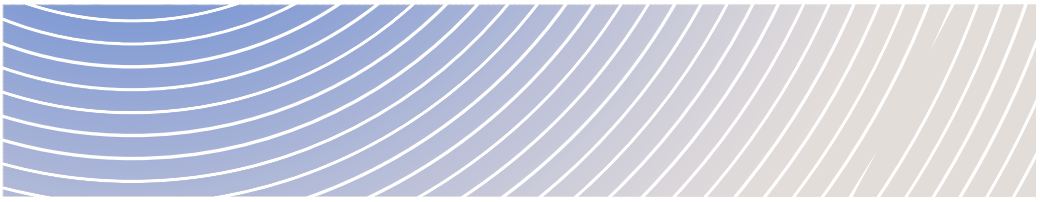
CENTRAL RIDGE EXPLORATION DRILLING PROJECT



DRAFT ENVIRONMENTAL ASSESSMENT REPORT

SEPTEMBER 2020

Impact Assessment Agency of Canada | Agence d'évaluation d'impact du Canada

Canada

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Catalogue No: EnXXX-XXX/XXXXF

ISBN : XXX-X-XXX-XXXXX-X

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This document has been issued in French under the title:
Projet de forage exploratiore Central Ridge

Executive Summary

Equinor Canada Ltd. (the proponent) is proposing to conduct an exploration drilling project within its exploration licences in the Flemish Pass area, located approximately 375 kilometres east of St. John's, Newfoundland and Labrador, in the Atlantic Ocean. The proponent's two offshore exploration licences are just outside and bordering Canada's 200 nautical mile exclusive economic zone. The Project would include exploration drilling, possible appraisal (delineation) drilling, vertical seismic profiling (VSP), well testing, well abandonment or suspension and associated supply and service activities. Up to two mobile offshore drilling units (MODUs) designed for year-round operations would be used for the Project, as well as supply vessels and helicopters that would travel between the drilling area and an existing supply base and airport in St. John's. The timeline proposed for the Project is between 2021 and 2030.

The Impact Assessment Agency of Canada (the Agency) conducted a federal environmental assessment (EA) of the Project based on the requirements of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). On August 28, 2019, the *Impact Assessment Act* (IAA) came into force and CEAA 2012 was repealed. However, in accordance with the transitional provisions of the IAA, the EA of this Project is being continued under CEAA 2012 as if that Act had not been repealed.

The Project would require authorization under the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* and may require authorization under the *Fisheries Act*. A permit under the *Species at Risk Act* may be required for effects on species that are listed as endangered or threatened on Schedule 1 of that *Act*.

This report summarizes the assessment conducted by the Agency in consultation with the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB), Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC), Health Canada, Natural Resources Canada, and Transport Canada. The Agency's analysis drew on: information from the proponent; the proponent's previous information for the Flemish Pass Exploration Drilling Project; previous and ongoing EAs of other offshore exploratory drilling projects; geospatial data and scientific information from the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador; and comments from Indigenous peoples and the general public provided on this Project as well as those received on previous and ongoing EAs of other exploratory drilling projects.

The Agency analyzed environmental effects on areas of federal jurisdiction, as well as effects related to changes to the environment that are directly linked or necessarily incidental to federal decisions that may be required for the Project. The features of the natural and human environment considered by the Agency were:

- fish and fish habitat;
- marine mammals and sea turtles;
- migratory birds;
- species at risk;
- special areas;
- commercial fisheries; and
- current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples.

Indigenous groups and members of the public raised concerns about the Project's potential routine and accidental effects on the marine environment (e.g., marine mammals, fish, birds, special areas), commercial fishing and on related effects on Indigenous peoples and communities.

The potential environmental effects of the Project's routine operations include:

- effects on fish habitat caused by the discharge of used drilling muds and cuttings to the marine environment;
- effects on marine mammals, fish and sea turtles caused by underwater sound from well site surveys and VSP operations, and from support vessels and MODU operations;
- effects on migratory birds caused by lights on the MODU and platform supply vessels and, if well testing is required, flaring; and
- interference with commercial fisheries, Indigenous or otherwise, including effects on fishing activity that may be caused by the need to avoid the 500-metre safety (exclusion) zone around drilling operations.

The proponent's project planning and design incorporates measures to mitigate the adverse effects of the Project. These include adherence to existing guidelines and regulations and planning to identify, control and monitor environmental risks.

Accidents and malfunctions could occur during exploration drilling, including batch fuel and drilling fluid spills and blowouts. Historically, the incidence of large oil spills during exploration drilling is extremely low. The proponent conducted oil spill fate and trajectory modelling to inform the assessment of potential environmental effects and spill response planning. The proponent proposed design measures, operational procedures, and dedicated resources to prevent and respond to spills of any size from the Project, and stated that in the unlikely event of a subsea hydrocarbon release, response measures would be undertaken in a safe, prompt and coordinated manner. Response measures could include containment, application of dispersants, mechanical recovery and shoreline protection operations, as applicable. To minimize response times, the C-NLPOB would require submission of a Well Capping and Containment Plan that explores options to reduce response times.

The Agency identified key mitigation measures and follow-up program requirements for consideration by the Minister of Environment and Climate Change in establishing conditions as part of a decision statement, in the event the Project is ultimately permitted to proceed. Given the current and potential expansion of activity of the offshore oil and gas sector in the Newfoundland and Labrador offshore, the Agency has recommended that the information gathered through the implementation of these conditions be published online to make it available to Indigenous groups, stakeholders and industry for consideration in future assessments.

The Project's possible effects on potential or established Aboriginal or treaty rights were also examined. One of the primary concerns raised by Indigenous groups during the EA is the potential for effects on Atlantic Salmon, a species of importance to Indigenous cultures that has experienced declines in recent decades, with some populations classified as endangered or threatened. Recognizing data gaps in research on at-sea salmon distribution and migration, and by extension the potential effects on the species from offshore drilling, the industry levy-funded Environmental Studies Research Fund issued a call for proposals for environmental and social studies related to Atlantic Salmon. The selection process for research proposals is ongoing. Indigenous groups also raised concerns about the potential effects of large-scale spills on fishing for commercial or traditional purposes and associated socioeconomic and health effects. Fishing by Indigenous communities for commercial or traditional purposes is the primary rights-based activity that could be affected by the Project. The Agency is of the opinion that the recommended measures to mitigate potential environmental effects on fish and fish habitat and

on commercial fisheries, and to prevent or reduce the effects of accidents and malfunctions, are appropriate measures to accommodate for potential impacts on rights.

