

WESTERN NEWFOUNDLAND & LABRADOR OFFSHORE AREA Strategic Environmental Assessment Update

Summary Report (DRAFT)



Submitted to:

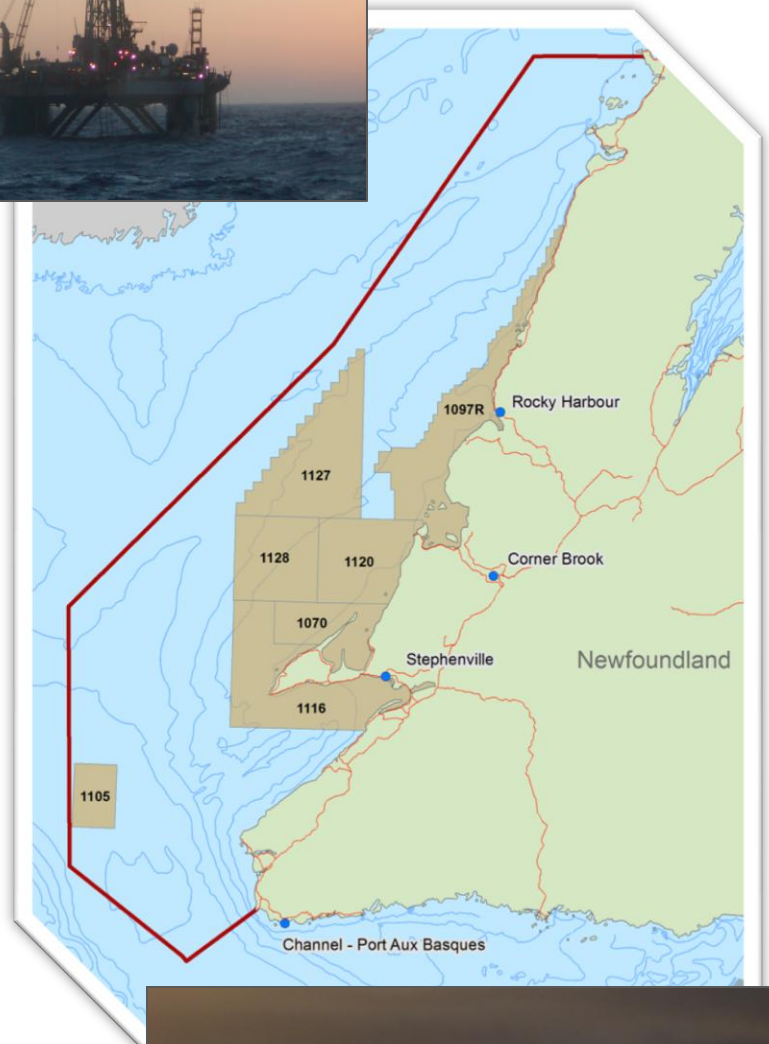
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1 INTRODUCTION

The Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB, or the Board) is responsible, on behalf of the Governments of Canada and Newfoundland and Labrador, for petroleum resource management in the Newfoundland and Labrador (NL) Offshore Area. The *Canada-Newfoundland Atlantic Accord Implementation Act* and the *Canada-Newfoundland Atlantic Accord Implementation Newfoundland Act*, administered by the C-NLOPB, govern all oil and gas operations in the region.

In the implementation of its mandate, the role of the C-NLOPB is to facilitate the exploration for and development of the hydrocarbon resources in the NL Offshore Area in a manner that conforms to the statutory provisions for: 1) worker safety; 2) environmental protection and safety; 3) effective management of land tenure; 4) maximum hydrocarbon recovery and value; and 5) Canada / Newfoundland and Labrador benefits. Although the legislation does not prioritize these mandates, worker safety and environmental protection are paramount in all Board decisions.

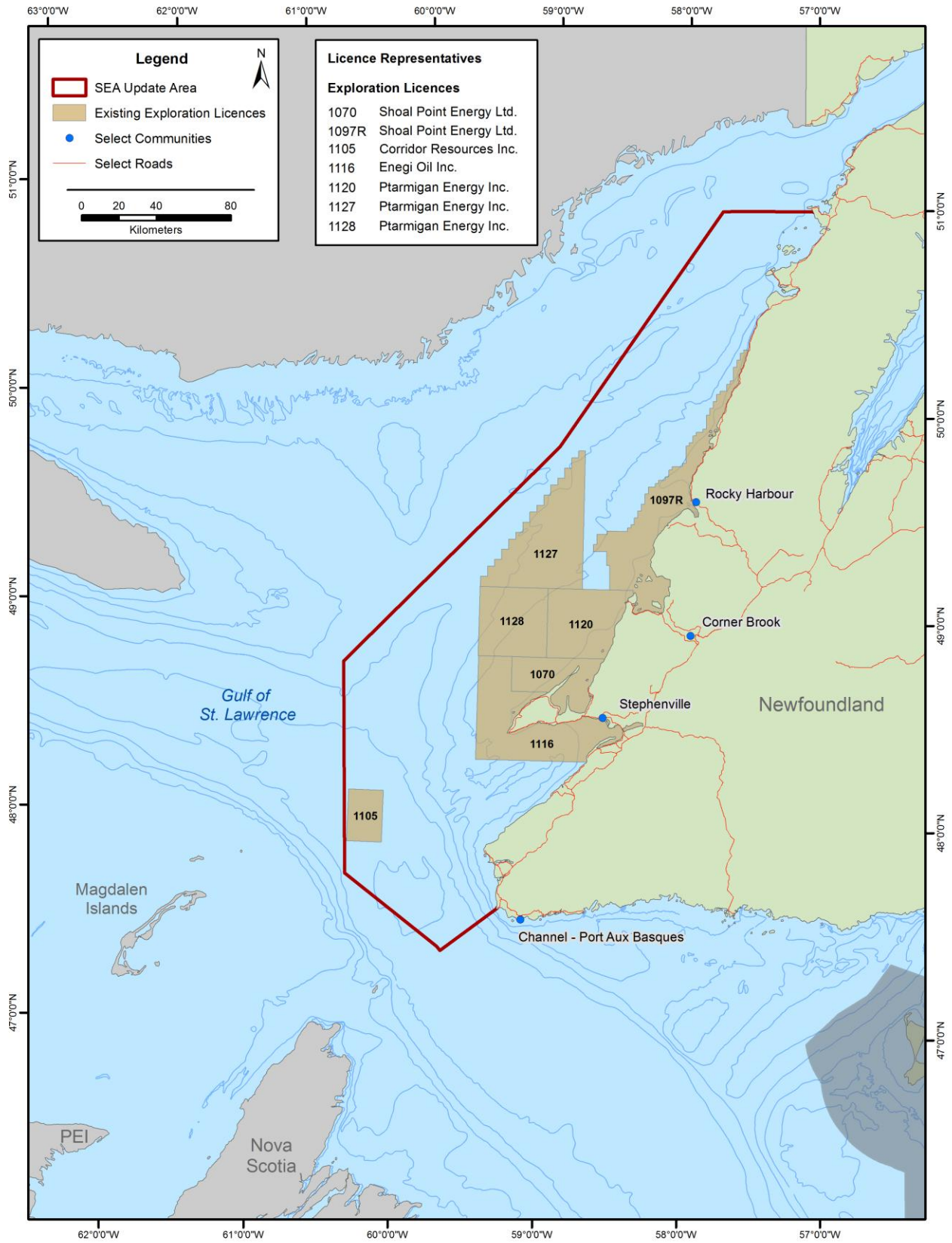
The C-NLOPB's regulatory responsibilities include the administration and issuance of specific licences, authorizations and approvals pertaining to offshore oil and gas exploration and development activities in the region. As part of these regulatory processes, the C-NLOPB has been undertaking Strategic Environmental Assessments (SEAs) of portions of the NL Offshore Area in which the issuance of exploration licences could be contemplated and which have not previously been subject to substantial levels of previous assessment. This has included the preparation of an SEA for the Western NL Offshore Area (Figure 1.1), which was initially completed in 2005 and subsequently amended in 2007 to extend its geographic coverage.

The Board has also committed to review its SEAs every five years and to update them as required, and in late 2011 commenced a process of updating the SEA for the Western NL Offshore Area, the results and outcomes of which are provided in the main SEA Update Report (AMEC 2013) summarized in this document. The SEA Update includes the identification, review and presentation of any new and relevant information on the existing environmental setting of the area that has become available since the initial SEA Reports were completed, as well as an updated analysis of any key potential environmental issues which may be associated with any future oil and gas exploration and/or production activities in the region. It also identifies any relevant knowledge and data gaps and makes recommendations for future mitigation and planning. An important and integral component of the SEA Update has been a program of public and stakeholder consultation and Aboriginal engagement.

Information from the SEA Update will assist the C-NLOPB in determining whether further exploration rights should be offered in whole or in part for the Western NL Offshore Area, as well as any general restrictive or mitigative measures that may be considered for application to future projects and activities. The SEA Update has a key focus on the exploration phase of offshore oil and gas activity in the region, including potential seismic surveys and drilling programs, although it also generally considers potential future production activity in the area should such exploration be successful in identifying commercially significant hydrocarbon resources.

Any future offshore oil and gas activities that may be proposed in the SEA Update Area pursuant to any additional exploration licences will require individual review and approval by the C-NLOPB and possibly other agencies under applicable regulatory processes.

Figure 1.1 The Western Newfoundland and Labrador Offshore Area – SEA Update Area



2 STRATEGIC ENVIRONMENTAL ASSESSMENT UPDATE: SCOPE, FOCUS AND APPROACH

The following sections briefly outline the scope and purpose of the SEA Update, including the “strategic decision” that it is intended to inform as part of the C-NLOPB’s decision-making process, as well as the spatial and temporal boundaries of the assessment and the key environmental components upon which it is focussed.

