beach • Highly productive area for Arctic char • Unique landfast ice habitat, important for seals, polar bears, wolves, foxes, and ravens • Salmon spawning area • Large sand delta, important for seabirds • Two IBAs, Nain Coastline (known for congregations of Harlequin Duck, Peregrine Falcon, and Surf Scoter) and Offshore Islands Southeast of Nain, are found within this EBSA
Hopedale Saddle	• Offshore EBSA (includes offshore waters) • Underwater features include: Hopedale Saddle, Labrador Marginal Trough, Nain Bank High Point	• Unique Eastern Hudson Bay beluga overwintering area • Several other coral, fish, marine mammal, and seabird species, including many that are rare or endangered (e.g., skates, Atlantic and spotted wolffish, roundnose grenadier, Ivory Gull), are found in high densities • Feeding area for harp seal; female and juvenile hooded seal between August and February • Offshore Islands Southeast of Nain IBA is located within this EBSA

Table 8.2 EBSAs within the Labrador Shelf SEA Update Area

EBSA Name	Physical Features	Key Biological Features
Labrador Slope	• Offshore EBSA (includes offshore waters) • Underwater features include: Labrador Slope, outer shelf, Hamilton Spur • Characterized by high bathymetric relief with depth ranges of 200 to 2,000 m	• High diversity of species • High concentrations of several coral and sponge species (coral species richness hotspot) • Aggregations of fish functional groups, several core species and several rare or endangered species, including Atlantic, spotted and northern wolffish, roundnose grenadier, skates, and Ivory Gull • Harp seal and juvenile and female hooded seal, as well as a variety of cetaceans and seabirds frequent the area for feeding
Labrador Marginal Trough	• Offshore EBSA (includes offshore waters) • Underwater features include: Cartwright Saddle, Labrador Marginal Trough, Hawke Saddle, inside Hamilton Bank	• Aggregations of several core fish species • Potential corridor for several species of fish and marine mammals • Area of highest probability of use for harp seal whelping • Harp seal summer feeding area • Cetacean feeding / migration area • Aggregations of planktivores, piscivores, and small and medium benthivores • Hooded seal (males, females and juveniles) are known to frequent parts of this EBSA from August to February • Important area for several species of seabirds
Hamilton Inlet	• Coastal and Offshore EBSA (includes both coastal and offshore waters) • Underwater features include: Coastal and inner shelf area outside of Hamilton Inlet, Sandwich Bay and south to Island of Ponds	• Capelin spawning beaches • Highly productive areas for Atlantic salmon • Major colonies of Atlantic Puffin and Razorbill • Outflow of Lake Melville provides nutrients, critical for primary productivity blooms along the Labrador coast; large, productive areas of early or permanent open water • Harp seal whelping on pack ice • Fall and early winter-feeding area for ringed seal • Important area for several waterfowl and seabirds, with nine IBAs within this EBSA: The Backway, Northeast Groswater Bay, South Groswater Bay Coastline, Tumbledown Dick Islands and Stag Islands, Goose Brook, Cape Porcupine, Gannet Islands, Bird Island, and Table Bay
Lake Melville	• Coastal EBSA (includes coastal waters) • Physical features include: saltwater tidal extension of Hamilton Inlet; large fjord, Brackish waters	• Unique habitat (brackish waters) • Area important to sea ducks (primarily Surf Scoter) and geese • High productivity and species diversity • Several freshwater, diadromous and marine fish species • Salmonid spawning rivers and juvenile rearing areas • Highest counts of moulting Surf Scoter in Eastern Canada • High densities of breeding ringed seal • Resident population of harbour seal • The Backway IBA is located within this EBSA

Table 8.2 EBSAs within the Labrador Shelf SEA Update Area

EBSA Name	Physical Features	Key Biological Features
Gilbert Bay	• Coastal EBSA (includes coastal waters) • Physical features include: Gilbert Bay, Alexis Bay; shallow-water, low-gradient, subarctic fjord	• Genetically distinct resident population of Atlantic cod • Other species include Arctic char and Atlantic salmon • Capelin spawning area
Orphan Spur	• Offshore EBSA (includes offshore waters) • Underwater features include: Orphan Spur, outer shelf, Labrador Slope • Characterized by high bathymetric relief with depth ranges of 400 to 2,000 m	• High diversity of species • High concentrations of several coral species • Aggregations of several fish functional groups, core species and rare or endangered species, including spotted, northern and Atlantic wolffish, skates, and roundnose grenadier • Female hooded seal are found in this area from August to September; harp seal feeding area (winter) • Several seabird species known to frequent the area • Important area to several species of sharks
Southern Pack Ice	• Offshore EBSA (includes offshore waters) • Usually located south of Hamilton Inlet, as far south as Notre Dame Bay, (varies both within and among years) • Seasonal pack ice is a unique feature of the entire Bioregion	• Pack ice influences environmental and biological processes such as light penetration, wind driven mixing, salinity, and timing and extent of spring phytoplankton bloom • Highly productive • Main pupping concentrations of both harp and hooded seals • Ecosystem consists of marine scavengers, seabirds (including Ivory Gull), and polar bear
Strait of Belle Isle[1]	• Coastal EBSA (includes coastal waters) • Underwater features include: Mecatina Trough, Strait of Belle	• High concentrations of piscivorous marine mammals, large cetaceans and abundant capelin • Main spawning ground for Atlantic herring (fall spawning) • Very high concentrations of shrimp and benthic invertebrates • Important production and concentration area for juvenile Atlantic cod

Source: DFO 2007a, 2007b, 2013, Wells et al. 2017, McQuinn et al. 2012
Note:
[1] Straight of Belle Isle EBSA was identified through a different process for the Estuary and Gulf of St. Lawrence Bioregion

The process for identifying EBSAs in the NL Shelves Bioregion and their importance to the broader ecosystem are outlined in Wells et al. (2017). Biological, physical and oceanographic data were collected from a variety of sources (primarily DFO and ECCC). Fish data were based on biomass from fall RV surveys; seabirds and waterfowl data were plotted at the species, or sometimes guild level; and rare or

endangered species were recognized based on COSEWIC designations. Traditional Ecological Knowledge (TEK) was collected and used to validate and/or augment scientific data during the EBSA identification process.

The process for identifying and defining candidate EBSA boundaries involved a step-by-step analysis of the spatial data to identify important areas (e.g., for several species or species groups and/or logical grouping based on common characteristics) and refine boundaries of EBSAs drawn in previous steps. Data layers were examined in detail to identify important areas at different resolutions so as to not overlook important areas that may have been missed at coarser resolutions (Wells et al. 2017).

For the Straight of Belle Isle EBSA the process was different, as it was identified and defined within the Estuary and Gulf of St Lawrence Bioregion; details for this process can be found in McQuinn et al. (2012). The focus for EBSA identification in this bioregion was on ecologically and biologically significant habitat for small pelagic fishes. The Strait of Belle Isle was identified as an important spawning area for autumn herring, as well as for aggregations of sand lance and capelin, and is also known as a foraging area for whales and dolphins (McQuinn et al. 2012).

EBSAs are important because of their ecology and sensitivity. This information is critical to the process of designating Marine Refuges (Section 8.1.1.3) and the areas do not always coincide.