The Agency concludes that the Project is not likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures.

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List of Abbreviations and Acronyms

Abbreviation/Acronym	Definition
Agency	Impact Assessment Agency of Canada
CEAA 2012	*Canadian Environmental Assessment Act, 2012*
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EA Report	Environmental Assessment Report
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
ESRF	Environmental Studies Research Fund
GIS	Geographic Information System
IAA	*Impact Assessment Act*
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
MARPOL	International Convention for the Prevention of Pollution from Ships
MMS	Mi'gmawei Mawiomi Secretariat
MODU	Mobile Offshore Drilling Unit
MTI	Mi'gmawe'l Tplu'taqnn Incorporated
NAFO	Northwest Atlantic Fisheries Organization
NRCan	Natural Resources Canada
Project	Central Ridge Exploration Drilling Project
Proponent	Equinor Canada Ltd.
Regional Assessment	Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador
VSP	Vertical Seismic Profiling
WNNB	Wolastoqey Nation of New Brunswick

1. Introduction

Equinor Canada Ltd. (the proponent) is proposing to conduct an exploration drilling project within two offshore exploration licences (1159 and 1160) located in the Flemish Pass, approximately 375 kilometres east of St. John's, Newfoundland and Labrador. The purpose of the Central Ridge Exploration Drilling Project (the Project) would be to determine the presence, nature and volume of potential hydrocarbon resources within the exploration licences. The proponent has indicated that exploration drilling is a critical activity to enable continued oil and gas discoveries to maintain production and meet global demand for energy.

The purpose of the Environmental Assessment (EA) Report is to provide a summary of the analysis conducted by the Impact Assessment Agency of Canada (the Agency) in reaching its conclusion on whether the Project is likely to cause significant adverse environmental effects after taking into account the proposed mitigation measures (Appendix A). The Minister of Environment and Climate Change will consider this report in making a decision on whether the Project is likely to cause significant adverse environmental effects, following which the Minister will issue an EA decision statement for the Project.

On August 28, 2019, the *Impact Assessment Act* (IAA) came into force and the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) was repealed. However, in accordance with the transitional provisions of the IAA, the EA of this Project is being continued under CEAA 2012 as if that Act had not been repealed. The Project is subject to CEAA 2012 as it would involve activities that are described in item 10 of the Schedule to the *Regulations Designating Physical Activities*.

The Agency co-operated with the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) during the EA of the Project. The C-NLOPB is an independent joint agency of the Governments of Canada and Newfoundland and Labrador and is responsible for the regulation of petroleum activities in the Newfoundland and Labrador offshore area. The EA conducted by the Agency is intended to satisfy the C-NLOPB's EA requirements. The Project is not subject to Newfoundland and Labrador provincial EA requirements.

In April 2019, the Minister of Environment and Climate Change announced the appointment of a Committee to conduct the Regional Assessment of Offshore Oil and Gas Exploratory Drilling East of Newfoundland and Labrador (the Regional Assessment). As outlined in an Agreement signed by the Ministers of Environment and Climate Change and Natural Resources, and the provincial Ministers of Natural Resources and Intergovernmental and Indigenous Affairs, the directive was to facilitate a more effective and efficient assessment process for exploratory drilling projects in the offshore study area, while also ensuring that the highest levels of environmental protection continued to be applied and maintained. This Project falls within the defined study area for the Regional Assessment, and to the extent possible, the Agency considered geospatial data and existing scientific evidence available in the Geographic Information System (GIS) Decision-Support Tool developed during the Regional Assessment.

Pursuant to subsection 19(1) of CEAA 2012, the Agency considered the following factors in the EA:

- the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other physical activities that have been or will be carried out;
- the significance of the effects;
- comments from the public;

- mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;
- the requirements of the follow-up program in respect of the project;
- the purpose of the project;
- alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;
- any change to the project that may be caused by the environment; and
- the results of any relevant study conducted by a committee established by the Minister to study the effects of existing or future physical activities carried out in a region.

In accordance with Section 5 of CEAA 2012, the Agency assessed potential environmental effects on areas of federal jurisdiction (subsection 5(1)) as well as effects related to changes in the environment that are directly linked or necessarily incidental to federal decisions that may be required for the Project (subsection 5(2)). Effects on species at risk were also considered as required by subsection 79(2) of the *Species at Risk Act*. Appendix B provides the Agency's rationale for selection of the following valued components:

- fish and fish habitat (including marine plants);
- marine mammals and sea turtles;
- migratory birds;
- species at risk;
- special areas;
- commercial fisheries;
- current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples.

The Project is located within the area assessed by the proponent in the Flemish Pass Exploration Drilling Project, for which a federal EA was completed in April 2019. The proponent submitted an abridged Environmental Impact Statement (EIS) that relied on analysis and conclusions of the Flemish Pass Exploration Drilling Project EIS, where applicable.

The Agency used various sources of information in conducting its analysis, including:

- the proponent's EIS and EIS Summary as well as the proponent's previous EIS and EIS Summary for the Flemish Pass Exploration Drilling Project;
- additional information received from the proponent in response to the information requirements issued by the Agency following review of the EIS;
- previous and ongoing EAs of other exploratory drilling projects in offshore Newfoundland and Labrador;
- the Regional Assessment and associated GIS Decision-Support Tool (https://nloffshorestudy.iciinnovations.com/ mapviewer/);
- advice from expert departments and agencies (C-NLOPB, Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC), Health Canada, Transport Canada, Natural Resources Canada (NRCan), Department of National Defense, Indigenous Services Canada and the Parks Canada Agency), as applicable;

- comments received from Indigenous peoples; and
- comments received from the public.

The Agency determined the significance of residual effects of routine project operations (Section 4), taking into account the measures that it considered necessary to mitigate the potential adverse environmental effects of the Project. The Agency also considered the effects of accidents and malfunctions that may occur in connection with the Project (Section 5.1), as well as the effects of the environment on the Project (Section 5.2) and cumulative environmental effects (Section 5.3).

2. Project Overview

The Project is located in the northwest Atlantic Ocean, in an area that has no permanent human presence, with the exception of continually occupied existing oil and gas facilities, and intermittent human activity related to fishing, shipping, research, military (naval) manoeuvres, and oil and gas exploration and extraction.