2.1 The “Strategic Decision” and Assessment Boundaries

As part of its planning and decision-making responsibilities regarding the issuance and administration of exploration rights (and possibly, development), the C-NLOPB has been undertaking (and updating, as required) SEAs of portions of the NL Offshore Area. The results of these assessments help to inform future exploration licencing decisions and thus, the eventual planning and conduct of any subsequent oil and gas exploration or production activities in these regions. The specific C-NLOPB “strategic decision” that the SEA Update is intended to inform is therefore whether to issue further exploration licences in the Western NL Offshore Area, and if so, to identify key environmental components and issues which should be considered in taking these future decisions and actions.

The boundaries of the Western NL Offshore Area (also referred to herein as the SEA Update Area) are as illustrated in Figure 1.1, and were chosen based on historical activity in the area as well as with consideration of relevant administrative boundaries. This area encompasses the Study Areas for the initial (2005 and 2007) SEA Reports, with the western limits of the SEA Update Area further extended to the boundary of an ongoing Québec SEA. The SEA also includes a general focus on environmental components within the larger Gulf of St. Lawrence which could potentially be affected by potential offshore oil and gas activities in the SEA Update Area, including accidental events.

In terms of temporal boundaries, the SEA Update considers an overall time horizon of approximately 10 years, and will be again reviewed within a five year period to determine whether a further update is necessary.

2.2 Scoping Document, Consultation Program and VEC Identification

The planning and preparation of the SEA Update has been guided by a Scoping Document, which was developed by the C-NLOPB and a multi-organization Working Group and made available for public review and input. This document outlines the factors to be considered, the scope of those factors and other guidelines for the preparation of the SEA Update.

An important and integral component of the SEA Update has been a program of public and stakeholder consultation and Aboriginal engagement. These activities have been designed and undertaken to identify questions or concerns regarding future oil and gas exploration and/or development activities in the region and their potential environmental effects, so that these issues could be considered in the SEA Update and ultimately, in future licencing decisions.

This included a series of public open houses in 11 locations throughout Eastern Canada, including communities in Newfoundland and Labrador, Québec, and each of the Maritime Provinces, in September and October 2012. The locations and dates of these public open house sessions are summarized in Table 2.1.

Table 2.1 Public Open Houses for the SEA Update

Location	Date
Port aux Basques, NL	September 30, 2012
Stephenville, NL	October 1, 2012
Corner Brook, NL	October 2, 2012
Rocky Harbour, NL	October 3, 2012
Lourdes de Blanc Sablon, QC	October 4, 2012
Miramichi, NB	October 9, 2012
Charlottetown, PEI	October 10, 2012
Sydney, NS	October 11, 2012
Cap-aux-Meules, Îles-de-la-Madeleine, QC	October 24, 2012
Havre-Saint-Pierre, QC	October 25, 2012
Gaspé, QC	October 29, 2012

A series of stakeholder meetings were also arranged and conducted with identified organizations in each area, and were intended to supplement the larger public sessions. Subsequent to the completion of the consultation sessions, additional written submissions from a number of individuals and organizations were received.

In planning and completing the SEA Update, the C-NLOPB also contacted a number of Aboriginal communities and organizations throughout Eastern Canada. In September 2012, the C-NLOPB wrote to 59 such groups, and received written input from and/or met with several of these in October and November of that year.

The information and input gathered through these processes has informed and shaped the nature and focus of the SEA Update considerably, by helping identify key environmental information requirements and issues that required consideration in the analyses and report.

The SEA Update focuses on those environmental components and potential interactions which are of primary concern, and thus, which have the most relevance to strategic planning and licencing related to possible future oil and gas activities in the SEA Update Area. Based on the results of the issues scoping exercise, and as specified in the Scoping Document, the following Valued Environmental Components (VECs) are considered:

- Fish and Fish Habitat;
- Water Birds;
- Marine Mammals and Sea Turtles;
- Species at Risk;
- Protected and Sensitive Areas; and
- Marine Fisheries.

2.3 SEA Update Approach and Methodology

The completion of the SEA Update included each of the following components, which are reflected in the structure and organization of the Report:

- 1) *Environmental Setting*: An updated description of the existing environment, including relevant components of the physical and biological environments and human activities, based on information that has become available since the initial SEA Reports were completed (2005 and 2007);

- 2) *Potential Environmental Interactions and Effects*: The identification of environmental issues and effects which may be associated with future offshore oil and gas activities in the area;
- 3) *Environmental Mitigation Measures*: An overview of measures which are often implemented during oil and gas exploration or production activities to avoid or reduce potential environmental effects;
- 4) *Environmental Planning Considerations*: An identification of key environmental considerations and any additional mitigation measures which may be relevant to help guide future licencing decisions;
- 5) *Cumulative Environmental Effects*: An analysis of potential effects that may result from oil and gas activities in combination with each other and with other projects and activities in the area; and
- 6) *Information Availability and Requirements*: An evaluation of the availability and adequacy of existing environmental information and any relevant data gaps.

3 OFFSHORE OIL AND GAS ACTIVITY IN THE WESTERN NL OFFSHORE AREA

3.1 The C-NLOPB and Associated Regulatory Processes

The C-NLOPB's annual cycle for the disposition of rights in the NL Offshore Area includes a number of stages to identify particular marine areas to be made available for possible future activity, followed by three associated documents of "title", namely the: 1) exploration licence; 2) significant discovery licence; and 3) production licence. The Board's regulatory responsibilities also include the issuing of specific authorizations and approvals pertaining to offshore oil and gas exploration (geophysical and drilling programs) and production activities. This has included requiring that project-specific environmental assessments (EAs) be conducted and submitted by proponents in relation to proposed oil and gas activities as part of the information submitted in its application for regulatory approval(s).

3.2 Oil and Gas Activity in the Western NL Offshore Area

A number of types of oil and gas activities may occur in the Western NL Offshore Area following the issuance of exploration licences and other authorizations and approvals by the C-NLOPB.

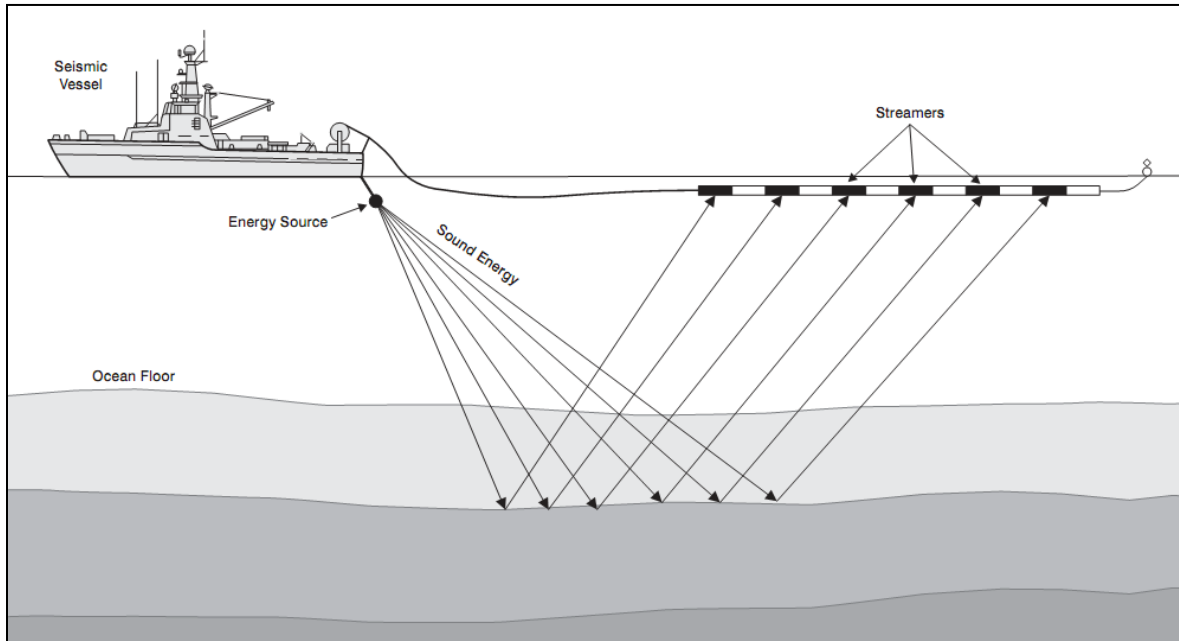
3.2.1 Geophysical Surveys

Geophysical surveys are often undertaken to identify geological formations that may contain oil and gas resources, and may include methods that use the natural fields of the Earth (e.g. gravity surveying, magnetic surveying, electromagnetic surveying) and/or those that require an input of artificially generated energy (e.g. 2D or 3D seismic surveys, 2D high resolution surveys, wide azimuth seismic surveys).

The primary components of an offshore geophysical survey utilizing artificial sources typically include a seismic vessel, a sound source, receivers (hydrophones) and associated supporting elements and activities (Figure 3.1). High-energy sound sources (airguns) are towed behind a survey vessel while it travels along a track line in a prescribed grid crossing known or suspected hydrocarbon accumulations. During the survey, the sound source is fired at regular intervals and directs high energy (low frequency) sound bursts toward the seafloor which can

penetrate below the surface. The reflected sound energy is then recorded by sensitive hydrophones (streamers) which are towed behind the vessel. Computer-based systems then convert the reflected sound (acoustic signals) into seismic data that can be used to map possible hydrocarbon accumulations.

Figure 3.1 Conceptual Illustration of a Typical Seismic Survey



3.2.2 Well Drilling

Exploration wells are drilled to determine whether areas of interest identified from previous geophysical surveys contain hydrocarbon resources.