8.1.1.2 Significant Benthic Areas

SBAs are defined in DFO's ERAF as "significant areas of cold-water corals and sponge dominated communities" (DFO n.d.). SBAs can be considered equivalent to VMEs and are not legally protected. The SBAs were determined using a kernel density estimation, a quantitative analyses technique applied to RV data to identify substantial concentrations of sponge and coral (Kenchington et al. 2016). The modelling that was used to delineate SBAs helps identify key marine species distribution, essential data for the understanding of anthropogenic pressures on these species and management of anthropogenic activities (Kenchington et al. 2016) and may indicate areas of future protected area designation and restoration activities. DFO has defined SBAs in the NL Shelves Bioregion based on four types of aggregations that form habitat for other species: sea pens; sponges; small gorgonian corals; and large gorgonian corals. The definition excludes non-aggregating species such as black corals and bryozoans. Sea pens are feather-like, soft suspension feeders that anchor to soft bottom substrates (DFO 2017a). Sponges are found at depths of 3,000 m or less along continental shelves, slopes, canyons and deep fjords. While the distribution of deep-water corals is patchy and influenced by various conditions, gorgonians grow mainly on stable boulders and bedrock but may also anchor in soft sediments (DFO 2017). As described in Section 5.3 and illustrated on Figure 5-5 and Figure 8-1, several SBAs within the Labrador Shelf SEA Update Area are primarily related to aggregations of sponges and large gorgonian corals (DFO 2021a).

8.1.1.3 Marine Refuges

A marine refuge is a type of other effective conservation measure (OECM) area that contributes to the Government of Canada's marine conservation targets. These OECM areas currently only include fisheries closure areas under the *Fisheries Act*, which are designated to conserve and protect fish and fish habitat. Those that meet OECM criteria are referred to as marine refuges (Government of Canada 2020). In

combination with *Oceans Act* MPAs, marine refuges, along with other designations, contribute to Canada's national and international conservation targets (Government of Canada 2017). As of December 21, 2017, marine refuges have been identified throughout Canadian waters. There are four marine refuges within the Labrador Shelf SEA Update Area, including Hawke Channel, Hopedale Saddle, Hatton Basin, and Northeast Newfoundland Slope Closure.

Hawke Channel

The Hawke Channel Closure is approximately 8,837 km² in area, overlapping a substantial portion of the Labrador Margin Trough EBSA (DFO 2017b). It is located approximately 100 km offshore, with bathymetry ranging from 100 to 200 m. It was selected as a marine refuge area because of the presence of Atlantic cod, a species that supports recreational and commercial fisheries in NL. The bottom habitat overlaps an EBSA that supports diverse populations of groundfish and other benthic species, such as Greenland halibut, and the habitat is an important snow crab fishing ground (DFO 2017b). The area is closed to bottom trawl, gillnet, and longline fishing activities. By protecting the bottom habitat, this closure also protects depleted species such as Atlantic wolffish.

Hopedale Saddle

The Hopedale Saddle Closure is approximately 15,411 km² in area, overlapping three EBSAs: Outer Shelf Nain Bank; Labrador Slope; and Hopedale Saddle (DFO 2017c). It is located approximately 150 km offshore in the area known as the Labrador Slopes, where the bathymetry begins to extend beyond depths of 500 m. It was selected as a marine refuge area because of the presence of corals and sponges, which are fragile, slow to recover, structure-providing species that "play an important functional role for numerous forms of marine life" (DFO 2017c). The area also supports an important overwintering area for the endangered Eastern Hudson Bay beluga population. The area is closed to bottom-contact fishing activities (DFO 2017c).

Hatton Basin

Hatton Basin Closure is approximately 42,459 km² in area, overlapping Hatton Basin / Labrador Sea / Davis Strait and the Outer Shelf Saglek Bank EBSAs (DFO 2017d). It is located approximately 50 km offshore at the tip of Labrador, where the Labrador Sea meets the Arctic Sea in the Davis Strait area. It was selected as a marine refuge area because of the presence of corals and sponges, which are fragile, slow to recover, structure-providing species. There are substantial concentrations of large gorgonian corals and sponges, as well as non-aggregating species such as black coral, stony coral and hydrocoral, known to play an important functional role for numerous forms of marine life (DFO 2017d). The area also supports important habitat for other marine mammals (including northern Hudson Bay narwhal) and high densities of sea birds (including the endangered Ivory Gull). The area is closed to bottom-contact fishing activities.

Northeast Newfoundland Slope Closure

Northeast Newfoundland Slope Closure is approximately 46,833 km² in area, overlapping Orphan Spur EBSA (DFO 2017e). It is located approximately 400 km offshore from southeast Newfoundland, and approximately 450 km to the nearest shoreline in Labrador. It was selected as a marine refuge area because of the presence of corals and sponges. The high concentrations of these structure-forming species provide habitat for many other species (DFO 2017e). The area is closed to bottom-contact fishing activities.

The closures for Hopedale Saddle, Hatton Basin and Northeast Newfoundland Slope protects substantial concentrations of coral and sponge, as well as the benthic fish species and invertebrates that use the structural habitat for various purposes (e.g., spawning, breeding, and nurseries), including those of commercial importance (e.g., Greenland halibut, northern shrimp, and striped shrimp). This protection could potentially contribute to increased species productivity and lead to increased abundance within and adjacent to the area (DFO 2017c, 2017d, 2017e).

While these Marine Refuge Areas restrict bottom contact fishing activities within their defined boundaries, the federal government has stated that other human activities taking place within these areas are not incompatible with the conservation of the ecological components of interests that each area possesses (DFO 2017b, 2017c, 2017d, 2017e). Proposed activities within OECM areas are assessed on a case-by-case basis. If the proposed activities are consistent with the conservation objectives of a specific area, they will be allowed. The Minister of Fisheries, Oceans and the Canadian Coast Guard will need to be satisfied that any risks to the area have been avoided or mitigated effectively before any proposed activity can take place (DFO 2019).

8.1.1.4 Gilbert Bay Marine Protected Area

Part of DFOs mandate under the *Oceans Act* is the development and implementation of a National Conservation Network, which includes the establishment of MPAs. MPAs are created with long-term conservation in mind and identify areas of high biodiversity, important habitats for marine species, and unique bathymetric features such as underwater canyons and hydrothermal vents (DFO 2002). MPAs can also protect areas with spiritual or cultural importance, including archaeological sites, shipwrecks, and areas traditionally used by Indigenous and non-Indigenous communities. Currently, there is one designated MPA in the Labrador Shelf SEA Update Area, Gilbert Bay.

The CNMCAA, which is used to establish NMCAs in Canada, restricts and prohibits specific activities, including the exploration and exploitation of oil and gas activities within a marine conservation area. Along with the Government of Canada's international commitment to conserve 25% of Canada's land, there is also the commitment to conserve 25% of Canada's oceans by 2025, working toward 30% of each by 2030. The plan is to be grounded in science, Indigenous knowledge, and local perspectives.

The NMCA policy guides the planning and management of NMCAs. Parks Canada is currently updating the national policy for NMCAs. The updated policy will reflect recent experience working collaboratively to establish and manage NMCAs and set the stage for the development of NMCA regulations.