Exploration licences 1159 and 1160 cover an offshore area of 4126.44 square kilometres, with a western edge more than 360 kilometres east of the island of Newfoundland and more than 775 kilometres from the nearest point on the coastline of Labrador. Water depths range from approximately 90 metres to 930 metres in exploration licence 1159, and from 40 metres to 1020 metres in exploration licence 1160.

Exact drilling locations have not yet been identified. The exploration licences are located outside Canada's 200 nautical mile exclusive economic zone on the outer continental shelf (Figure 1).

To set spatial boundaries for the description of effects, the proponent defined: a project area in the immediate vicinity of project activities; a local study area encompassing the area where project-related effects are reasonably expected to occur; and a regional study area that establishes the context for determination of significance of Project-related effects. These areas are depicted in Figure 1.

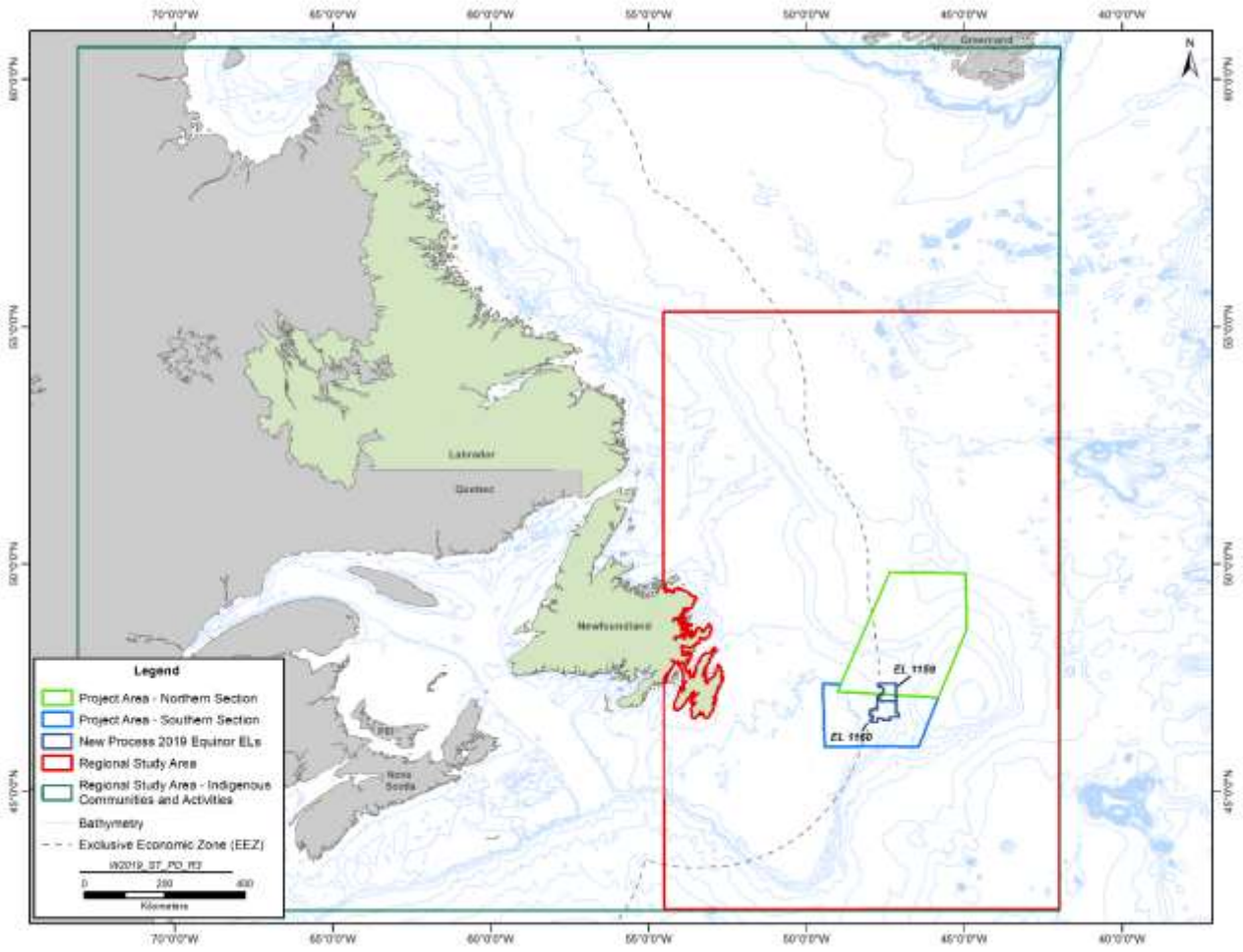


Figure 1: Project Area and Associated Licences

Source: Equinor Canada Ltd. 2020

The Project would include the drilling, testing and abandonment or suspension of up to six offshore wells within each exploration licence and associated incidental activities. Drilling would be undertaken by up to two mobile offshore drilling installations (MODUs) (either floating semi-submersible unit(s) and/or drill ship(s)). The type of MODU chosen would depend on the physical environment characteristics at the proposed drill site, particularly water depth, expected drilling depth, and expected water and ice conditions.

The key components and activities that comprise the Project include:

- MODU mobilization;
- offshore drilling (both exploration drilling and possible delineation drilling);
- vertical seismic profiling (VSP) surveys;
- well testing, including formation flow testing;
- well abandonment or suspension; and
- associated supply and service activities, including supply and stand-by vessels and helicopters.

Logistical support required for the Project, including the MODU, supply vessels and helicopters would be owned by third-party service providers and contracted for use by the proponent.

The proponent's planned temporal scope for the Project is from 2021 to 2030 but drilling activities would not be continuous over this period. Project activities would be aligned with the exploration licence periods and would end once regulatory obligations and commitments have been met and a licence has either reverted back to the C-NLOPB or been converted to a Significant Discovery Licence. In-field project activity could commence as early as 2021.

It is expected that each well would require approximately 35 to 65 days for drilling, evaluation and well abandonment or suspension. The specific nature and timing of each project phase and activity within each year of the program would continue to evolve and become further defined as planning and implementation progress.