A number of types of offshore drilling rigs can be used to drill a well once a specific drill site or target is determined (such as semi-submersible drilling units, drill ships, or jack-up drilling units). Drill rigs allow for the raising and lowering of the drill pipe and drill bit, the movement (rotation) of the drill bit, and the installation and circulation of drilling fluids. Offshore drilling installations also contain associated support infrastructure and facilities such as transportation facilities (for helicopters and support vessels), work areas, safety equipment and crew accommodations. Supply vessels and helicopters are used to transport personnel, equipment and materials to and from a drilling rig during an offshore program.

Exploration drilling may also include horizontal directional drilling from on-land locations to investigate potential resources located below the ocean. Most of the exploration wells (eight of nine) that have been drilled to date in the Western NL Offshore Area have been undertaken from on-land locations.

Figure 3.2 Some Typical Offshore and On-Land Drilling Units



Hydraulic fracturing (also referred to as “fracking”) is a stimulation process that may be performed on oil and gas wells that involve low-permeability reservoirs. In these situations, the hydrocarbons present are trapped in the pores of the surrounding rock. The hydraulic fracturing process involves pumping high pressure fluid down a well to create a network of fractures in the reservoir rock, which establish a series of pathways that allow the hydrocarbons to move more freely from the rock pores to the wellbore. Hydraulic fracturing has recently been proposed for an onshore to offshore exploration program in Western Newfoundland. Any such activity would require the receipt of applicable permits and authorizations from the C-NLOPB and other federal and provincial regulatory departments and agencies.

3.2.3 Production

In the event that the results of any future oil and gas exploration licencing and associated seismic and drilling projects are positive and commercially significant resources are discovered, offshore production may be proposed and, subject to approval, developed. Predictions concerning likely numbers, types and other characteristics of possible production activities in the SEA Update Area cannot presently be undertaken since no offshore discoveries have yet been declared and the commercial resource potential of the area is therefore unknown.

3.2.4 Potential Accidental Events and Malfunctions

During an offshore exploration or production project, an accidental event or malfunction is an unlikely, although unfortunately possible, occurrence. Environmental incidents may include potential blowouts (subsea and surface), as well as other possible spills of hydrocarbons or other substances from a drill rig, production platform and/or associated vessel activities, which may vary considerably in terms of their nature, scale, duration and potential environmental effects. The use, storage and movement of fuels, drilling fluids and other chemicals also have the potential to result in accidental spills into the marine environment.

Notwithstanding the heightened awareness of, and concern regarding, such accidental events following the 2010 Gulf of Mexico spill, most offshore wells are drilled without incident, and the likelihood of a significant and environmentally damaging spill occurring is extremely low. Moreover, the regulatory review and approval processes and other requirements that apply to oil and gas activities in the NL Offshore Area are amongst the

most rigorous and stringent in the world. Operators are required to demonstrate that they have the ability and capacity to undertake such activities in a safe and environmentally responsible manner – both in terms of the prevention of hydrocarbon spill events, as well as appropriate procedures and resources to respond to such an event, should one occur.

As part of its regulatory review processes, the C-NLOPB receives and considers information from operators that detail the proposed drilling location and activities, the equipment and procedures involved, and the qualifications and training of personnel, through multi-tiered approval and authorization processes. Operators are also required to develop and implement systematic and comprehensive oil spill prevention and response plans and procedures. The C-NLOPB is also completing a review of the spill response capability of operators working in areas under its jurisdiction, including the SEA Update Area. Should offshore drilling activity be proposed, approved and implemented (based on the above requirements), and in the very unlikely event of a large oil spill, a number of processes and measures also exist to compensate any affected parties for any associated losses or damages. These are described in the associated *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity* and other documentation.

The fate and behaviour of accidental spills are dependent upon site and well-specific characteristics, such as hydrocarbon type and properties, oceanographic conditions, as well as the size, location and timing of the spill. Regulatory reviews for individual proposed drilling programs in the NL Offshore Area typically include a project-specific analysis of oil spill probabilities, as well as modelling studies of the likely fate and behaviour of possible oil spills. This information then informs the EA analyses for a project, including the probability of accidental events and required mitigation (prevention and response) measures, and ultimately, regulatory decisions on whether or not to approve it.

3.2.5 Previous Oil and Gas Activity in the Western NL Offshore Area

Oil and gas exploration activity has occurred and is being proposed in the Western NL Offshore Area pursuant to previous licencing and approvals. Nearly 15,000 line km of seismic data has been acquired and released in the region, and past exploration activity has also included the drilling of nine wells (and one re-entry), all but one of which were completed from onshore locations. There are currently seven Exploration Licences in the SEA Update Area totalling over one million hectares (Figure 1.1).

4 ENVIRONMENTAL SETTING

The SEA Update provides an updated overview of the environmental setting of the Western NL Offshore Area, including the relevant components of its physical, biological, and human environments. The sources of the information presented in the SEA Update (and summarized below) are identified in the main report itself.

4.1 Physical Environment

The SEA Update Area is located in the eastern portion of the Gulf of St. Lawrence, a semi-enclosed sea that covers a marine area of about 240,000 km² and which contains about 35,000 km³ of water. It is bounded on the north by the Quebec-Labrador Peninsula, to the east by the Island of Newfoundland, to the south by Nova Scotia, and to the west by the Gaspé Peninsula and other portions of Québec and New Brunswick. It opens to the Atlantic Ocean through the Cabot Strait in the south and the Strait of Belle Isle in the north.

The geology of Western Newfoundland and the adjacent Gulf of St. Lawrence is complex and dynamic, and the current geological and geomorphic characteristics of its coastal and marine environments have been shaped by various natural and human factors and processes over time. The region is considered to be of quite low seismic potential. The SEA Update Area includes nearly 1,000 km of coastline, stretching from Cape Ray near the Island of Newfoundland's southwest corner to New Ferolle on the Great Northern Peninsula. This extensive section of coast is characterized by various, and quite diverse, shoreline types and characteristics, ranging from steep bedrock cliffs, to beach systems and barachoix, to deltas and sand dune systems. The various coastal segments that comprise the shoreline are therefore diverse, and thus, vary in terms of their history of, and potential for, erosion and other natural and anthropogenic influences and disturbances.

The marine bathymetry within the SEA Update Area exhibits a wide range of physiographic features, from intertidal flats near the coast, to a continental shelf further offshore, to the steep slopes of the Esquiman Channel and the northern part of the Cabot Strait. As a result, water depths range from several meters along the western coast of Newfoundland, to 100 - 300 m further offshore toward the Esquiman Channel, to more than 500 m in the Laurentian Channel and Cabot Strait.

The prevailing winds in the region throughout most of the year have a northwesterly, westerly or southwesterly direction, depending on the time of the year. Air temperature values exhibit strong seasonal variations, and visibility can be affected by the occurrence of fog, daylight hours, and the frequency and type of precipitation. The most severe sea states occur between October and January, with a peak in December.

The Gulf of St. Lawrence exhibits unique physical oceanographic features and circulation patterns, owing to its isolation from the North Atlantic Ocean, the significant amount of fresh runoff from the St. Lawrence River as well as other sources, and water movement through the Cabot Strait and the Strait of Belle Isle. In deeper areas, the water column generally consists of a surface layer, a cold intermediate layer, and a deeper water layer. The mean circulation pattern is cyclonic, with transport directed to the northeast along the western coast of Newfoundland, and to the southwest along the coast of Québec in the north.

Sea ice initially occurs in the northern part of the region, with a freeze-up date of mid January for the northernmost section, with sea ice coverage then expanding and typically covering most of the region by late February and reaching maximum coverage by mid March. Once the ice cover begins to retreat, the southern part of the area is typically ice-free by early April and the remainder is free of ice by late May. Although icebergs (particularly smaller ones) do occasionally enter into the SEA Update Area, they are far less common here than in other portions of the NL Offshore Area. There have been no recorded sightings of very large icebergs in or near the SEA Update Area.

4.2 Biological Environment

The following sections provide a summary overview of relevant aspects of the biological environment of the SEA Update Area, including Fish and Fish Habitat, Water Birds, Marine Mammals and Sea Turtles.

4.2.1 Fish and Fish Habitat

The Gulf of St. Lawrence is a rich ecosystem that supports a diverse assemblage of fish and invertebrate species. These ecosystem components are linked to the well being of other animals inhabiting the region and the coastal communities that depend on them. Such inter-relationships are the basis of broad changes that have been

observed in the Gulf of St. Lawrence in recent years, which are thought to be linked to fishing and/or changes in primary productivity. The SEA Update considers each of the types of marine organisms that inhabit the SEA Update Area, including corals, phytoplankton, zooplankton, benthic invertebrates and fish.

The lower end of the food chain in the area is dominated by copepod zooplankton, which comprises about 75 percent of the zooplankton species richness. Zooplankton populations rely on phytoplankton blooms and in turn provide food either directly or indirectly to a great diversity of benthic organisms and fish (and organisms higher up the food chain). Fish species in the SEA Update Area also play an important role in regulating the ecosystem and include many commercially and socially important species such as Atlantic cod, Atlantic salmon, herring, redfish and others. The greatest marine species diversity in the Gulf of St. Lawrence, however, is found in the benthic invertebrate assemblage, which includes over 1,500 species, some of which are commercially important such as American lobster, snow crab, Atlantic scallop, blue mussel and northern shrimp.