Gilbert Bay (Figure 8-1) has been an MPA under Canada's *Oceans Act* since October 2005 (DFO 2005b) because of its genetically and geographically distinct population of Atlantic cod (DFO 2007b). It was the first MPA in eastern Canada's subarctic coastal zone established and managed under the *Oceans Act* (Wroblewski et al. 2007). Gilbert Bay is 28 km long, but relatively shallow, with two narrow openings to the Labrador Sea near the community of Williams Harbour (Government of Canada 2005) (note: Williams Harbour was resettled in 2017).

There are a number of coralline algae beds (sensitive habitat) present within Gilbert Bay (Government of Canada 2005) that support a wide variety of marine organisms and plants. The area is also frequented by several species of marine mammals, including minke whales, harbour porpoise, killer whales, and harp seals, and is inhabited seasonally by several species of waterfowl, including Common Loon, Canada Goose, and Common Merganser (DFO 2013).

A number of sills separate Gilbert Bay, causing the spring run-off that flows over these sills to result in low salinity surface waters. This restricts the inflow of subsurface saline water and impedes the development of a full estuarine circulation (DFO 2007b). These hydrographic and geomorphological features may contribute to the maintenance of the discrete cod population within Gilbert Bay by retaining their eggs and larvae (DFO 2007b). Tagging and tracking of the Gilbert Bay cod have confirmed that many cod remain in the bay year-round (DFO 2005b). However, Gilbert Bay cod do leave the MPA and are fished in areas where they mix with offshore stocks (DFO 2021a). Individuals are reddish or golden-brown in colour, due to their carotenoid-rich diet of invertebrates (DFO 2007b). The timing and length of spawning differs from that of offshore cod populations, as Gilbert Bay cod spawn within the bay between the end of May and early June, whereas other stocks spawn offshore between January and March (DFO 2007b).

Gilbert Bay cod is known to grow slower and exhibit lower reproductive potential than other populations of cod, resulting in a low production and recruitment capacity. This may be a consequence of a combination of low water temperatures and limited food availability. The annual surface water temperature ranges from -1.8°C to 15°C, and for six months (November to May), the waters may remain at subzero temperatures and are ice-covered. Water temperatures at depths greater than 50 m remain below 0°C throughout the year (DFO 2007b).

The MPA includes the waters of Gilbert Bay, for a total area of approximately 60 km². Prohibitions are placed on fishing activity within various zones of the MPA to ensure the health of the cod population and its key habitats. Other activities consistent with the conservation objectives of the MPA may be exempted (Wroblewski et al. 2007). A community-based steering committee, now referred to as the Advisory Committee, developed a three-year management plan in 2007, which was renewed in 2013 (DFO 201). The 2013 to 2018 Gilbert Bay MPA Management Plan spans five years, incorporating the advice of the Gilbert Bay Advisory Committee, the results of the monitoring programs, input from public consultations, and advice from Science and Fisheries Management Branches of DFO. A Science Advisory Report was completed in 2009 to review the Gilbert Bay MPA monitoring indicators, protocols and strategies, and an assessment of the Gilbert Bay cod population, which in addition to results of the annual monitoring program of the Gilbert Bay cod population, indicate a decline in abundance (DFO 2013). Fishing activities in areas outside the MPA boundaries is the greatest potential threat to Gilbert Bay cod (DFO 2013).

8.1.1.5 National Parks and National Historic Sites

National parks are administered by the federal government (Parks Canada) under the *National Parks Act*. Two national parks have been identified and established within the Labrador Shelf SEA Update Area, the Torngat Mountains National Park and the Mealy Mountains National Park Reserve. The boundaries of these two parks include the intertidal zones of the park boundaries, and offshore islands. Within the Labrador Shelf SEA Update Area, Parks Canada also holds jurisdiction over the preservation and management of the Hopedale Mission National Historic Site.

Torngat Mountains National Park

The Torngat Mountains National Park extends from Saglek Bay to Killinek Island near Cape Chidley at the northern tip of Labrador and comprises 9,700 km². Traditional activities, such as fishing and hunting, are still allowed within its boundaries. The Torngat is the region's first national protected area and is free from commercial, industrial, and mineral development. These are the highest and most rugged mountains in eastern Canada, with its highest point at 1,652 m in Mount Caubvick (Nature Canada 2007).

Two ecosystems, Low Arctic Tundra and Low Arctic Alpine, are prominent in the Torngat Mountains. Vegetation in upland surfaces of the Torngat Mountains is limited, consisting of bare rock and tundra. Valleys have rocky terrain with a sparse cover of low-lying Arctic sedges, lichens, mosses, grasses, flowers, mixed evergreens, and deciduous shrubs. White birch and willow thickets grow in less stable areas and mark the transition zone between tundra and open stands of black spruce and tamarack in the south. Bogs in the lowland areas contain black spruce with mixed evergreen and deciduous shrubs, underlain by mosses (Nature Canada 2007).

Many species have low population abundance because of the climatic conditions. Species that inhabit the region include the George River Caribou herd (population of 8,100 in 2020 [Government of NL n.d.(a)]) and Torngat Caribou herd (population of 1,326 in 2017 [Government of NL n.d.(a)]), black bears, polar bears, red fox, Arctic foxes, snowshoe hares, wolves and muskrat. The Torngat Mountains contain known populations of Harlequin Duck and SAR in the area include Barrow's Goldeneye and Peregrine Falcon. In a COSEWIC meeting in 2017, the Peregrine Falcon was removed from an at-risk status due to large scale recovery of the population (COSEWIC 2017). Puffins, murres and Razorbills also inhabit the coastal region. Common marine life includes whales, seals, and Arctic char (Nature Canada 2007).

A feasibility study is currently ongoing for the potential establishment of an Indigenous Protected Area adjacent to Torngat Mountains National Park, as described in Section 8.1.1.6.

Mealy Mountains National Park Reserve

During the writing of the original SEA Report, the Mealy Mountains National Park Reserve had been a proposed area and had not received official status. In 2015, an agreement was reached between the provincial and federal government to formally create the Akami-Uapishk^{U}-KakKasuak-Mealy Mountains National Park Reserve. The reserve is located in central Labrador, south of Lake Melville (Figure 8-1) and is NL's fourth official national park. This is an area of Arctic tundra surrounded by boreal forests and coastal seascapes and is within the home range of the threatened Mealy Mountain caribou herd. The

mountains overlook Lake Melville in central Labrador, and have been used as traditional hunting, trapping, and fishing territories for Indigenous peoples in Labrador.

The Mealy Mountains are approximately 21,000 km² and includes portions of half of Labrador's 10 ecoregions, specifically the High Subarctic Tundra, High Boreal Forest, Mid Boreal Forest, Coastal Barren and String Bog / Eagle River Plateau ecoregions (Protected Areas Association [PAA] 2007). The area has distinct natural components (marine, estuarine, lake, island, coastal plain, river, plateau, mountain, forest, and bog) and a rugged topography. Its summits are in a state of permafrost, with annual mean temperatures between -4°C and -7°C (Jacobs n.d.). The highest mountain within the range is approximately 3,700 ft (Parks Canada 1976).

Wildlife in the area include moose, black bear, red fox, lynx, snowshoe hare, wolves, ravens, Spruce Grouse, and the Mealy Mountains caribou herd (PAA 2007). Seabirds and waterfowl in the area include Atlantic Puffin, murre, petrel, gannet, Canada Goose, and eider and Black Duck (Parks Canada 2005), Osprey and Bald Eagle (Parks Canada 1976). Seals, whales, and the occasional polar bears also frequent the coast (Parks Canada 2005). The upper portion of the Eagle River in the Mealy Mountains is a productive salmon river (Parks Canada 1976). Other fish species reported in the Eagle River include sea-run and resident brook trout, white sucker, longnose sucker, and northern pike, with American eel and rainbow smelt also suspected of occurring (Anderson 1985).