The proponent identified and evaluated alternatives for the following aspects of the Project:

- Drilling unit selection - as the specific MODU for the Project has not been selected, both semi-submersible and drill ship were considered in the proponent's assessment of environmental effects.
- Drilling fluid selection - the preferred option is a combination of water-based muds and synthetic-based muds as they are both technically and economically feasible. The proponent indicated that it prefers water-based mud for riserless drilling where the cuttings are disposed directly on the seafloor and synthetic-based muds for more challenging geological conditions.
- Drilling waste management - offshore disposal is the preferred option, with treatment of synthetic-based mud cuttings prior to disposal. Reinjection into a dedicated offshore disposal well was not considered feasible, while disposal on land was not preferred due to technical and economic constraints such as limited storage capacity on the MODU, increased cost and operational delays, and additional safety and environmental risks associated with handling and transportation of waste.
- Platform lighting – standard lighting is preferred over spectral lighting because of technical or economic issues such as lack of commercial availability, limited capability in extreme weather, safety concerns and lower energy efficiency.
- Flaring options – flaring as required and formation testing while tripping were considered in the proponent's assessment of environmental effects. Depending on the type of data the proponent would need to gather, either method may be used, subject to C-NLOPB requirements and approval. Restricting flaring to daylight hours was

not deemed feasible as it could compromise the information generated by the test and would prolong test time, with associated additional safety risk and operational costs.

Views expressed by federal authorities, Indigenous groups[1] or the public related to alternative means of carrying out the Project were directly linked to potential effects on valued components of the identified alternatives and differences between these predicted effects. These views are outlined in Section 4, as appropriate.

The Agency is satisfied that the proponent adequately assessed alternative means of carrying out the Project.

[1] In this report, the term “Indigenous groups” refers to all of the following: aggregate organizations and/or tribal councils representing multiple individual First Nation communities; Inuit government organizations/collectives; and individual First Nation communities (i.e., those not represented by an aggregate organization or tribal council).

3. Consultation and Engagement Activities

3.1. Crown Consultation with Indigenous Peoples

The Crown has a duty to consult Indigenous peoples in Canada, and to accommodate where appropriate, when its proposed conduct might adversely impact a potential or established Aboriginal or treaty right. Consultation/engagement with Indigenous groups is also undertaken more broadly to aid good governance, and sound policy development and decision-making.

The Agency served as Crown Consultation Coordinator for a whole-of-government approach to consultation. The Agency consulted Indigenous groups that: hold communal commercial fishing licences in Northwest Atlantic Fisheries Organization (NAFO) areas that overlap the project area and regional study area, or portions of them; hold licences for species that migrate through the project area such as swordfish; that fish for or have an interest in Atlantic Salmon or other migratory fish species which, could potentially be affected by the Project. The following groups were consulted:

- **Labrador Inuit**: Nunatsiavut Government and the NunatuKavut Community Council.
- **Labrador Innu**: Innu Nation, representing Sheshatshiu Innu First Nation and Mushuau Innu First Nation.
- **Nova Scotia Mi'kmaq**: Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), representing 11 of 13 Mi'kmaq communities in Nova Scotia: Acadia First Nation, Annapolis Valley First Nation, Bear River First Nation, Eskasoni First Nation, Glooscap First Nation, Membertou First Nation, Paqtnkek First Nation, Pictou Landing First Nation, Potlotek First Nation, Wagmatcook First Nation, and We'kmoqma'q First Nation.
- **Nova Scotia Mi'kmaq**: Millbrook First Nation and Sipekne'katik First Nation (self- represented).
- **New Brunswick Wolastoqiyik (Maliseet)**: Wolastoqey Nation of New Brunswick (WNNB), representing the six Wolastoqiyik communities in New Brunswick: Kingsclear First Nation, Madawaska Maliseet First Nation, Oromocto First Nation, St. Mary's First Nation, Tobique First Nation, and Woodstock First Nation.
- **New Brunswick Mi'kmaq/Mi'gmaq**: Mi'gmawe'l Tplu'taqnn Incorporated (MTI), representing eight of nine Mi'gmaq communities in New Brunswick: Buctouche First Nation, Eel River Bar First Nation, Fort Folly First Nation, Esgenoopetitj First Nation, Indian Island First Nation, Pabineau First Nation, Eel Ground First Nation, and Metepenagiag First Nation.
- **New Brunswick Mi'kmaq**: Elsipogtog First Nation (self-represented).
- **New Brunswick Peskotomuhkati (Passamaquoddy)**: Peskotomuhkati Nation at Skutik.
- **Prince Edward Island Mi'kmaq**: L'nuey, representing Abegweit First Nation and Lennox Island First Nation.
- **Quebec Mi'gmaq**: Mi'gmawei Mawiomi Secretariat (MMS), representing the three Mi'gmaq communities in Quebec: Micmacs of Gesgapegiag, La Nation Micmac de Gespeg, and Listuguj Mi'gmaq Government.
- **Quebec Innu**: Les Innus de Ekuanitshit and Première Nation des Innus de Nutashkuan.

The Agency determined that the depth of consultation with the above-noted Indigenous groups would be low on the consultation spectrum based on an analysis of potential or established Aboriginal or treaty rights protected under Section 35 of the *Constitution Act, 1982* (Section 35 Rights), and the potential for adverse effects on these

rights due to the Project.[2] The Agency provided this analysis to Indigenous groups, along with draft consultation plans, and requested feedback on the plans. Comments were received on the Agency's depth of the consultation assessment; however, the information did not result in a change to this determination (i.e., the depth of consultation remained at the low end of the spectrum throughout the EA).

The Agency also engaged the Qalipu First Nation and Miawpukek First Nation on the island of Newfoundland for the purposes of good governance, providing them with information on the Project, as well as inviting them to submit comments at key stages in the process.

The Agency integrated the Crown's consultation and engagement activities into the EA and invited all the aforementioned Indigenous groups to review and comment on the Summary of the Project Description and EIS Summary, and the draft EA Report and potential conditions (this report). Indigenous groups were also provided an opportunity to review and comment on additional information provided by the proponent in response to information requirements issued by the Agency following the comment period on the EIS Summary. Furthermore, the Agency maintained contact with Indigenous groups throughout the EA providing intermittent updates via e-mail on all offshore oil and gas exploration projects; sending reminders during comment periods; and responding to questions as they arose throughout the process.