The Gulf of St. Lawrence and the SEA Update Area itself includes a wide variety of marine habitats that range from highly productive coastal eelgrass beds and estuaries to relatively deep channels offshore. Each habitat is occupied by a characteristic assemblage of plants and animals, which can occupy specific habitats year round or use them seasonally. For example, the warm and productive shallows are important spawning, nursery, and adult feeding grounds for both groundfish and pelagic fishes but are vacated by many species in winter in favour of deeper, warm waters such as those found in the Esquiman Channel or beyond the Gulf of St. Lawrence. In contrast, deep warm waters are occupied year round by a different assemblage of fish (such as redfish) which are joined seasonally by those avoiding harsh winter conditions in the shallows.

These patterns of habitat use result in important seasonal migrations of species such as Atlantic cod, herring, Atlantic salmon and many other species. These movements take place through important corridors within the SEA Update Area to and from the Strait of Belle Isle or Cabot Strait. The nature and timing of many of these migrations are somewhat predictable.

Habitat heterogeneity in the Gulf of St. Lawrence also results in areas of ecological significance that include protected areas (e.g. National Parks and natural areas), zones of high productivity or diversity (e.g. eelgrass beds), those that provide key ecosystem functions (e.g. spawning grounds or staging areas), those that contain species that are particularly sensitive to anthropogenic disturbance (e.g. corals), or those areas that are particularly important for contributions to scientific understanding of the marine environment and/or human use (such as Bonne Bay). The SEA Update Area includes marine areas and habitats protected by Gros Morne National Park and the Port au Choix Historic Site, and includes one of the Gulf of St. Lawrence's 10 "Ecologically and Biologically Significant Areas" (EBSAs) - the West Coast of Newfoundland EBSA.

Species within the SEA Update Area exhibit a variety of life history strategies, physiologies and morphologies that define their sensitivity to natural and anthropogenic disturbance. Some are comprised of small, genetically unique populations that are vulnerable to disturbance of moderate spatial scales. Many reproduce at older ages and cannot endure high mortality. Furthermore, the evolutionary history of these animals can leave them poorly equipped to deal with invasive species that are colonizing the Gulf of St. Lawrence. Many commercially harvested species remain at low levels and/or are declining. Moreover, the SEA Update Area is known to contain four species listed and protected under federal and/or provincial legislation, including three wolffish species and the white shark, as well as several more listed by COSEWIC (such as the American eel).

4.2.2 Water Birds

A number of bird species occur in the SEA Update Area and adjacent marine and coastal environments, including seabirds, coastal waterfowl, shorebirds, and other bird species that inhabit the region at specific or extended periods for nesting, breeding, feeding, migration and other activities. Several important areas and habitats have also been identified at locations along the coastline of Western Newfoundland and elsewhere in the Gulf of St. Lawrence.

Seabirds that occur in the marine waters off Western Newfoundland include cormorants, gannets, phalaropes, gulls, terns, alcids (auks), jaegers and skuas, and tubenoses (fulmars, petrels and shearwaters). Although the Gulf of St. Lawrence is used by a variety of bird species throughout the year, the coast and waters of Western Newfoundland have relatively lower abundances of seabirds compared with other marine areas of Newfoundland and Labrador. The largest concentration of seabirds in the area is in late winter (January to March), and geographically, the southern part of the area supports the greatest seabird abundance during this period. Seabirds are least abundant in the SEA Update Area in the fall. Shorebirds in the SEA Update Area are most abundant during migration, particularly from July to September, when Arctic-nesting species migrate through the area to their wintering areas. The western coast of Newfoundland supports a high proportion of the migrating shorebirds that occur in the province. A variety of waterfowl, loons, and grebes also inhabit or move through the area at particular times, and spend much of their time on the water's surface.

Several of these marine-associated bird species are currently or soon likely to be designated as being at risk (and are therefore protected) under the federal and/or provincial legislation, including the 1) Piping Plover, 2) Harlequin Duck, 3) Barrow's Goldeneye, 4) Ivory Gull, 5) Red Knot (*rufa* subspecies), 6) Buff-breasted Sandpiper, 7) Peregrine Falcon, 8) Short-eared Owl and 9) Bank Swallow. Four of these avifauna species, the Piping Plover, Harlequin Duck, Short-eared Owl and Bank Swallow, are known to breed in coastal habitats in Western Newfoundland. There are four Important Bird Area (IBA) sites in the SEA Update Area: 1) Codroy Valley; 2) Codroy Valley Estuary; 3) Grand Bay West to Cheeseman Provincial Park; and 4) Gros Morne National Park), as well as various known nesting sites for rare and/or other species, particularly the Piping Plover, for which several critical habitat beaches have been identified within Western Newfoundland and elsewhere in the Gulf of St. Lawrence.

4.2.3 Marine Mammals and Sea Turtles

Over 20 marine mammal and reptile species are known to, or are likely to, occur within the SEA Update Area and in adjacent marine and coastal regions. These include various cetacean (whale and dolphin) species, including mysticetes (baleen whales) and odontocetes (toothed whales and porpoises), pinnipeds (seals) and sea turtles. These species vary considerably in their likelihood of presence and occurrence (from common, to very rare, to possible but unlikely), as well as the particular areas and habitat types that they utilize and the times at which they occur in or pass through the region.

The Gulf of St. Lawrence has long been recognized as being of significance for marine mammals, both overall and with regard to specific areas that are of particular ecological and biological importance. One such identified area is the Western Shelf of Newfoundland, which extends from the Cabot Strait to the Esquiman Channel and covers mostly coastal waters. Water temperatures in this area are typically slightly above freezing, and the ice cover period for the area is therefore minimal. The area is significant for marine mammals, with areas of high uniqueness, concentration and adaptive values. The most important sections of the area are located in the

northern margin (near the Strait of Belle Isle), and the south of the area at St. Georges Bay. The latter provides a potentially significant feeding area for many species, including the Blue Whale, divers and krill eating species, which utilize the ice-free water over much of the year. In the northern part of the SEA Update Area, the Strait of Belle Isle is also considered to be particularly important for marine mammals. While the ice-free months are the most important period for the majority of marine mammal and sea turtle species in the SEA Update Area, the southern shelf is considered important for Grey, Hooded and Harp Seals during the ice-covered period, when it provides an important whelping and breeding area. Sea turtles are highly migratory and occur infrequently in the overall region, and they are not found in the Gulf of St. Lawrence during the winter months.

A total of six federally listed marine mammal species at risk (Blue Whale - Atlantic Population; North Atlantic Right Whale; Northern Bottlenose Whale - Scotian Shelf Population; Beluga Whale - St. Lawrence Estuary Population; Fin Whale - Atlantic Population; and Harbour Porpoise - Northwest Atlantic Population) and one listed sea turtle (Leatherback - Atlantic Population) are known to occur in the SEA Update Area. Two additional species that may occur in the SEA Update Area, the Killer Whale (Northwest Atlantic and Eastern Arctic Populations) and Loggerhead Sea Turtle (Atlantic Ocean Population) are listed by COSEWIC. Critical habitat has been identified for three of these marine mammal species at risk: 1) the Northern Bottlenose Whale (Scotian Shelf Population); 2) North Atlantic Right Whale; and 3) the Beluga Whale (St. Lawrence Estuary Population). Critical habitat of the Northern Bottlenose whale is located off the southern coast of Nova Scotia, along the Scotian Shelf. The North Atlantic Right Whale's critical habitat is located within the Bay of Fundy and off of southern Nova Scotia at Roseway Basin. The Beluga Whale's identified critical habitat is within the St. Lawrence estuary west of Baie-Comeau, including the lower reaches of the Saguenay River.

4.3 Protected Areas

A number of marine and coastal areas within the SEA Update Area and throughout the larger Gulf of St. Lawrence have been designated as protected under provincial, federal and/or other legislation and processes, due to their ecological, historical and/or socio-cultural characteristics and importance.

Gros Morne National Park (a UNESCO World Heritage Site) is located in Western Newfoundland and encompasses a segment of the coastal and near-shore marine areas that extend along the SEA Update Area. Also, the Port au Choix National Historic Site protects and interprets the history of several ancient peoples who inhabited this portion of the Island of Newfoundland. In addition to the landbases included within these important protected areas, the intertidal zones (extending to the normal low water mark) along their coasts are also protected. There are currently no federal National Marine Conservation Areas (NMCAs) located in the SEA Update Area, although the South Coast Fjords area off the south coast of Newfoundland is a potential candidate NMCA for the Laurentian Channel marine region. Similarly, there are no federal *Oceans Act* Marine Protected Areas (MPAs) or identified Areas of Interest (AOIs) located directly within the area, although the Laurentian Channel off the southwest coast of Newfoundland has been identified as an AOI. There are likewise no Migratory Bird Sanctuaries in the region. Provincial parks and protected areas in Western Newfoundland include the Table Point Ecological Reserve, Arches Provincial Park, Blow Me Down Provincial Park, Codroy Valley Provincial Park and J.T. Cheeseman Provincial Park.

The larger Gulf of St. Lawrence has an extensive network of parks and protected areas, including some that are federally designated and others within various provincial jurisdictions. National Parks include Prince Edward Island National Park, Kouchibouguac National Park in New Brunswick, Cape Breton Highlands National Park in Nova Scotia, Forillon National Park on the Gaspé Peninsula of Québec and Mingan Archipelago National Park

Reserve on the Québec North Shore. The Saguenay-St. Lawrence Marine Park is the only designated NMCA in or near the Gulf of St. Lawrence and represents the St. Lawrence Estuary marine region, although it is not located within or adjacent to the SEA Update Area. There are a number of other potential NMCAs located in the Gulf of St. Lawrence (e.g., Îles-de-la-Madeleine - Magdalen Shallows marine region; Jacques Cartier Passage). Another MPA (Basin Head) and two AOIs (American Bank and Shediac Valley) are also located within the Gulf of St. Lawrence, as are various National Wildlife Areas and Migratory Bird Sanctuaries.