The Mealy Mountains are characterized by boreal forest and Arctic tundra ecosystems. Vegetation included stunted black spruce, dwarf birch, Labrador tea, lichen, and moss. There are also large areas without trees (Parks Canada 2005).

As part of the agreement between the federal and provincial government, Akami-Uapishk^{U}-KakKasuak-Mealy Mountains National Park Reserve will protect approximately 10,700 km² (Government of Canada 2018). As mentioned above, Indigenous people have historically used the Mealy Mountains for traditional and subsistence purposes. As a result, there is an emphasis on a co-management approach to the park reserve, and agreements and understanding have been reached between Parks Canada and Indigenous groups in Quebec and Labrador to define roles and how the reserve will be used and managed. Parks Canada has signed Park Impacts and Benefits Agreements with both the Innu Nation and Nunatsiavut Government, and has negotiated a Shared Understanding Agreement with NunatuKavut Community Council regarding management and traditional use of the reserve (Government of Canada 2018; Government of NL n.d.[b]).

Other Coastal Historic Sites

There are a number of historic sites and structures located on the Labrador coast within the Labrador Shelf SEA Update Areas (Parks Canada n.d.), including, but not limited to:

- Hopedale Mission National Historic Site (including the Hopedale Moravian Mission Complex Registered Heritage Structure)
- Battle Harbour Historic District National Historic Site of Canada, which contains a number of Registered Heritage Structures (flour store, seal store, herring store, pork store, salmon store, salt store)

- Bunkhouse / Cookhouse Registered Heritage Structure, Benjy's Cove
- Hebron Mission National Historic Site
- Okak National Historic Site
- White Elephant Building Registered Heritage Structure, Makkovik
- Moravian Church Registered Heritage Structure, Nain

8.1.1.6 Indigenous Protected Area Adjacent to Torngat Mountains National Park

In September 2019, the Government of Canada and the President of the Nunatsiavut Government announced the official launch of a feasibility assessment for the potential establishment of an Indigenous Protected Area under the *Canada National Marine Conservation Areas Act*, adjacent to Torngat Mountains National Park (Section 8.1.1.5). The proposed Indigenous Protected Area is approximately 15,000 km², and would connect protected lands with protected waters, conserving the fjords that extend into Torngat Mountains National Park. This initiative results from the vision of the 2017 Statement of Intent on Imappivut (or "Our Waters") for the waters offshore of the LISA to advance the initiative for oceans management in the Labrador Sea. The area would represent the Labrador Shelf Marine Region, which includes a transition between Arctic and Atlantic habitats and communities and encompasses a variety of marine mammal species and important concentrations of breeding and migrating seabirds and waterfowl.

Parks Canada is currently working with the Nunatsiavut Government to conduct the feasibility assessment for the Indigenous Protected Area study area (Government of Canada 2019; DFO 2021a) and have formed a Steering Committee consisting of Nunatsiavut Government and Parks Canada representatives to lead on this work.

8.1.2 Provincially Designated Sensitive Areas

8.1.2.1 Gannet Islands Ecological Reserve

The Gannet Islands Ecological Reserve (established 1983) is an archipelago of seven islands and surrounding marine component at the mouth of Sandwich Bay. It is the largest seabird colony in Labrador and has the largest Razorbill colony in North America. It also hosts important breeding populations of Atlantic Puffin and Common Murre. It is the largest known moult site for Harlequin Duck in eastern North America.

Ecological reserves have strict regulations regarding access and permitted activities. Motorized vehicles and land aircraft are prohibited, as is fishing, hunting, trapping, and removal of biotic entities, building structures, or logging (*Wilderness and Ecological Reserves Act 1980*).

Population estimates for the Gannett Islands species are from Robertson et al. (2002). In 1983, Common Murre populations were estimated at 37,155 pairs in the Gannet Clusters and 23,734 on Outer Gannet Island. In 1998, those estimates were 19,360 and 17,342, respectively, corresponding to declines of 47.9% and 26.9%, respectively. Thick-billed Murre were estimated to have increased from 946 to 1,337 pairs on the Gannet Clusters (increase of 41.3%) and from 471 to 560 pairs on Outer Gannet Island (increase of 18.9%). The Atlantic Puffin breeding population on the Gannet Clusters has remained fairly

stable over the past 20 years, from 33,000 to 42,000 pairs, making it the second largest colony in eastern North America. Razorbills were estimated at 6,497 pairs in 1978 and at 9,808 in 1999. These results confirm that the Gannet Islands is the most important Razorbill colony in North America (Robertson et al. 2002). Other species that may be breeding on the Gannet Islands include: Black Guillemot, which has not been recently confirmed as breeding; Black-Legged Kittiwake, which was confirmed as having 20 nests in 1999; Great Black-Backed Gull, which had 25 nests in the Gannet Cluster in 1999 and an estimated 5 on the Outer Gannet Island. Leach's Storm-petrel was known to be present in 1998-1999 and perhaps be breeding in very low numbers. Northern Fulmar is thought to breed on the Gannet Islands in very low numbers, although the number of occupied sites may have decreased since the 1980s. Field crews documented approximately 60 pairs of Common Eider nesting on the Gannet Islands (Robertson et al. 2002).

8.1.3 Other Designated Sensitive Areas

8.1.3.1 Important Bird Areas

The IBA program is an international conservation initiative coordinated by Birdlife International and its co-partners Bird Studies Canada and Nature Canada. An IBA is a site providing essential habitat for one or more species of breeding or non-breeding birds. These sites may contain threatened species, endemic species, species representative of a biome, or highly exceptional concentrations of birds. Sites are identified using a set of standardized and internationally agreed upon criteria. IBAs can be identified under four main categories: sites regularly holding large numbers of threatened species; sites regularly holding endemic species or species with restricted ranges; sites regularly holding an assemblage of species largely restricted to a biome or a unique or threatened community type; and sites where birds congregate in large numbers when breeding, in winter, or during migration. IBAs are identified according to their importance (based on specific bird population thresholds) as either globally, continentally, or nationally important. As described in Section 7.8 and illustrated in Figure 7-18, there are 15 IBAs within the Labrador Shelf SEA Update Area (including the Gannett Islands Ecological Reserve).

8.1.3.2 Internationally Identified EBSAs

Along with federally identified EBSAs within the Labrador Shelf SEA Update Area, the United Nations Convention on Biological Diversity (CBD) has also identified areas that are considered sensitive, although these areas are not legally protected / designated as a "Protected Area" (per the IUCN definition). One of these areas, the Seabird Foraging Zone in the Southern Labrador Sea, overlaps with the portion of the Labrador Shelf SEA Update Area that falls outside the EEZ. The other area, the Labrador Sea Deep Convection Area, lie adjacent to the boundary of the Labrador Shelf SEA Update Area. These two areas are located on Figure 8-1 and are described below.