A summary of comments received to date by Indigenous groups, along with Agency responses, is provided in Appendix C. Previous to this EA, the Agency organized information sessions and workshops in 2017 and 2018 for Indigenous groups being consulted in the EAs of several exploratory drilling projects proposed for the eastern Newfoundland offshore area. The Agency has taken a coordinated approach to engagement with Indigenous groups on offshore exploratory drilling projects, given the similarity between project activities, locations, and the timing of the EAs. Given that concerns raised were similar across projects, the Agency has also considered previous comments in its analysis of effects for this Project. The main areas of concern raised in relation to exploration drilling include:

- salmon and potential interactions with the Project;
- effects on fish and fish habitat;
- effects on fishing for communal commercial and food, social or ceremonial purposes, including related socioeconomic and health effects;
- effects of accidents and malfunctions, including the use of dispersants in oil spill response;
- effects on migratory birds;
- compensation in the event of damages from normal operation or due to accidents and malfunctions; and
- cumulative effects.

The Agency supported the consultation and/or engagement of Indigenous groups during the EA through its Participant Funding Program. In total $158,795 was allocated to seven Indigenous communities and aggregate organizations.

[2] In describing the preliminary determination regarding the depth of consultation, the Agency contacted the above-noted Indigenous groups, with the exception of Qalipu First Nation and Miawpukek First Nation, which were contacted separately and engaged in the EA for the purposes of good governance.

3.2. Public Participation

The Agency provided several opportunities for the public to participate in the EA during comment periods on the Summary of the Project Description and EIS Summary and this draft EA Report and draft potential conditions.

In response to the public notice during the comment period on the EIS Summary, submissions were received from the Fish, Food and Allied Workers' Union; the Newfoundland and Labrador Oil & Gas Industries Association; and the public.

The Fish, Food and Allied Workers' Union provided information on the nature and importance of the fishing industry, and raised concerns related to potential effects of the Project on commercial fisheries, including related socioeconomic effects, vessel traffic, invasive species and mitigation measures. The Newfoundland and Labrador Oil & Gas Industries Association indicated its support for the Project, highlighting the economic importance of the offshore oil and gas sector, the experience and knowledge that exists in the sector, and some of the outcomes and information presented in the draft Regional Assessment report.

The Agency received two comments from the public, one stating that they were against the Project, and the other requesting an enhanced regulatory system to expedite exploratory drilling projects.

The Agency made funding available through its Participant Funding Program to support the public in reviewing and providing comments. Through this program, a total of $24,215 was allocated to two public organizations to reimburse eligible expenses related to their participation in the EA.

3.3. Agency's Approach to Summarizing Views Expressed

Throughout the EA, the Agency received comments from many of the same parties that participated in previously completed EAs of other exploration drilling projects offshore Newfoundland and Labrador over the past two years: Flemish Pass Exploration Drilling Project, Eastern Newfoundland Offshore Exploration Drilling Project, CNOOC International Flemish Pass Exploration Drilling Project, Newfoundland, Orphan Basin Exploration Drilling Project, and Jeanne D'Arc Basin Exploration Drilling Project. Additionally, the Agency considered comments submitted during ongoing EAs of the West Flemish Pass Exploration Drilling Project and BHP Canada Exploration Drilling Project.

To the extent possible, the Agency sought to realize efficiencies for Indigenous groups and the public by taking a coordinated approach to engagement on offshore exploratory drilling project EAs. A concern expressed during engagement activities is about the consultation burden created by the number of projects currently under assessment. Accordingly, the Agency's effects analysis has considered concerns raised across all projects, as applicable, to ensure all available information is considered regardless of capacity for participation in a particular EA.

Over the course of several EAs, the Agency has noted that concerns raised by Indigenous groups and the public have been similar from project to project. Similarly, this has been noted in expert advice received from federal authorities. As such, the Views Expressed sections of this EA Report include a summary of key comments received in relation to the various offshore exploratory drilling projects previously or currently subject to EA. All

comment submissions specific to this Project are available in their entirety on the Canadian Impact Assessment Registry (https://iaac-aeic.gc.ca/050/evaluations/proj/80175?culture=en-CA).

4. Predicted Effects on Valued Components

This section discusses the potential effects of the Project on the valued components considered by the Agency. These effects are further described in the proponent's EIS and associated information, which can be accessed at https://iaac-aeic.gc.ca/050/evaluations/proj/80175?culture=en-CA.

The Agency analysis considered the proponent's assessment of the project's effects based on a structured approach that is consistent with accepted practices for conducting EAs and with the Agency's *Operational Policy Statement: Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012*. The predicted residual environmental effects were considered based on the following assessment criteria, as applicable:

- magnitude: the degree of change from baseline conditions or other standards, guideline, or objectives, which may be expressed quantitatively or qualitatively;
- geographic extent: the geographic or spatial area within which the residual effects is expected to occur;
- duration: the period of time over which the residual effect would occur;
- frequency: how often the residual effect would occur;
- reversibility: whether the residual effect on the valued components can be returned to its previous condition once the activity or component causing the disturbance ceases; and
- context: the current degree of anthropogenic disturbance and/or ecological sensitivity in the area in which the residual effect would occur.

As described in the analysis below and taking into account the implementation of key mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on fish and fish habitat, marine mammals and sea turtles, migratory birds, special areas, species at risk, commercial fisheries or the current use, health and socioeconomic conditions of Indigenous peoples.

4.1. Fish and Fish Habitat

The project area and surrounding marine environments are used by fish and invertebrate species of commercial, cultural and/or ecological importance and support regionally important areas of biodiversity and marine productivity. Species distributions fluctuate as species migrate on daily or seasonal cycles. For example, on an annual cycle, the project area is visited by large pelagic fish (e.g., Swordfish, sharks, tunas) during the warm water season, while other occupants (e.g., capelin, Atlantic Cod) may leave the area at certain times of the year as they migrate inshore to spawn or feed. Other species (e.g., redfish, Greenland Halibut, Snow Crab) are more resident in nature.

Structure forming sponges and corals provide habitat, refuge and foraging areas for a variety of species. The Agency is aware there are at least 56 species of corals and sea pens distributed on the Flemish Cap, Flemish Pass and the Grand Banks and at least 60 species of sponges in the offshore Newfoundland area. Regionally, areas with relatively high sponge biomass are located in the southern Flemish Pass and Northeast Newfoundland

Slope and Tail of the Grand Banks. The proponent indicated that within the project area, research vessel survey results indicate the presence of large gorgonian coral, small gorgonian coral, sea pens and sponges.

Fish species at risk that may occur in the project area or have ranges overlapping the regional study area include American Eel, Atlantic Bluefin Tuna and Atlantic Salmon, all species which have been highlighted by Indigenous groups as being of particular concern.