The Government of Canada has identified the Gulf of St. Lawrence as one of five priority large ocean management areas requiring large-scale coordinated management, and the Gulf of St. Lawrence Integrated Management (GOSLIM) initiative aims to plan and manage human activities among multiple user groups while conserving sustainable ocean resources. Fisheries and Oceans Canada has also identified various smaller scale integrated Coastal Management Areas (CMAs) in the region, with three of these being located in Western Newfoundland: 1) Great Northern Peninsula; 2) Bay St. George / Port au Port; and 3) Bay of Islands.

Each of the provincial governments of Nova Scotia, Prince Edward Island, New Brunswick and Québec have also established marine and/or coastal parks or other protected areas around the Gulf of St. Lawrence and elsewhere.

4.4 Human Activities

The current population of the Western Newfoundland region is approximately 67,000 persons, distributed throughout many municipalities and unincorporated communities along the coastline and throughout the interior. The majority of these are small coastal towns, with the most densely populated areas located around Corner Brook and Stephenville as well as a number of other smaller centres on or near the Northern Peninsula. The region's economy is predominantly natural resource-based with various regional centres that provide a range of commercial and public services.

Marine fisheries are an integral component of the socioeconomic environment of Newfoundland and Labrador and other parts of Canada, including the various communities and regions that extend along the coastline of Western Newfoundland and which surround the Gulf of St. Lawrence. The fishery has played a key role in the region's history, and thus in shaping its people, communities and overall culture, and it continues to be an essential element of the economy and lifestyles of the people that live in these areas. Numerous individuals and organizations depend on fish harvesting and its associated processing and spin-off industries, with many residents participating in recreational and subsistence fishing as an important aspect of their culture and overall way of life. Aboriginal people and communities throughout the Gulf of St. Lawrence also continue to undertake fishing activities for commercial and/or traditional purposes, and many groups have depended on the resources of the sea to sustain their people and cultures for generations.

The SEA Update Area overlaps with a number of NAFO Divisions, Subdivisions and Unit Areas (UAs) which are used to manage (and describe) fishing activity off Western Newfoundland (e.g., UAs 4Rb, 4Rc and 4Rd) and in the larger Gulf of St. Lawrence (Divisions and Subdivisions 4R, 4S, 4T, 4Vn and 3Pn). The 2011 commercial fish harvest within the NAFO 4Rb, 4Rc and 4Rd totalled nearly 42,000 tonnes with a landed value of almost \$40 million. Herring and mackerel together comprised approximately 65 percent of the total fish landings by weight in this region from 2005 – 2011, followed by shrimp and capelin and then other species to a far lesser extent. Lobster and shrimp accounted for nearly half of the landed value of the area's fishery from 2005 to 2011 overall, followed by mackerel, herring, cod, turbot and others. The commercial fish harvest within the larger Gulf of St.

Lawrence (NAFO 4R, 4S, 4T, 4Vn and 3Pn) in 2011 totalled approximately 200,000 tonnes and had a landed value of approximately \$512 million. Herring comprised nearly one third of the total fish landings by weight in this region from 2005 – 2011, followed by shrimp, snow crab, lobster and mackerel and others. Lobster itself comprised almost half of the overall landed value of the fishery from 2005 and 2011, followed by snow crab, shrimp, and various other species. The seal harvest has also been an important source of additional income for some fishers.

Fishing activity in the SEA Update Area in recent years has generally extended from March to December, with the highest landings by weight occurring in the Fall (October – November) period, but with approximately half of the total fish value being harvested in the Spring and early Summer (May – June) season.

Commercial fishing in the Gulf of St. Lawrence as a whole takes place year-round, with the highest landings by weight occurring in the Spring and early Summer (May - June) period, followed by the late Summer and early Fall timeframe. Various types of fishing gear are used to harvest fish and shellfish off Newfoundland and Labrador and elsewhere in the Gulf of St. Lawrence.

There are currently five aquaculture sites located in Western Newfoundland, including facilities for blue mussel, salmon, and cod. Elsewhere in the Gulf of St. Lawrence, marine aquaculture continues to emerge as an important economic generator.

A number of Aboriginal communities and organizations occur throughout the Gulf of St. Lawrence region, many of which are involved in marine fishing activity in the SEA Update Area and/or elsewhere in the Gulf of St. Lawrence, including fishing for traditional and commercial purposes. Recreational fishing also takes place seasonally in coastal and inland waters. Residents and visitors also gather shellfish such as mussels and clams in coastal areas, and hunt waterfowl in season.

The west coast of Newfoundland and the Strait of Belle Isle are adjacent to important shipping routes of the Gulf of St. Lawrence and the St. Lawrence Seaway. An existing submarine cable transects the SEA Update Area from the Bay of Islands to the Gaspé region of Québec, and a subsea power cable across the Cabot Strait is being proposed. There are also several known unexploded ordnance (UXO) sites within the SEA Update Area.

Western Newfoundland has a number of other key tourism attractions and associated infrastructure and services, including parks and campgrounds, hiking and walking trails, nature parks and beaches, as well as alpine and nordic skiing, snowshoeing and snowmobiling areas. Tour operators provide boating, sea kayaking, hunting and fishing and other activities. This region also has cultural and heritage sites, including museums and interpretation centres, annual festivals and other facilities and activities which attract local, national and international visitors.

5 ENVIRONMENTAL INTERACTIONS, MITIGATION AND KEY PLANNING CONSIDERATIONS

The SEA Update identifies and evaluates potential environmental issues and effects, mitigation measures and key planning considerations related to possible future offshore oil and gas activities in the SEA Update Area.

5.1 Fish and Fish Habitat (Including Species at Risk)

Fish and their habitats are important considerations in any review of proposed or potential activities that may occur within, and affect, the marine environment. As described earlier, a variety of fish species and habitat components occur within the SEA Update Area, with different species groups occupying different habitats, at different times, for the purposes of carrying out various aspects of their life histories in this region. This rather broad VEC includes finfish as well as plankton, algae, benthos and other relevant aspects of fish habitats, given the clear interrelationships between these ecological components.

5.1.1 Potential Environmental Interactions and Effects

Some of the key potential interactions between marine fish and oil and gas exploration and production activities are provided in Table 5.1, as well as some of the standard mitigation measures that are often required or otherwise implemented to avoid or reduce such effects.

Table 5.1 Fish and Fish Habitat (Including Species at Risk): Summary of Potential Environmental Interactions and Mitigation

Potential Environmental Interactions	Potential (Standard) Mitigation
1) Injury or mortality from exposure to underwater sounds such as seismic signals, explosions or others at very close range (particularly immobile species).	<ul style="list-style-type: none"> • Avoidance of sensitive areas and times • Minimization of airgun source level and use of “ramp up” procedures • As a minimum, adherence to the C-NLOPB’s <i>Geophysical, Geological, Environmental and Geotechnical Program Guidelines</i>, including the associated <i>Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment</i> (in the planning of exploration activities; establishment and monitoring of a safety zone; prescribed start-up and shut-down procedures, etc). • Minimization of environmental discharges and emissions and compliance with relevant regulations and standards • Minimization of vessel traffic volume, and compliance with the <i>Canada Shipping Act</i> and other relevant regulations • Use of existing and common travel routes where possible • Minimization of flight activity and avoidance of low-level operations • Chemical screening and selection • Use of an oily water separator to process contained deck drainage; collected oil stored and disposed of properly • Appropriate handling, storage, transportation and on-
2) Fish avoidance of certain areas that would otherwise be used (e.g. insonified areas during seismic surveys), altering the presence and abundance of marine fish as well as disturbing their movements / migration (to and through the area), feeding and other important activities.	
3) Interference with (and the masking of) sounds in the marine environment that originate from or are used by marine fish, such as in communication, feeding and other activities.	
4) Contamination of fish and habitats due to environmental discharges (e.g., hydrocarbons in deck drainage, wastewater, produced water, run-off from onshore drill pads).	
5) Alteration of fish habitats from the discharge and deposition of drill cuttings, the placement of other project infrastructure or activities, or the introduction and spread of aquatic invasive species.	
6) Attraction of individuals to project installations and vessels (e.g. lights), with increased potential for injury, contamination or other interactions.	

Potential Environmental Interactions	Potential (Standard) Mitigation
7) Changes in the availability, distribution or quality of feed sources and/or habitats for fish as a result of planned oil and gas activities and their environmental emissions.	<ul style="list-style-type: none"> shore disposal of solid and hazardous wastes Use of WBMs where possible and technically feasible Use of non-toxic drilling fluids Treatment of SBM-associated drill cuttings to comply with guidelines prior to discharge
8) Changes in the presence, abundance, distribution and/or health of fish as a result of accidental spills (e.g. physical exposure, ingestion, effects on prey and habitats).	<ul style="list-style-type: none"> Atomize any produced water with hydrocarbons in flare (using high efficiency burners) and/or appropriate treatment and disposal Use of mechanical separation during well abandonment Size, location and timing of blasting events Use of existing sites and access roads, or minimization of project footprint for on-land exploration Sediment control measures Site / access rehabilitation following project completion Spill prevention and design considerations Spill preparedness and response procedures Spill containment around on-shore drill sites

In addition to the examples listed above, additional and/or refined measures may also be appropriate and required for particular projects, depending on their specific characteristics, location, timing, environmental settings, and possible effects. Mitigation is therefore determined on a project-specific basis, through the individual regulatory reviews of proposed seismic surveys, exploration drilling programs or production projects in the NL Offshore Area. Environmental compliance monitoring (including reporting on waste discharges, emissions, and treatment systems) is also required to verify adherence to applicable legislation and any conditions of regulatory approval.