Seabird Foraging Zone in the Southern Labrador Sea

This area has been identified as potentially supporting large aggregations of seabirds, including Black-legged Kittiwake, Thick-billed Murres, and Leach's Storm petrel. This area covers areas both within and outside the Canadian EEZ, extends from the Orphan Basin and follows the continental slope north to offshore waters of Labrador. Other species such as puffins and shearwaters are also known to visit the waters of the southern Labrador Sea to feed (CBD 2018).

Labrador Sea Deep Convection Area

This site has been identified as one of the only sites in the Northwest Atlantic Ocean where deep-water convection exchanges surface waters with the deeper waters of the ocean, serving as a component of the global ocean circulation system. This area also provides the mid-water overwintering refuge for pre-adult *Calanus finmarchicus*, which is a keystone species that seeds zooplankton populations on the Labrador Shelf and areas further downstream. This area is located in offshore waters of the Labrador Shelf, extending northward from the Labrador Sea towards the mouth of Baffin Bay (CBD 2018). The western boundary of the deep convection area is defined by Canada's EEZ and is not necessarily the limit of the deep-water convection processes (DFO 2021b).

8.2 POTENTIAL EFFECTS - SENSITIVE AREAS

Sensitive areas have been noted for their biological and ecological importance, and have been designated, and in some cases protected, under international, federal, and/or other applicable legislation, due to this importance. Potential effects of oil and gas activities on sensitive areas are closely linked to the potential effects identified for Fish and Fish Habitat (Section 5.7), Marine Mammals and Sea Turtles (Section 6.9), and Marine and Migratory Birds (Section 7.9). These VCs include SAR and SOCC that may also use sensitive areas and are cross-referenced throughout this section. A description of potential effects on sensitive areas was also conducted as prescribed in Section 7.2.3 of the Final Scoping Document (Appendix A). As described in Sections 8.1.1 to 8.1.3, there are several sensitive areas within the Labrador Shelf SEA Update Area, including MPAs, EBSAs, marine refuge areas, SBAs, IBAs, and ecological reserves. The potential effects of an accidental event on sensitive areas are identified in Section 12.5.

8.2.1 Potential Pathways

Offshore oil and gas activities have the potential to interact with the habitat quality and long-term viability of sensitive areas, which could affect the ability of the sensitive area to continue to provide important biological and ecological functions on which marine species and/or fisheries depend. Potential interactions with routine project activities most closely relate to concerns with the changes to the existing quality and use of natural habitats within these sensitive areas.

There is potential for a change in habitat quality for sensitive areas as a result of oil and gas activities affecting the marine environment. The key potential interactions between offshore oil and gas activities and sensitive areas may therefore be summarized as follows:

- Light and sound emissions affecting underwater environment from the presence and operation of the MODU / production platform during exploration drilling and production operations. The IUCN threat taxonomy identifies “excess energy” in the form of light and sound as a form of pollution (which is often limited to substances, but now includes non-substance forms that degrade habitat) (IUCN-CMP n.d.)
- Reduction of water and sediment quality from discharge of drill muds and cuttings from exploration drilling and production operations
- Effects on water quality and/or air quality from other emissions and discharges from various oil and gas activities
- Underwater sound from operation of MODU / production platform, geophysical and VSP surveys, helicopter transportation, and vessel movement
- Change in benthic habitat associated with leaving the wellhead in place during well abandonment
- Change in benthic habitat (indirect) due to climate change associated with GHG emissions from the use of any extracted fossil fuels

8.2.2 Overview of Effects

Table 8.3 provides an overview of the key potential environmental interactions between sensitive areas and routine offshore oil and gas exploration and production activities.

The effect of sound from oil and gas activities would be expected to have little effect on sensitive areas and would be more likely to affect the marine animals (fish, marine birds, and marine mammals) that use the sensitive areas as critical habitat, potentially resulting in temporary avoidance of habitat by marine fish, marine mammals, and sea turtles. Sections 5.7.2 and 6.9.2 discuss the effects of underwater sound on fish and fish habitat, and marine mammals and sea turtles, respectively, and that discussion is not repeated here.

Table 8.3 Summary of Potential Environmental Effects from Routine Activities on Sensitive Areas

Components / Activities	Potential Environmental Interactions		
	Light and Sound Emissions Affecting Underwater Environment	Reduction of Water and Sediment Quality	Change in Benthic Habitat
Geophysical Surveys			
Sound source arrays	●	●	●
Support vessel movement	●	●	
Exploration and Production Drilling			
Presence and operation of the MODU	●	●	●
Movement of support vessels and aircraft	●	●	●

Table 8.3 Summary of Potential Environmental Effects from Routine Activities on Sensitive Areas

Components / Activities	Potential Environmental Interactions		
	Light and Sound Emissions Affecting Underwater Environment	Reduction of Water and Sediment Quality	Change in Benthic Habitat
Routine discharges, including drill cuttings	●	●	●
Well flow testing and flaring	●		
Well abandonment			●
Atmospheric emissions	●		
Oil and Gas Production			
Routine discharges, including produced water		●	●
Support vessel and tanker traffic	●	●	

The installation of infrastructure and associated sediment resuspension will have direct effects on benthic species, typically to approximately 100 m (radius) from the installation on the seafloor (Cordes et al. 2016). Drill cuttings and associated muds (both WBMs and SBMs) can extend to over 2 km (Cordes et al. 2016) and have the potential to cause localized environmental effects around the well site to approximately 50 to 500 m, depending upon the type of cuttings and associated mud discharged (WBMs or SBMs), depending on number of wells (Wood 2020). Benthic communities comprised of sedentary or slow-moving species may be smothered in the immediate vicinity of the well site by drill waste and the sediment quality, altering the area in terms of nutrient enrichment and oxygen depletion (Neff et al. 2000; Neff et al. 2004). These effects could potentially result in changes in the composition of the benthic macrofauna community. There may be sensitive areas that are habitat for species that may be adversely affected by the discharge of drill cuttings, such as coral and scallops. It is anticipated that effects to those species may occur within 50 to 500 m of the well site (Wood 2020). A review study by Cordes et al. (2016) estimated that ecological impacts could persist for years to decades for benthic species (longer for sensitive species, such as coral) and population and community level effects are most common between 200 to 300 m from the discharge source. Special mitigation strategies may be required for such areas.

Other discharges and emissions will be released on a regular basis during the drilling program, potentially affecting water quality, and attract marine fish and birds to certain discharges (e.g., sanitary and organic wastes). Given the rapid rate of dilution and dispersion of most produced waters upon discharge to the receiving waters, most produced waters effects are extremely localized. Produced water discharges are subject to rapid dilution factors within the 10 m of the discharge point and as such effects are expected to occur immediately adjacent to the discharge point. If a production platform is situated in estuarine waters, there is a possibility for produced water effects to occur in nearshore sediments resulting in reduced invertebrate abundance and diversity. Although the likelihood of this scenario occurring is remote, it is considered in this section for completeness.

During well abandonment, the well head can either be removed, or abandoned in place. Approval may be sought to leave the wellhead in place, and if this is the case, there will be a hard substrate suitable for recolonization by benthic communities.

8.2.3 Mitigation Measures for Sensitive Areas

The following provides an overview of standard mitigation measures that are often required and/or otherwise implemented during offshore oil and gas activities to help avoid or reduce adverse environmental and socio-economic effects on sensitive areas (Table 8.4).