The Agency considered the proponent's analysis, expert advice from federal authorities and comments from Indigenous groups and the public, and identified the following key interactions and resulting potential effects on fish and fish habitat:

- drill cuttings and drilling fluids deposited on the seabed and released into the water column could cause alteration, disruption or destruction of fish habitat and associated mortality and health effects on fish and benthic organisms; and
- sound emissions from drilling operations, supply vessels and VSP surveys could result in fish injury, mortality and behavioural effects (e.g., avoidance).

The proponent drew information from previous modelling conducted in the Flemish Pass to predict the geographic extent of sediment deposition and sound emissions above thresholds for effects on fish and fish habitat. Drill cuttings modelling conducted for ExxonMobil's Eastern Newfoundland Exploration Drill Project (exploration licence 1137), located approximately 40 kilometres west of exploration licence 1160, provided the most conservative distances to thresholds for fish and fish habitat. Sound modelling conducted for the CNOOC International Flemish Pass Exploration Drilling Project (exploration licences 1144 and 1150), located 45 kilometres northeast of exploration licence 1159, provided the most conservative distances to thresholds for fish and fish habitat. As geographic extent would vary with environmental conditions (e.g., water depth, time of year), the effects analysis considered the maximum predicted geographic extent for each potential effect, reported in Table 1.

Table 1: Predicted Maximum Geographic Extent of Sediment Deposition and Sound Emissions above Effects Thresholds for Fish and Fish Habitat

Project-related Interaction	Predicted Maximum Geographic Extent
Sediment Deposition	
Cuttings deposited on the seafloor at thicknesses above the burial threshold for sensitive benthic organisms[a]	300 to 800 metres, with localized patches as far as 1.4 kilometres in one seasonal analysis
Total area of seafloor with cuttings deposits above the burial threshold for sensitive benthic organisms	0.063 square kilometres
Sound Emissions[b]	
Drilling operations sound emissions that could cause recoverable injury in certain fish species	150 metres
Drilling operations sound emissions that could cause temporary hearing threshold shift in certain fish species	330 metres
VSP sound emissions that could cause mortality or physical injury of fish eggs/larvae	Immediate vicinity of the sound source

Project-related Interaction	Predicted Maximum Geographic Extent

[a] DFO supports a conservative threshold of 1.5 millimetres for assessing effects of drill wastes on corals and sponges.

[b] Thresholds for effects of sound emissions are found in Popper et al. (2014).

The proponent indicated additional potential effects on fish and fish habitat could result from waste discharges, introduction of invasive species through ballast water, light emissions, and wellhead decommissioning. The proponent stated that routine liquid discharges, such as sewage and ballast water, would be managed in accordance with the *Offshore Waste Treatment Guidelines*, *Ballast Water Control and Management Regulations*, and the *International Convention for the Prevention of Pollution from Ships* (MARPOL), as applicable for foreign vessels, and that any potential effects would be short-term and localized. The proponent indicated that light from the MODU would not be expected to penetrate the water column beyond 50 meters from the source, and that resulting effects on fish habitat quality and use would be low in magnitude. The proponent further noted that wellhead cutting as part of well abandonment could result in short-term, low-magnitude emissions of sound and light, and fish would likely temporarily avoid the area during these activities.

4.1.1. Views expressed

Federal Authorities

DFO and the C-NLOPB requested further information on the drill cuttings model input, design and effects thresholds and determined it was reasonable to inform the effects assessment and development of well-specific mitigation. In addition, DFO and C-NLOPB reviewed the proposed seabed investigation survey methods, including how drill cuttings dispersion model results would inform survey design and criteria to define coral and sponge aggregations.

DFO reviewed the provided baseline information and effects analysis, including information on the migration patterns of Atlantic Salmon in the Northwest Atlantic. It advised that Atlantic Salmon that spawn in rivers of eastern Canada (including the four Atlantic provinces and Quebec) travel throughout the Northwest Atlantic Ocean. Although oceanic movements are not well understood, the few marine surveys available have indicated that Atlantic Salmon are found most abundantly west of Greenland and in the Labrador Sea in summer and fall and along the eastern slope of the Grand Banks in spring. Surveys have also detected salmon in waters of the Jeanne d'Arc Basin/Flemish Pass region but in lower abundances than the areas previously noted and only in the spring. DFO further advised that it is possible that some salmon overwinter in the Jeanne d'Arc Basin/Flemish Pass region and that salmon are likely to be present in the Jeanne d'Arc Basin/Flemish Pass region at some times of the year as they migrate through the area, to and from natal rivers, but it is not known to be a significant migration route or overwintering area. The department advised that monitoring of finfish for the past 25 to 30 years in the Newfoundland and Labrador offshore has revealed no effects on fish health from ongoing oil and gas operations.

DFO advised the Agency that the mitigation measures, monitoring and follow-up programs proposed by the proponent and recommended by the Agency would adequately address the potential effects of the Project on fish and fish habitat.

Indigenous Peoples

Concerns about effects of offshore exploratory drilling on Atlantic Salmon were raised by several Indigenous groups. Submissions included information on the potential presence of Atlantic Salmon in the eastern Newfoundland offshore area and concerns about effects of project-related sound and light emissions on the species. KMKNO recommended that drilling activities be prohibited between January and August so as not to interact with migratory Atlantic salmon. Miawpukek First Nation noted that the precautionary principle should be applied in evaluating effects on Atlantic Salmon, and recommended tagging studies and the development of a recovery strategy for the species.

Indigenous groups also expressed concerns regarding potential effects of drill cuttings deposition on the benthic environment, including the need for baseline information, pre-drill survey design, and criteria for well relocation, and potential habitat loss resulting from drill cuttings disposal. Additional comments from Indigenous groups included those related to potential effects on American Eel, Atlantic Bluefin Tuna and North Atlantic Swordfish, all culturally important species. They also raised concerns about potential effects of offshore noise on plankton, potential effects of biocides on fish and fish habitat, and the need for follow-up to determine the effectiveness of mitigation of noise effects on fish and fish habitat.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

Members of the public expressed concern about smothering of benthic communities and about effects of temporary infrastructure on benthic habitat. World Wildlife Fund – Canada stressed the ecological importance of deep sea coral and sponge assemblages, and indicated support for proposed mitigation to identify and avoid these species. It noted that regionally relevant guidelines are needed to identify relevant species and criteria for setback distances, and recommended that mitigation plans for the Project incorporate the recommendations of an ongoing Canadian Science Advisory Secretariat process to identify coral and sponge mitigations for exploratory drilling in the Newfoundland and Labrador offshore. DFO has advised the results of that process will contribute to the development of guidance on mitigating impacts of exploratory drilling on corals and sponges, and that this guidance will inform DFO advice when consulted on pre-drill surveys and associated coral and sponge mitigation plans.