5.1.2 Environmental Planning Considerations

A number of fish species that are designated as being at risk (and which are formally protected) under the SARA and/or the NL ESA are known or likely to occur in the SEA Update Area, including several species of wolffish and the white shark, as well as several other species that have also been evaluated and designated by COSEWIC.

Particularly important, and/or sensitive, areas and times for fish and fish habitat that have been identified through the SEA Update, which may be relevant for consideration in future planning and decision-making regarding offshore oil and gas activities in the region are summarized in the following Table:

Table 5.2 Fish and Fish Habitat (Including Species at Risk): Environmental Planning Considerations

Component / Activity	Identified Areas / Times of Particular Importance
<p><i>Plankton</i></p> <p><i>Benthos / Corals</i></p>	<ul style="list-style-type: none"> Spring phytoplankton bloom in the northeast Gulf of St. Lawrence in April-May Area off St. George's Bay has an abundance of cod eggs in the spring (April / June) Coastal area north of the Port au Port Peninsula, has an abundance of herring and capelin larvae (May / June) Central Laurentian region is the main redfish larval zone with larval extrusion occurring from April to July Known locations of corals throughout the area, including aggregations of sea pens off of the southwest corner and just outside the boundaries of the SEA Update Area

Component / Activity	Identified Areas / Times of Particular Importance
<p><i>Fish Habitats / Times (General)</i></p>	<ul style="list-style-type: none"> • Generally, the shallower regions of the Gulf of St. Lawrence are more important as habitat during the warm water season • Deep channels and slopes serve as habitat for species year-round but are particularly important in cold water seasons when many finfish species move to these areas for refuge and/or spawning • Estuaries are often extremely productive and serve as important feeding, staging and nursery habitat for a variety of vertebrate and invertebrate species. This is especially true of eelgrass, which has been designated as an ecologically significant species in Eastern Canada • There are areas in and along the slopes of the Laurentian and Esquiman Channels that are important in the life cycle components of many demersal and pelagic fish in terms of migration, refuge, and feeding • Other ecologically important areas identified in the 2005 SEA and/or during public consultations include: <ul style="list-style-type: none"> - A steep slope area at the northern end of the Esquiman Channel, known locally as the “Hole” - A slope area close to shore between Bellburns and River of Ponds - The area around Ramea - Port aux Basques and east, north to St. George’s Bay has been identified as an important lobster area - Green Point Banks, an inshore area between Trout River and Sally’s Cove, is an important area for fish species such as mackerel, lobster, and herring (spawning) - Bonne Bay is a particularly important area from an ecological, scientific and socioeconomic perspective
<p><i>Reproduction</i></p>	<ul style="list-style-type: none"> • The Cape St. George area sees spawning of cod (April through June) and spring spawning herring (May and June) • Coastal area north of the Port au Port Peninsula has a large abundance of herring and capelin larvae (May and June) • Capelin spawning beaches, including: Trout River, beach south of Baker’s Brook, Sandy Cove Bay, Port au Choix, Port Saunders, River of Ponds, Belburns, Meadows, John’s Beach, Ship Cove (June / July) • Herring spawning grounds including spring spawning locations in the May-June period (e.g. St. George’s Bay, Green Point, Bay of Islands, Port au Port Bay, Sally’s Cove) and fall locations in July-September (e.g. St. John Bay, Ingornachoix Bay) • Laurentian Channel sees Greenland halibut spawning in the January through March period • Slope regions of the Laurentian Channel and the Esquiman Channel are thought to see wolffish spawning from approximately October through December • Important lobster areas in the region include areas off Ramea, Port aux Basques and east, north to St. George’s Bay, and identified lobster spawning areas from Outer Port au Port to Shag Bay, as well as near Shoal Point, Outer Bay of Islands (just above North Head) and Trout River Bay (May through July)
<p><i>Migration</i></p>	<ul style="list-style-type: none"> • Many species use the Esquiman Channel (including the Cabot Strait Escarpment) as their principal migration corridor (cod, redfish) and refuge area (capelin, herring) in the Gulf of St. Lawrence • Other specific areas of importance as migration routes and for critical life stages of fish that are within or near the SEA Update Area include: <ul style="list-style-type: none"> - Atlantic cod populations are found in shallow waters in summer (0 – 50 m) and

Component / Activity	Identified Areas / Times of Particular Importance
	<p>move to deeper waters in winter, going through the Cabot Strait and off of Newfoundland's south coast. They return to shallower waters again in June</p> <ul style="list-style-type: none"> - Atlantic salmon move through both the Strait of Belle Isle and Cabot Strait in early summer into the Gulf of St. Lawrence and return in summer to spawn in freshwater - Atlantic mackerel migrate into the Gulf of St. Lawrence through the Cabot Strait in late spring / summer, particularly towards the Magdalen Shallows, and migrate out of the area in the fall - Summer feeding grounds for pelagic species (herring, capelin, barracudina, spiny dogfish, silver hake, and pollock) at the head of the Esquiman Channel in the vicinity of the Port au Port Peninsula

The ecosystem in the Gulf of St. Lawrence is dynamic. Although there is some on-going discourse related to the extent that fishing activity or changes in water temperatures have caused this, it is generally agreed that there has been a trophic shift over the last few decades that may not yet have stabilized, and consequently, the ecosystem may have somewhat less of a buffering capacity to potential stressors. Climate change has a compounding effect on the marine fish community with observed climate driven shifts in the presence, abundance and distribution of marine fish species throughout the region. Aquatic invasive species are also an area of general concern for the region, with coastal areas being particularly vulnerable to the introduction (and effects) of such species.

5.2 Water Birds (Including Species at Risk)

A number of bird species occur in the SEA Update Area and adjacent marine and coastal environments, including seabirds, coastal waterfowl, shorebirds, and other bird species that inhabit the region at specific or extended periods for nesting, breeding, feeding, migration and other activities. Several important areas and habitats have been identified at locations along the coastline of Western Newfoundland and elsewhere in the Gulf of St. Lawrence.

5.2.1 Potential Environmental Interactions and Effects

Some of the potential environmental interactions between offshore oil and gas activities and birds include those listed in Table 5.3, which also highlights standard mitigation measures that are often implemented in relation to these possible effects.

Table 5.3 Water Birds (Including Species at Risk): Summary of Potential Environmental Interactions and Mitigation

Potential Environmental Interactions	Potential (Standard) Mitigation
1) Attraction of night-flying birds to oil and gas installations and vessels (offshore or on-shore), including their lights, flares or other emissions, with possible injury or mortality (strikes, incineration, disorientation, energy expenditure).	<ul style="list-style-type: none"> • Avoidance of known and observed bird colonies and significant aggregations of avifauna • Minimizing the amount and adjusting the duration and frequency of lighting used • Adherence to the C-NLOPB's <i>Geophysical, Geological, Environmental and Geotechnical Program Guidelines</i> • Avoid or minimize flaring, use of high efficiency burners
2) Bird attraction or disturbance resulting from other activities and equipment associated with offshore or on-land activities (e.g. drill rigs, containment	

Potential Environmental Interactions	Potential (Standard) Mitigation
structures) and possible injury or mortality.	<ul style="list-style-type: none"> • Protocols for the collection and release of birds • Minimize discharges, and compliance with the <i>Canada Shipping Act</i> and regulations • Minimization of vessel traffic volume and use of existing and common travel routes where possible • Avoid low-level flight operations • Use of existing sites and access roads, or minimization of project footprint for on-land activities • Site / access rehabilitation following project completion • Minimization of environmental discharges and compliance with guidelines, chemical screening and selection • Use of an oily water separator to process contained deck drainage; collected oil stored and disposed of properly • Appropriate handling, storage, transportation and on-shore disposal of solid and hazardous wastes • Sediment control measures • Oil spill prevention and design considerations • Spill preparedness and response procedures • Spill containment around on-shore drill sites
3) Disturbance to birds and their activities as a result of vessel, aircraft and/or vehicular movements, or through the presence of offshore and/or on-shore structures and activities (lights, noise, land clearing).	
4) Possible injury as a result of exposure to noise within the water column during seismic activities (particularly diving birds) or other disruptions to and changes in their feeding and other behaviours.	
5) Changes in the availability, distribution and/or quality of food sources or habitats (water surface, coastal areas) for birds.	
6) Changes in the presence, abundance, distribution and/or health of birds as a result of exposure to accidental oil spill, which may affect individuals (physical exposure, ingestion) and important habitats (offshore, coastal and on-land areas).	

Environmental mitigation and monitoring requirements are determined on a project-specific basis, through the individual regulatory reviews of proposed projects in the NL Offshore Area.

5.2.2 Environmental Planning Considerations

Several bird species that are currently (or may potentially be) designated as being at risk (and which are therefore protected) under federal and/or provincial legislation are known or likely to occur in the SEA Update Area. These include the: 1) Piping Plover; 2) Harlequin Duck; 3) Barrow’s Goldeneye; 4) Ivory Gull; 5) Red Knot (*rufa* subspecies); 6) Buff-breasted Sandpiper; 7) Peregrine Falcon; 8) Short-eared Owl; and 9) Bank Swallow. Four of these avifauna species (Piping Plover, Harlequin Duck, Short-eared Owl and Bank Swallow), are known to breed in coastal habitats in Western Newfoundland.