Table 8.4 Summary of Standard Environmental Mitigation Measures for Sensitive Areas

Mitigation	Applicability		
	Geophysical Surveys	Exploration and Production Drilling	Oil and Gas Production
Conduct an imagery-based seabed survey in the vicinity of well sites, confirming the absence of shipwrecks, debris on the seafloor, unexploded ordnance and sensitive environmental features, such as habitat-forming corals or SAR.		•	•
Implement the standard environmental mitigation measures identified in Table 5.9 (Section 5.7.3) for fish and fish habitat, including SAR; Table 6.5 (Section 6.9.3) for marine mammals and sea turtles, including SAR; and Table 7.9 (Section 7.9.3) for marine birds, including SAR. The mitigation measures in Table 5.9, Table 6.5, and Table 7.9 that are of particular relevance to the Sensitive Areas VC are those pertaining to light and sound emissions, water quality, sediment quality, benthic habitat, and SAR.	•	•	•

As this VC is closely linked to the Fish and Fish Habitat VC (Section 5.7.3), Marine Mammals and Sea Turtles VC (Section 6.9.3), and Marine Birds VC (Section 7.9.3), mitigation measures implemented under those VCs are also applicable to sensitive areas, and are therefore cross-referenced in Table 8.4, but are not repeated.

Offshore oil and gas activities, in or adjacent to sensitive areas, may be subject to various mitigation to reduce potential effects to these areas. These mitigation measures may be in additional to those discussed in this report and would depend on the timing and nature of the offshore petroleum activity in or adjacent to these areas. For formally protected areas, oil and gas related activities may be prohibited or otherwise restricted, pursuant to applicable legislation, to avoid or reduce the potential for negative effects on these areas.

The recently completed Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (Bangay et al. 2020) identified several standard monitoring and follow-up commitments / requirements that have been included in various project-specific EAs and/or EA approval

conditions for offshore exploration drilling programs in the Canada-NL Offshore Area. The Labrador Shelf SEA Update Area is outside of the area assessed by the Regional Assessment, but it is possible that mitigations identified in the report could be recommended for future exploratory drilling in the Labrador Shelf SEA Update Area. This includes the following commitments / requirements that are of relevance to potential effects on sensitive areas:

Drill Cuttings: For every well drilled, the operator must measure the concentration of SBM retained on discharged drill cuttings as described in the OWTG to verify that this meets relevant performance targets and report the results to the C-NLOPB.

Sediment Deposition and Benthic Habitats: For the first well in each EL, any well located in an area determined by seabed surveys to be sensitive benthic habitat, any well located withina special area designated as such due to the presence of sensitive coral and sponge species, or any well located near such a special area for which drill cuttings modelling predicts possible adverse effects on the area, the operator must develop and implement, in consultation with DFO and the C-NLOPB, follow-up that includes:

- Measurement of sediment deposition extent and thickness post-drilling to verify the drill waste deposition modelling predictions
- Benthic fauna surveys to verify the effectiveness of mitigation measures
- Reporting, including a comparison of modelling results to *in situ* results, within 60 days to the C-NLOPB

DFO is currently developing operational guidance for exploratory drilling to reduce potential impacts on corals and sponges offshore of Newfoundland and Labrador. The CSAS coordinates the scientific peer review and science advice from DFO, and in January 2020, the CSAS held a peer review meeting to generate scientific advice on the avoidance and mitigation of significant impacts on corals and sponges during exploratory drilling programs in offshore NL. CSAS published a science advisory report on this topic in July 2021 (DFO 2021c). The scientific advice contained in the science advisory report (DFO 2021c) will inform DFO's operational guidance, along with other information sources, such as international best management practices, relevant policies and other considerations.

Underwater Noise: For the first well in each EL, the operator must develop and implement, in consultation with DFO and the C-NLOPB, a follow-up program that describes how underwater noise levels will be monitored through field measurement during the drilling program, and the provision of that information prior to the start of the drilling program.

Marine Mammals and Sea Turtles: The development and implementation of an operational monitoring program for marine mammals during VSP surveys, in consultation with applicable regulatory authorities. These typically include the following:

- A trained marine mammal observer (MMO) will be on board to record marine mammal and sea turtle sightings during VSP survey operations
- Visual monitoring for the presence of marine mammals and sea turtles will occur within a pre-determined exclusion zone during VSP operations where a seismic sound source array is used

- Observational / shutdown procedures will be implemented in accordance with the SOCP for marine mammals and sea turtles
- Submission of a report of the observational program annually to the C-NLOPB and DFO, including documentation of marine mammal and sea turtle sightings.

Marine and Migratory Birds: Prior to the start of a drilling program and in consultation with ECCC and the C-NLOPB, the operator must develop and implement a follow-up program for the duration of the drilling program that includes:

- Daily monitoring for the presence of marine birds from the drilling installation using a trained observer following ECCC's ECSAS standardized protocol for pelagic seabird surveys
- Daily monitoring from the drilling installation and support vessels for the presence of stranded birds, with ECCC's procedures for handling and documenting stranded birds being followed

As described in the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (Bangay et al. 2020), information on any required follow-up programs must be developed and submitted to the C-NLOPB prior to their implementation, including information on the methodology, location, frequency, timing, and duration of monitoring associated with the follow-up program. Follow-up also includes requirements for reporting on its results, including variation from EA effects predictions that would require the implementation of new or modified mitigation. The follow-up program is also updated as required in consultation with relevant authorities. In addition, within 90 days of the end of each calendar year of a multi-year drilling program, the operator must submit to the C-NLOPB and the IAAC a report outlining its activities to comply with the EA approval, any consultations undertaken and an indication of how concerns were addressed, and the results of the follow-up and any additional mitigation requirements.

Section 6.9.3 identifies currently non-standard mitigation measures related to marine mammals and sea turtles that have been proposed by DFO's CSAS for potential future inclusion in the SOCP. Section 7.9.3 identifies non-standard follow-up and mitigation recommendations related to marine birds that have been proposed by the Committee responsible for the recently completed Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (Bangay et al. 2020). The measures described in Sections 6.9.3 and 7.10.3 are generally applicable to marine mammals, sea turtles, and marine birds, including in sensitive areas. The CSAS and Committee recommendations summarized in those sections are not currently standard practice and may therefore be considered enhanced mitigation measures in the context of present-day oil and gas activities in the Canada-NL Offshore Area (and the Labrador Shelf SEA Update Area therein). However, these currently non-standard measures have potential to become standard practices and/or mandatory requirements in the future through industry leadership and/or through incorporation into relevant guidelines, policies, regulations, and/or conditions of regulatory approval.

8.2.4 Environmental Planning Considerations for Sensitive Areas

As this VC is closely linked to the Fish and Fish Habitat VC (Section 5.7.4), Marine Mammals and Sea Turtles VC (Section 6.9.4), Marine Birds VC (Section 7.9.4), and Commercial, Recreational, and Indigenous Fisheries VC (Section 9.6.4), environmental planning considerations for those VCs, particularly timing restrictions during migration periods, are also applicable to sensitive areas but are not repeated here.

Offshore oil and gas activities in or adjacent to the Gilbert Bay MPA will be bound by the protection measures defined in the appropriate legislative framework for these areas. Operators should be aware that additional mitigation, may be required and will be determined at the project-specific EA stage. The unique characteristics and rich diversity of marine life within Gilbert Bay, an MPA, may result in restrictions of activities within or near Gilbert Bay if such activities are not consistent with conservation objectives of an MPA.