4.1.2. Agency Analysis and Conclusion

Analysis of Effects

Areas within exploration licences 1159 and 1160 may support aggregations of sponges and corals. Habitat complexity and biodiversity in deep-sea environments is highly dependent on these long-lived, structure-forming organisms, which provide refuge, nursery and foraging areas for many fish and invertebrate species. Without adequate mitigation, benthic habitat, including corals and sponges, could be affected by the discharge of drilling muds and cuttings from the Project. The Agency notes that sedentary or slow moving species may be smothered and the sediment quality may be altered by nutrient enrichment and oxygen depletion at cuttings deposition thicknesses above the threshold for burial effects. Drill cuttings deposition modelling predicted that sediment thicknesses above the most conservative burial threshold of 1.5 millimetres could be exceeded up to 1.4 kilometres from the well location. Recovery time for affected areas would vary by species, with the longest recolonization times associated with slow-growing, sensitive coral and sponge species.

Given the importance and sensitivity of corals and sponges, the proponent would be required to conduct high-definition visual surveys at each well site and around anchor points prior to drilling to identify any aggregations of habitat-forming corals or sponges or other environmentally sensitive features. The proponent would be required to submit a site-specific seabed survey plan to the C-NLOPB and DFO for review and approval prior to each survey. Subject to survey findings, required mitigation would include relocation of the anchors or the well and/or redirection of cuttings discharges, to be determined in consultation with DFO and the C-NLOPB. If it is determined that it is not technically feasible to move the well or redirect cuttings discharges, the proponent would be required to conduct a comprehensive assessment of the benthic habitat in consultation with DFO prior to drilling to determine the potential for non-compliance with the fish and fish habitat protection provisions of the *Fisheries Act* and related options for mitigation to reduce any identified risks.

The Agency notes that continuous underwater sound from operation of the MODU and support vessels over the 35-65 day drilling period for each well may cause recoverable injury or a temporary hearing threshold shift in certain species of fish at distances of up to 150 and 330 metres from the source, respectively. Sound may also result in behaviour responses, including avoidance or attraction, and may mask fish sensory abilities. The Agency further notes that VSP surveys would produce the most intense sound associated with the Project, exceeding injury thresholds for some species or life stages in the immediate vicinity of the sound source. However, VSP surveys would be intermittent in frequency and short-term in duration, lasting 12 to 48 hours per well. Mobile species would likely exhibit temporary avoidance behaviour and the surveys would begin with a “ramp up” phase to increase initial avoidance and limit potential effects. Immobile organisms may experience injury and mortality but these effects would be localized.

Certain fish species that could be affected by the Project are of particular importance to Indigenous groups and are used or have been historically used by these groups for traditional purposes, in particular Atlantic Salmon. Indigenous groups provided the Agency with information on Atlantic Salmon and expressed concern about its potential interaction with the Project. The Agency notes that DFO reviewed available information and confirmed that there is uncertainty regarding the at-sea migration patterns and habitat use of Atlantic Salmon. Given the potential for some Atlantic Salmon to occur in areas that overlap with the Project, effects on the species could occur. DFO has advised that potential effects of the Project are expected to be negligible to low and spatially and temporally limited. This prediction is made with a moderate level of certainty given the uncertainties about Atlantic Salmon distributions and reasons for population declines. Based on advice from DFO and the C-NLOPB, the Agency is of the view that restricting drilling activities during certain times of year was not warranted.

Given the uncertainty about Atlantic Salmon and the importance of the species to Indigenous groups, the proponent would be required to support research on the presence and distribution of Atlantic Salmon in eastern Canadian offshore areas, and update the C-NLOPB and Indigenous groups annually on research activities. Atlantic Salmon was identified as an area of research interest by the Environmental Studies Research Fund (ESRF), an industry levy-funded initiative managed by a joint government/industry/public board. In May 2019, the ESRF issued a call for proposals for environmental and social studies related to Atlantic Salmon. Following the review of the letters of interest, finalists were selected for full proposals in November 2019. The final selection process in ongoing.[3]

[3] Additional information on this most recent call for proposals can be found here: https://www.esrfunds.org/181.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public in identifying the following key measures to mitigate the Project's effects on fish and fish habitat:

- prepare a pre-drill seabed investigation plan for each well site and anchor point and submit to DFO and the C-NLOPB for review and approval prior to implementing the survey. The plan should be designed to:
    - collect high-definition visual data to confirm the presence or absence of sensitive environmental features, including aggregations of habitat-forming corals or sponges;
    - identify the equipment used for the surveys, to be operated by a qualified individual;
    - include information on survey transect length and pattern around each well site, which should be based on applicable drill cutting dispersion model results. Transects around anchor sites should extend at least 50 metres from the extent of each structure;
- based on approved plans, undertake a seabed investigation survey at each well location and around each anchor point prior to commencing drilling a well. Retain a qualified independent marine scientist to provide advice in real-time;
- provide the results of the seabed investigation survey to the C-NLOPB and DFO prior to commencing drilling. In addition, provide a description of additional mitigation and monitoring based on the results of the survey and predicted areas of sedimentation and disturbance. Results of the surveys should be provided to Indigenous groups and posted online for public access;
- if aggregations of habitat-forming corals or sponges or other environmentally sensitive features are identified when undertaking the survey:
    - relocate the anchors or the well and/or redirect cuttings discharges to ensure that the MODU, anchors or drilling muds and cuttings discharges will not affect them, unless not technically feasible. No drilling should occur before a decision is made by the C-NLOPB and DFO regarding appropriate mitigation and monitoring; or
    - if it is determined, to the C-NLOPB's satisfaction, that it is not technically feasible to relocate the anchors or the well or redirect cuttings discharges, conduct a comprehensive assessment of the potentially-affected benthic habitat in consultation with DFO prior to drilling to determine the potential for non-compliance with the fish and fish habitat protection provisions of the *Fisheries Act* and related options for mitigation to reduce any identified risk. Consultation with DFO shall include mitigation options to reduce any identified risk to habitat-forming coral and sponge aggregations or other environmentally sensitive features in accordance with the provisions of the *Fisheries Act*;
- select chemicals to be used during the Project in accordance with the *Offshore Chemical Selection Guidelines for Drilling and Production Activities on Frontier Lands* and use lower toxicity drilling muds and biodegradable and environmentally-friendly additives within muds and cements;
- ensure that all discharges from the MODU meet the *Offshore Waste Treatment Guidelines*;
- transport spent or excess synthetic-based muds that cannot be re-used during drilling operations to shore for disposal at an approved facility;
- ensure that all discharges from supply vessels meet or exceed the standards established in the MARPOL;
- conduct a pre-drill survey with qualified individual(s) at each well site to determine the presence of any unexploded ordnance or other seabed hazards. If any such ordnance or seabed hazard is detected, avoid disturbing or manipulating it and contact the nearest Joint Rescue Coordination Centre and the C-NLOPB prior to commencing drilling to determine an appropriate course of action; and

- implement mitigation listed in Section 4.2 Marine Mammals and Sea Turtles related to the conduct of VSP surveys.