Some particularly important and/or sensitive areas and times for birds, including Species at Risk, that have been identified through the SEA Update, and which may be relevant for future planning and decision-making regarding offshore oil and gas activities in the region, include those summarized in the Table below:

Table 5.4 Water Birds (Including Species at Risk): Environmental Planning Considerations

Component / Activity	Identified Areas / Times of Particular Importance
<i>Important Habitats</i>	<ul style="list-style-type: none"> • Important Bird Areas (IBA), of which there are four in the SEA Update Area: 1) Codroy Valley; 2) Codroy Valley Estuary; 3) Grand Bay West to Cheeseman Provincial Park; and 4) Gros Morne National Park • Known nest sites / breeding sites for avifauna species (including various species at risk) • Critical habitat (beaches) for breeding Piping Plovers identified in Western Newfoundland (and elsewhere in the Gulf of St. Lawrence) • Areas of Gros Morne National Park are of particular importance to various species of

Component / Activity	Identified Areas / Times of Particular Importance
	avifauna <ul style="list-style-type: none"> • Sandy Point / Flat Bay Islands areas • Stephenville Crossing area
<i>Seasonal Considerations</i>	<ul style="list-style-type: none"> • Greatest concentration of pelagic seabirds in the SEA Update Area occurs in the winter months and through the breeding season • During the summer breeding season, the greatest abundance of seabirds is concentrated around nesting colonies • Seabirds are least abundant in the SEA Update Area in the fall of the year • Shorebirds are most abundant during migration, particularly from July to September, when Arctic-nesting species migrate through the area to their wintering areas. Many species utilize coastal habitats such as sandy mudflats. Western Newfoundland supports a significant proportion of the province’s migrating seabirds • Waterfowl breeding in coastal and estuarine environments, particularly the colonial Common Eider, are vulnerable in the summer months • In the fall staging period and in the winter, species such as eiders, scoters and mergansers can be found in large numbers in coastal waters

5.3 Marine Mammals and Sea Turtles (Including Species at Risk)

Several marine mammal and reptile species are also known or likely to occur within the SEA Update Area and in adjacent marine and coastal regions. Given the relatively rarity of many of these species, and because several are protected under species at risk legislation in Canada and elsewhere, the presence and distribution of marine mammals and sea turtles in the area is an important consideration in future planning and decision-making regarding potential future offshore oil and gas activities.

5.3.1 Potential Environmental Interactions and Effects

Some of the key potential environmental interactions between offshore oil and gas activities and this VEC include those listed in Table 5.5, which also highlights some of the standard mitigation measures that are often implemented to avoid or reduce such effects.

Table 5.5 Marine Mammals and Sea Turtles (Including Species at Risk): Summary of Potential Environmental Interactions and Mitigation

Potential Environmental Interactions	Potential (Standard) Mitigation
1) The avoidance of certain areas, with these behavioural changes altering the presence, abundance and overall distribution of marine mammal and sea turtles and their movements, feeding and other activities (especially if avoided areas are particularly important or rare, or disturbed repeatedly).	<ul style="list-style-type: none"> • Avoidance of sensitive areas and times, including known and observed marine mammal concentrations • Minimization of airgun source level and use of “ramp up” procedures • On-board monitoring for marine mammals and sea turtles, with established protocols for avoiding or reducing interactions if animals are observed
2) The possible attraction of individuals to offshore installations and vessel, resulting in injury or mortality through collisions, contamination or other interactions.	<ul style="list-style-type: none"> • As a minimum, adherence to the C-NLOPB’s <i>Geophysical, Geological, Environmental and Geotechnical Program Guidelines</i>, including the associated <i>Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment</i> (in the planning
3) Interference with sounds within the marine environment that originate from and/or are used by	

Potential Environmental Interactions	Potential (Standard) Mitigation
marine mammals (e.g. communication, detection of prey, reproduction, echolocation).	of exploration activities; establishment and monitoring of a safety zone; prescribed start-up and shut-down procedures, etc)
4) Temporary hearing impairment or permanent injury or mortality from extremely loud and instantaneous sounds (such as in close proximity to a seismic airgun or an underwater explosion).	<ul style="list-style-type: none"> • Minimization of vessel traffic volume and use of existing and common travel routes where possible • Minimization of environmental discharges and emissions and compliance with relevant regulations and standards
5) Changes in the availability or quality of feed sources and/or habitats as a result of environmental emissions.	<ul style="list-style-type: none"> • Compliance with the <i>Canada Shipping Act</i> and other relevant regulations
6) Changes in the presence, abundance, distribution and/or health of marine mammals and sea turtles due to accidental oil spills (through physical exposure, ingestion, effects on prey and habitats).	<ul style="list-style-type: none"> • Avoid low-level flight operations • Chemical screening and selection • Use of an oily water separator to process contained deck drainage; collected oil stored and disposed of properly • Appropriate handling, storage, transportation and on-shore disposal of solid and hazardous wastes • Sediment control measures • Atomize any produced water with hydrocarbons in flare (using high efficiency burners) and/or appropriate treatment and disposal • Use of mechanical separation during well abandonment • Planned size, location and timing of blasting events • Oil spill preparedness and response procedures • Spill prevention and design considerations • Spill containment around on-shore drill sites

Again, mitigation and monitoring requirements are determined on a project-specific basis, through the individual regulatory reviews of proposed oil and gas exploration and production projects in the NL Offshore Area.

5.3.2 Environmental Planning Considerations

A total of six federally listed marine mammal species at risk are known to occur in the SEA Update Area, including the 1) Blue Whale - Atlantic Population; 2) North Atlantic Right Whale; 3) Northern Bottlenose Whale - Scotian Shelf Population; 4) Beluga Whale - St. Lawrence Estuary Population; 5) Fin Whale - Atlantic Population; and 6) the Harbour Porpoise - Northwest Atlantic Population, as well as one listed sea turtle (Leatherback - Atlantic Population). Two additional species that may occur in the SEA Update Area, the Killer Whale (Northwest Atlantic and Eastern Arctic Populations) and Loggerhead Sea Turtle (Atlantic Ocean Population), are listed by COSEWIC but not under SARA.

As noted previously, the Gulf of St. Lawrence has long been recognized as an area of particular significance to marine mammals including several particular areas within the region such as the Western Shelf of Newfoundland, which extends from the Cabot Strait in the south to the Esquiman Channel in the north and covers mostly coastal waters, as well as the Strait of Belle Isle to the north. The ice-free months are the most important period for most marine mammals in the SEA Update Area. Sea turtles are highly migratory and occur somewhat infrequently in the overall region.

5.4 Protected and Sensitive Areas

A number of marine and coastal areas within the SEA Update Area, and throughout the larger Gulf of St. Lawrence, have been designated as protected under federal or provincial legislation or other processes, due to their ecological, historical and/or socio-cultural characteristics and importance.

Areas that have been identified as being particularly important and/or sensitive from an ecological perspective (such as fish spawning areas, bird colonies,) or for fishing activity have been considered and assessed integrally within the Fish and Fish Habitat, Water Birds, Marine Mammals and Sea Turtles and/or Marine Fisheries VECs themselves, as described in other sections.

5.4.1 Potential Environmental Interactions and Effects

Environmental interactions between oil and gas activities and protected and sensitive areas may be both direct and indirect in nature and cause. The conduct of oil and gas exploration activities directly within or near such areas may, for example, have adverse implications for these locations and their important and defining ecological and socio-cultural characteristics. These interactions may occur through the possible presence of equipment, personnel and activities in the area as well as the associated noise, visual intrusions, routine emissions and resulting disturbances that may occur in nearby environments. Any resulting decrease in the real or perceived integrity or value of these sites in the short or long term may also affect their value, enjoyment and thus visitation levels. This may, in turn, have important implications for the communities and economies that depend on these areas and their associated tourism activities and recreational opportunities.

The potential for hydraulic fracturing activities in the SEA Update Area was a subject of some considerable interest and discussion during the consultation program. The primary questions and environmental issues raised included: the potential for hydrocarbons and/or the chemicals used in fracturing to reach and contaminate groundwater sources (including public drinking water sources); questions about the amount and sources of water used; the potential for chemical spills into the environment; and other effects on human health and well-being.

Any biophysical effects resulting from offshore, near shore or on-land oil and gas or other human activities may also “spread” to adjacent protected and sensitive areas in the SEA Update Area or elsewhere in the Gulf of St. Lawrence by affecting the marine fish, birds, mammals or other environmental components that move to and through the area. Although unlikely to occur, a large oil spill may, depending upon its magnitude, location and oceanographic conditions, also extend to other areas and coastlines in the region, potentially affecting protected areas and their associated environmental components and characteristics.

5.4.2 Environmental Planning Considerations

Potential restrictions or measures may be implemented to help reduce the potential for negative effects resulting from oil and gas activities and any nearby protected or sensitive locations. These include the standard environmental protection measures listed and described in previous sections, the implementation of which would also serve to help address any associated effects on adjacent protected and sensitive areas. Again, these and other mitigation measures would be determined on a project-specific basis, through the individual regulatory reviews of proposed exploration (seismic or drilling) and/or development projects.

A concern raised during public and stakeholder consultations for the SEA Update was around the potential for visual intrusions, noise or other disturbances resulting from the presence of oil and gas equipment, personnel and activities adjacent to Gros Morne National Park or other protected and sensitive areas along the Western Newfoundland coastline. It was therefore suggested by some that, either on a generic or a project-specific basis, guidelines and procedures be established regarding the distance and timing at which oil and gas activities could take place in proximity to protected areas.

Any proposed exploration or production projects that involve hydraulic fracturing will also require the receipt of applicable (project-specific) authorizations from relevant regulatory agencies. Appropriate planning, design and analysis will be required to ensure that these activities do not interact with or otherwise negatively affect the quality and availability of safe drinking water or other aspects of human health and well-being. Given the current degree of public interest around this issue, and the relative newness of this technology in the province, there is a clear need for further and on-going communication with interested and potentially affected communities, individuals and organizations.