As the Torngat Mountains National Park is the region's first national protected area and is free from commercial, industrial and mineral development (although traditional activities such as fishing and hunting will still be allowed within its boundaries), no exploration or production activities would be allowed within its boundaries (which includes Saglek Bay to Killinek Island near Cape Chidley in the marine environment).

Although designation as an official IBA of Canada does not bring legal protection, it does signify that an area may be of continental or global importance to the conservation of bird species and therefore should be considered in planning. The Gannet Islands IBA is protected because it is inside the boundaries of the provincial designation as an Ecological Reserve (Seabird Sanctuary). Damage to an Ecological Reserve warrants fines for individuals or corporations. The protection of bird sanctuaries includes the land and the water around the sanctuaries that is the jurisdiction of the Province (*Wilderness and Ecological Reserves Act* 2007). Protection of the Ecological Reserves (including the Gannet Islands) includes prohibitions against using motorized vehicles or aircraft, hunting, fishing, logging, and development.

The majority of data / knowledge on corals and sponges in the Labrador Shelf SEA Update Area has come from DFO trawl surveys and only represents information from trawlable substrates (i.e., soft / sandy ocean floor). Given that coral and sponge abundance is often positively correlated with hard substrate (Mortensen and Buhl-Mortensen 2004, 2005; Carney 2005; Mortensen et al. 2006), this represents a large data / knowledge gap regarding habitat types and species from these habitats. DFO does not survey coastal areas in northern Labrador and the Northern Shrimp Research Foundation surveys that are conducted do not have the same rigor as DFO multispecies surveys (e.g., training, staff, mandate). DFO surveys do cover southern Labrador; however, they are conducted less frequently due to distance, weather and vessel availability. Increased survey and monitoring efforts, by government, educational institutions, and the oil and gas industry, can help add to the existing body of knowledge of the offshore environment, and provide more clarity and certainty to the species presence within the Labrador Shelf SEA Update Area.

Sensitive areas may also have increased vulnerabilities to the impacts from climate change that could be compounded by the effects from oil and gas activities. There is a need to understand how climate change is affecting organisms in sensitive areas being considered. For example, ocean warming, oxygen loss, acidification and a decrease in flux of organic carbon from the surface to the deep ocean are projected to harm habitat-forming cold-water corals, which support high biodiversity, partly through decreased calcification, increased dissolution of skeletons, and bioerosion (medium confidence). Vulnerability and risks are highest where and when temperature and oxygen conditions both reach values outside species' tolerance ranges (medium confidence). Expected coastal ecosystem responses to climate change over the 21st century are habitat contraction, migration, and loss of biodiversity and functionality. Pervasive human coastal disturbances will limit natural ecosystem adaptation to climate hazards (high confidence). (IPCC 2019).

8.3 DATA GAPS

Sensitive areas use is also closely linked to the biophysical environments, therefore, data gaps identified in Sections 5.8 (Fish and Fish Habitat), 6.10 (Marine Mammals and Sea Turtles), 7.11 (Marine Birds), and 9.7 (Commercial, Recreational, and Indigenous Fisheries) are applicable here.

8.4 REFERENCES

Anderson, T.C. 1985. The Rivers of Labrador. Can. Spec. Publ. Fish. Aquat. Sci., 81.

Bangay, G., W. Foote, G. Anderson, M. Murphy Rustad, and K. Storey. 2020. Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador. Available online at: https://iaac-aeic.gc.ca/050/documents/p80156/134068E.pdf

Carney, R.S. 2005. Zonation of deep biota on continental margins. Ocean. Mar. Biol., 43: 211-278.

CBD (Convention on Biological Diversity) .2018. Seabird Foraging Zone in the Southern Labrador Sea. Available at: https://chm.cbd.int/database/record?documentID=204102

Cordes, E.E., D.O. Jones, T.A. Schlacher, D.J. Amon, A.F. Bernardino, S. Brooke, R. Carney, D.M. DeLeo, K.M. Dunlop, E.G. Escobar-Briones and A.R. Gates. 2016. Environmental impacts of the deep-water oil and gas industry: a review to guide management strategies. Frontiers in Environmental Science, 4: 58 pp.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2017. Peregrine Falcon Achieves Landmark Recovery but Salmon Struggle. Available at: https://www.newswire.ca/news-releases/peregrine-falcon-achieves-landmark-recovery-but-salmon-struggle-661881443.html

DFO (Fisheries and Oceans Canada). No Date. Ecological Risk Assessment Framework for Coldwater Corals and Sponge Dominated Communities. Available at: https://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/risk-ecolo-risque-eng.htm

DFO (Fisheries and Oceans Canada). 2002. Canada's Oceans Strategy. Fisheries and Oceans Canada, Ottawa, ON.

DFO (Fisheries and Oceans Canada). 2005a. Identification of Ecologically and Biologically Significant Areas. DFO Can. Sci. Advis. Sec. Ecosystem Status Rep., 2004/006: 15 pp.

DFO (Fisheries and Oceans Canada). 2005b. Gilbert Bay-Marine Protected Area. Available at: http://www.dfo-mpo.gc.ca/oceans-habitat/oceans/mpa-zpm/factsheets-feuillets/gbay_e.asp.

DFO (Fisheries and Oceans Canada). 2007a. Ecologically and Biologically Significant Areas (EBSA) in the Estuary and Gulf of St. Lawrence: Identification and Characterization. DFO Can. Sci. Advis. Sec., Sci. Adv. Rep., 2007/016: 14 pp.

DFO (Fisheries and Oceans Canada). 2007b. Gilbert Bay Marine Protected Area. Oceans Division, Fisheries and Oceans, Canada. Available at: http://www.gilbertbay.com/intro.htm.

DFO (Fisheries and Oceans Canada). 2013. Gilbert Bay Marine Protected Area Management Plan 2013-2018. Available at: http://waves-vagues.dfo-mpo.gc.ca/Library/40675312.pdf

DFO (Fisheries and Oceans Canada). 2017a. Guidance on the level of protection of significant areas of coldwater corals and sponge-dominated communities in Newfoundland and Labrador waters. DFO Can. Sci. Advis. Sec. Sci. Resp. 2017/030: 29 pp.

DFO (Fisheries and Oceans Canada). 2017b. Hawke Chanel Closure. Available at: https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/refuges/hawkechannel-chenalhawke-eng.html

DFO (Fisheries and Oceans Canada). 2017c. Hopedale Saddle Closure. Available at: https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/refuges/hopedalesaddle-ensellementhopedale-eng.html

DFO (Fisheries and Oceans Canada). 2017d. Hatton Basin Closure. Available at: https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/refuges/hattonbasin-bassinhatton-eng.html

DFO (Fisheries and Oceans Canada). 2017e. Northeast Newfoundland Slope Closure. Available at: https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/refuges/northeastnewfoundlandslope-talusnordestdeterreneuve-eng.html

DFO (Fisheries and Oceans Canada). 2019. Protection Standards to better conserve our oceans. Available at https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/standards-normes-eng.html

DFO (Fisheries and Oceans Canada). 2021a. Biophysical and Ecological Overview of a Study Area within the Labrador Inuit Settlement Area Zone. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2021/003: 49 pp.

DFO (Fisheries and Oceans Canada). 2021b. Science Review of the Labrador Shelf Offshore Area Strategic Environmental Assessment (SEA) Update. Canadian Science Advisory Secretariat Science Response 2021/031: 78 pp.

DFO (Fisheries and Oceans Canada). 2021c. Coral and Sponge Mitigations in Relation to Exploratory Drilling Programs in the Newfoundland and Labrador Region. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2021/028: 26 pp.

Government of Canada. 2005. Canada Gazette Part 1. *Gilbert Bay Marine Protected Area Regulations*. June 18, 2005. Volume 139 (25).

Government of Canada. 2011. National Framework for Canada's Network of Marine Protected Areas. Fisheries and Oceans Canada, Ottawa, ON. 31 pp.

Government of Canada. 2017. Operational Guidance for Identifying 'Other Effective Area-Based Conservation Measures' in Canada's Marine Environment. Fisheries and Oceans Canada. Available at: http://www.dfo-mpo.gc.ca/oceans/documents/publications/oeabcm-amcepz/OEABCM_operational_guidance_EN.pdf

Government of Canada. 2018. Akami-Uapishk^{U}-KakKasuak-Mealy Mountains National Park Reserve: About. Available online at: https://www.pc.gc.ca/en/pn-np/nl/mealy/info/index

Government of Canada. 2019. Government of Canada and Nunatsiavut Government Working Together to Protect Northern Labrador Coast. Available online at: https://www.canada.ca/en/parks-canada/news/2019/09/government-of-canada-and-nunatsiavut-government-working-together-to-protect-northern-labrador-coast.html

Government of Canada. 2020. Other Effective Area-based Conservation Measures. Available at: https://www.dfo-mpo.gc.ca/oceans/oecm-amcepz/index-eng.html

Government of NL (Newfoundland and Labrador). No Date (a). Caribou Conservation and Management. Available online at: https://www.gov.nl.ca/hunting-trapping-guide/2021-22/labrador-caribou/

Government of NL (Newfoundland and Labrador). No Date (b). Mealy Mountains to Become Newfoundland and Labrador's Fourth National Park. Available online at: https://www.newfoundlandlabrador.com/trip-ideas/travel-stories/mealy-mountain-to-become-newfoundland-and-labradors-4th-national-park

IPCC (Intergovernmental Panel on Climate Change). 2019: Summary for Policymakers. Pp. 3. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. Available at: https://www.ipcc.ch/site/assets/uploads/sites/3/2019/12/SROCC_FullReport_FINAL.pdf.

IUCN-CMP (International Union for Conservation of Nature-Conservation Measures Partnership). No Date. IUCN – CMP Unified Classification of Direct Threats. Version 3.2. 20 pp. Available at: https://s3.amazonaws.com/iucnredlist-newcms/staging/public/attachments/3127/dec_2012_guidance_threats_classification_scheme.pdf

Jacobs, J.D. No Date. Parks and Protected Areas as a Focus for Studies of Climate Change Impacts on Highland Ecosystems in Newfoundland and Labrador. Highlands Research Group, Memorial University of Newfoundland. Available at: http://ontario.c-ciarn.ca/pdf/jacobs.pdf.

Kenchington, E., L. Beazley, C. Lirette, F.J. Murillo, J. Guijarro, V. Wareham, K. Gilkinson, M. Koen Alonso, H. Benoît, H. Bourdages, B. Sainte-Marie, M. Treble and T. Siferd. 2016. Delineation of coral and sponge Significant Benthic Areas in eastern Canada using kernel density analyses and species distribution models. DFO Can. Sci. Advis. Sec. Res. Doc., 2016/093: vi + 178 pp.

McQuinn, I.H., M.-N. Bourassa, C. Tournois, F. Grégoire and D. Baril. 2012. Ecologically and biologically significant areas in the Estuary and Gulf of St. Lawrence: Small pelagic fishes. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/087: iii + 76 pp.

Mortensen, P.B. and L. Buhl-Mortensen. 2004. Distribution of deep-water gorgonian corals in relation to benthic habitat features in the Northeast Channel (Atlantic Canada). Mar. Biol., 144(6): 1223-1238.

Mortensen, P.B. and L. Buhl-Mortensen. 2005. Morphology and growth of the deep-water gorgonians *Primnoa resedaeformis* and *Paragorgia arborea*. Mar. Biol., 147(3): 775-788.

Mortensen, P.B., L. Buhl-Mortensen and D.C. Gordon. 2006. Distribution of deep-water corals in Atlantic Canada. Pp. 1832-1848. In: Proceedings of the 10th International Coral Reef Symposium, Volume 1.

Nature Canada. 2007. Backgrounder: Torngat Mountains, Labrador. Available at: http://www.naturecanada.ca/newsroom_jan_21_05a.asp.

Neff, J.M., G. Kjeilen-Eilersten, H. Trannum, R. Jak, M. Smit and G. Durell. 2004. Literature Report on Burial: Derivation of PNEC as Component in the MEMW Model Tool. ERMS Report No. 9B. AM 2004/024: 25 pp.

Neff, J.M., S. McKelvie and R.C. Ayers, Jr. 2000. Environmental Impacts of Synthetic Based Drilling Fluids. OCS Study MMS 2000-64. US Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Program, New Orleans, LA. 118 pp.

PAA (Protected Areas Association). 2007. Mealy Mountains Fact Sheet. Available at: http://www.paanl.org/Mealy_Mountains.htm

Parks Canada. No Date. Canada's Historic Places. Available at: https://www.historicplaces.ca

Parks Canada. 1976. Preliminary National Park Considerations for Labrador. Parks System Planning Division-National Parks Branch. P.6.

Parks Canada. 2005. East Coast Boreal Region 21. Available at: http://www.pc.gc.ca/docs/v-g/nation/sec3/nation58_e.asp

Parks Canada. 2017. National Historic Sites: Hopedale Mission National Historic Site. Available at: https://www.pc.gc.ca/en/lhn-nhs/nl/hopedalemission

Robertson, G.J., R.D. Elliot and K.G. Chaulk. 2002. Breeding seabird populations in Groswater Bay, Labrador, 1978 and 2002. Can. Wildl. Ser. Tech. Rep. Ser., 394.

Wells, N.J., G.B. Stenson, P. Pepin and M. Koen-Alonso. 2017. Identification and descriptions of Ecologically and Biologically Significant Areas in the Newfoundland and Labrador Shelves Bioregion. DFO Can. Sci. Advis. Sec. Res. Doc. 2017/013: v + 87 pp.

Wells, N., K. Tucker, K. Allard, M. Warren, S. Olson, L. Gullage, C. Pretty, V. Sutton-Pande and K. Clarke. 2019. Re-evaluation of the Placentia Bay-Grand Banks Area of the Newfoundland and Labrador Shelves Bioregion to Identify and describe Ecologically and Biologically Significant Areas. DFO Can. Sci. Advis. Sec. Res. Doc. 2019/049: viii + 151 pp.

Wood [Environment & Infrastructure Solutions]. 2020. Drill Cuttings Dispersion Modelling Bay du Nord Development Project. Available at: https://iaac-aeic.gc.ca/050/documents/p80154/135564E.pdf

Wroblewski, J.S., L.K. Kryger-Hann, D.A. Methven and R.L. Haedrich. 2007. The fish fauna of Gilbert Bay, Labrador: A marine protected area in the Canadian subarctic coastal zone. J. Mar. Biol. Ass. UK, 87: 575-587.