There are numerous other existing protected areas throughout the Gulf of St. Lawrence, including National Parks, Provincial Parks and Protected Areas, Marine Parks, MPAs and AOI. Although there is limited potential for direct interaction between any future offshore oil and gas activities off Western Newfoundland and these sites, concerns were raised that a large accidental oil spill and its effects could potentially extend to other provinces that border the Gulf of St. Lawrence. Again, the probability of such an event occurring is very low, with the actual environmental “zone of influence” of any such oil spill being dependent on various factors. The regulatory reviews of proposed drilling programs include a detailed analysis of possible spill types and probabilities, as well as modelling of the likely fate and behaviour of hypothetical oil spills, and this information will then be considered in the project-specific regulatory reviews and decisions.

5.5 Marine Fisheries

As a result of the nature, location, timing and intensity of marine fishing activity in the SEA Update Area and the surrounding Gulf of St. Lawrence, the potential exists for interactions between fisheries and offshore oil and gas activities. Avoiding such interactions and any adverse effects on fishers and their activities is a key priority for both industries.

5.5.1 Potential Environmental Interactions and Effects

The main potential interactions between offshore oil and gas activities and marine fisheries are as follows:

- Possible damage to fishing gear or vessels as a result of direct interactions with oil and gas related equipment, activities or environmental discharges;
- Loss of access to preferred fishing areas during offshore oil and gas activities, and possible decreases in fishing success and efficiency;
- Indirect effects on fish landings and values due to biophysical effects on fish resources (including fish abundance, distribution or quality); and

- The potential effects of offshore oil spills on fishing activity, equipment and fish resources and the resulting implications for fishers and their livelihoods and communities.

5.5.2 Environmental Planning Considerations

Planning and on-going communication between offshore oil and gas operators and the fishing industry, has been and remains the most effective means for ensuring that such activities are carried out in a safe and environmentally responsible manner, avoiding or reducing adverse interactions between the oil and gas and fishing sectors. The C-NLOPB's *Geophysical, Geological, Environmental and Geotechnical Program Guidelines*, for example, outline a number of measures to help avoid or otherwise address potential interactions with other ocean users, including with regard to communications, gear and/or vessel damage, and other issues.

The establishment of safety (no-fishing) zones around offshore installations and in areas of high vessel traffic helps to minimize the potential for negative interactions. Notices to Mariners and other communications, the use of Fisheries Liaison Officers (FLOs), the representation of Newfoundland based fishers by the Fisheries, Food and Allied Workers union (FFAW), and the One Ocean initiative have been particularly useful in creating and maintaining open and on-going dialogue between these two industries, and in fostering a proactive and cooperative approach. The various mitigation measures outlined above to avoid or reduce the potential effects of oil and gas activities on fish and fish habitat can also serve to help address any indirect effects on marine fisheries.

Should these measures be unsuccessful in preventing adverse environmental effects to marine fisheries (such as gear damage, or the unlikely event of an offshore oil spill), processes exist to compensate fishers for losses or damages related to offshore oil and gas activity.

5.6 Potential Accidental Events and Malfunctions

Environmental incidents which may be associated with offshore oil and gas exploration drilling or development activities include potential blowouts (subsea and surface), as well as other possible spills of hydrocarbons or other substances, which may vary considerably in terms of their nature, scale, duration and potential environmental consequences.

As indicated previously, the potential for, and possible adverse environmental outcomes of, an accidental spill resulting from future oil and gas activities in the Western NL Offshore Area was a key area of focus during the consultations undertaken for the SEA Update. This included the recognized need to prevent such an incident from occurring, as well as ensuring that appropriate procedures and measures are in place to effectively respond to any such accidental event, including having the required equipment, expertise and compensation for affected parties. Given the semi-enclosed nature of the Gulf of St. Lawrence and its oceanographic (currents, waves and winds) processes, there was concern raised that any large spill could reach the coastlines of one or more provinces. There were also questions raised regarding the potential for an effective oil spill response during the winter months during periods of ice cover, as well as likely oil spill response times and effectiveness given the currently limited oil spill response equipment and capacity in the Western Newfoundland area.

An overview of the regulatory processes and other requirements that apply to offshore oil and gas activities in the NL Offshore Area was provided earlier, including oil spill prevention and response measures and associated reviews and required approvals. The C-NLOPB is also currently completing an overall review of the spill response

capability of operators working in areas under its jurisdiction, including the SEA Update Area. In the event of an increased level of offshore oil and gas activity in the SEA Update Area, other considerations at a regional and strategic level could include, for example, potential pre-deployment of response equipment and materials in Western Newfoundland and/or around the Gulf of St. Lawrence; development of inter-jurisdictional protocols to respond to a major environmental emergency (including response management); inter-jurisdictional waste management coordination; and inter-jurisdictional response exercising.

5.7 Cumulative Environmental Effects

The environment of the SEA Update area and the larger Gulf of St. Lawrence – including fish and fish habitat, water birds, marine mammals and sea turtles, protected and sensitive area, marine fisheries and other components – has been influenced by a variety of natural and anthropogenic factors, including past and future fishing activity, vessel traffic and other human activities, as well as effects of climate change and other biophysical processes. These previous, on-going, and future activities and processes will continue to affect the environmental conditions and characteristics of the region, in combination with each other and with possible future oil and gas exploration and development activity in the area.

Information on the specific nature, intensity and spatial and temporal distribution of potential offshore exploration (seismic and drilling) activities and possible production projects in the SEA Update Area and their environmental effects is not available at this early stage. The likely level of any future exploration in the area, and the relatively short-term nature of these individual actions, will however mean that individual projects would likely be separated enough in space and time such that cumulative effects between them are not likely to occur. This will, of course, depend on the eventual intensity and spatial and temporal distribution of these activities, their respective environmental effects and their zones of influence. Also, oceanographic conditions and processes, such as large scale water movements to, from and throughout the Gulf of St. Lawrence, as well as good sound propagation in certain areas (especially the deeper channels), may extend the spatial extent of environmental disturbances and thus, the potential for cumulative effects to occur. The widespread and migratory nature of many species of fish, birds, marine mammals and turtles also increases the potential for individuals or populations to be affected by multiple perturbations, and therefore, for cumulative environmental effects to occur. Protected areas, marine fisheries and other human activities may also be subject to multiple types and levels of stressors, both on-going and potential.

The nature, magnitude and spatial and temporal distribution of any environmental effects from planned future offshore oil and gas projects would have to be assessed and evaluated through project-specific modelling and analyses as part of individual EA reviews. Avoiding or reducing such overlap between offshore oil and gas exploration and development projects and/or with other unrelated activities in the region (and therefore, any resulting cumulative effects) can and should therefore be considered in planning and reviewing any individual projects and activities as they are defined and proposed.

5.8 Information Availability and Requirements

The marine environment of the SEA Update Area and the larger Gulf of St. Lawrence is large, dynamic and complex. Environmental features and conditions occur and change in particular areas over time, as a result of various natural and/or anthropogenic processes and influences. The Gulf of St. Lawrence is a relatively well studied marine area overall, however, and at a regional scale some of its components are reasonably well understood, but there are several areas in which there is limited information on critical elements and activities

(such as zooplankton and other important marine taxa which have unique or poorly understood life histories). Existing and available information, knowledge and understanding regarding fish and their habitats in the SEA Update Area and adjacent environments is therefore both impressive, but inevitably, incomplete. Similarly, there continues to be a somewhat limited amount of specific and up-to-date information available on the number and spatial and temporal distribution of water birds, marine mammals and sea turtles offshore Newfoundland and Labrador, including this area. Offshore operators are required to develop and implement monitoring for birds and/or marine mammals during their programs, and any information gathered through such observations would, over time, contribute to an expanded information and knowledge base regarding the presence, abundance and spatial and temporal distribution in the SEA Update Area.

Although detailed information on all marine species and their occurrence, abundance, distribution and activities within the SEA Update Area is clearly not available, some overall environmental characteristics and trends can, however, be identified and highlighted which are appropriate for an SEA level of analysis and associated licencing decisions, and which would be relevant to the planning and conduct of any future oil and gas activities in the region.

A less than complete understanding of the likely effects of some offshore oil and gas activities and disturbances (such as seismic energy) on marine animals, and on the effectiveness of certain mitigation measures, was also identified as a data gap in the original SEA for the Western NL Offshore Area and by others, and there remain various areas of on-going uncertainty around some of these issues and therefore, a need for further investigation.

For those areas that are designated as protected under federal or provincial government legislation or other means, there is information available regarding their presence, location, size and important ecological and/or socioeconomic features and value, for consideration and planning, assessing and implementing any future oil and gas or other human activities in the region.

An information base is also available regarding fishing activity in the SEA Update Area and in the larger Gulf of St. Lawrence, particularly for the commercial fisheries which are managed, regulated and monitored by DFO and other organizations. This information provides a regional picture of fishing activity in the area that is considered adequate and appropriate for the purposes of the SEA Update and for informing future licencing decisions and the design and review of any individual offshore oil and gas projects. It is imperative, however, that this information continues to be made available in a useful format and timely manner to government agencies and offshore operators. These existing fisheries data sets and other available information, supplemented by continued dialogue and information-sharing involving fishers and their representative organizations and other industry groups, provide useful information for such planning and decision-making.

6 STRATEGIC ENVIRONMENTAL ASSESSMENT UPDATE: SUMMARY AND CONCLUSIONS

C-NLOPB Note: *The Draft SEA Update Report has identified sensitive areas, data gaps and planning considerations for the SEA Update Area. Following the conclusion of the regulatory and public comment period for the draft SEA Update, recommendations and conclusions regarding the issuance of rights and any requirement on the restriction of offshore oil and gas activities in the SEA Update Area will be finalized for inclusion in the Western Newfoundland and Labrador Offshore Area SEA Update Report.*