Follow-up

The Agency has identified the following measures as part of a follow-up program, to be developed in consultation with the C-NLOPB and DFO, to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on fish and fish habitat:

- monitor the concentration of synthetic-based muds on drill cuttings to verify that the discharge meets, at a minimum, the performance target specified in the *Offshore Waste Treatment Guidelines*. Report results to the C-NLOPB;
- for the first well on each exploration licence and for any well where drilling is undertaken in an area determined by the seabed investigation survey to be sensitive benthic habitat, conduct specific follow-up monitoring, including:
    - measurement of sediment deposition extent and thickness post-drilling and prior to departing the location to verify drill cuttings dispersion modelling predictions;
    - survey of benthic fauna present after drilling has been concluded;
    - reporting of results, including a comparison of modelling results to in situ results, to the C-NLOPB and DFO;
    - results should be provided to Indigenous groups and posted online for public access;
- contribute to research on the presence and distribution of Atlantic Salmon in eastern Canadian offshore areas and update the C-NLOPB and Indigenous groups annually on research activities. Research initiatives can be explored through organizations such as the ESRF and through input from and collaboration with Indigenous groups; and
- implement the follow-up measures listed in Section 4.2 Marine Mammals and Sea Turtles related to the verification of underwater sound as a result of the Project.

Agency Conclusion

The Agency is of the view that the adverse residual environmental effects on fish and fish habitat would occur continuously (e.g., sound emissions from the MODU), regularly (e.g., waste emissions) or sporadically (e.g., VSP surveys) during drilling operations (maximum of 65 days per well). The effects would be reversible once drilling has concluded, with the exception of effects on sensitive benthic species. Effects would be low in magnitude, with most sound and waste emissions within established thresholds and guidelines. Areas of drill cuttings deposition above established thresholds would be localized to the area around the well site.

Taking into account the implementation of the mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on fish and fish habitat.

4.2. Marine Mammals and Sea Turtles

The project area supports a diverse array of marine mammals, including various species of cetaceans and pinnipeds,[4] and sea turtles and contains important feeding and refuge areas, migratory routes, and breeding and birthing areas. Twenty-seven species of marine mammals and four species of sea turtles may be found in the project area.

Several species are present in the project area year-round (e.g., Blue Whale, Fin Whale, Humpback Whale, Killer Whale, Northern Bottlenose Whale, Sperm Whale, and Minke Whale), while others are present seasonally (e.g., Sei Whale, Common Bottlenose Dolphin, Short-beaked Common Dolphin, and Striped Dolphin). Some of these species, including the Northern Bottlenose Whale, Blue Whale and North Atlantic Right Whale, are considered at risk (see Appendix D for a full list of species at risk that may occur in the project area or surrounding area).

The Agency considered the proponent's analysis, expert advice from federal authorities and comments from Indigenous groups and the public, and identified the following key interactions and resulting potential effects of exploration drilling on marine mammals and sea turtles:

- sound emissions from drilling operations, supply vessels and VSP could result in injury or behavioural effects; and
- collisions with offshore survey and supply vessels could cause injury or death.

The proponent drew information from published research to predict the geographic extent of sound emissions above thresholds for effects on marine mammals. The proponent compared the Project to a number of projects based in the Flemish Pass. Modelling conducted for CNOOC's Flemish Pass Exploration Drilling Project, located 45 kilometres northeast of exploration licence 1159, provided the most conservative distances to thresholds for marine mammals. Thresholds for sea turtles are expected to be comparable to those published for the low-frequency hearing marine mammals. As geographic extent would vary with environmental conditions (i.e., water depth, time of year), the effects analysis considered the maximum predicted geographic extent for each potential effect, reported in Table 2.

Table 2: Predicted Geographic Extent of Sound Emissions above Effects Thresholds for Marine Mammals

Sound Emissions Thresholds by Project Activity	Predicted Geographic Extent (distance from source)
Drilling Operations	
Sound emissions above 24-hour continuous exposure threshold for auditory injury of high-frequency hearing marine mammals[a]	3.3 kilometres
Sound emissions above 24-hour continuous exposure threshold for auditory injury of other marine mammal hearing groups	230 metres
Sound emissions above threshold for behavioural disturbance of marine mammals	

[4] Cetaceans are aquatic mammals commonly known as whales, dolphins, and porpoises and include mysticetes (toothless/baleen whales) and odontocetes (toothed whales). Pinnipeds are aquatic fin-footed mammals commonly known as seals, sea lions and walrus.

Sound Emissions Thresholds by Project Activity	Predicted Geographic Extent (distance from source)
	56.8 kilometres during summer and slightly further in the winter[b]
VSP Surveys	
Sound emissions above 24-hour continuous exposure threshold for auditory injury of low-frequency hearing group cetaceans[a]	9.66 kilometres
Sound emissions above 24-hour continuous exposure threshold for auditory injury of other marine mammal hearing groups	380 metres
Sound emissions above maximum instantaneous sound pressure level threshold for auditory injury of marine mammals	120 metres
Sound emissions above threshold for behavioural disturbance of marine mammals	7.9 kilometres

[a] Toothed whales such as Harbour Porpoise are high-frequency hearing, while baleen whales such as Humpback Whale are low-frequency hearing.

[b] R_{max}, which is the maximum range at which the given sound level threshold is encountered in the model.

The proponent indicated additional potential effects on marine mammals and sea turtles could result from waste discharges and well decommissioning. The proponent committed to treating and discharging wastes in accordance with the *Offshore Waste Treatment Guidelines*, and predicted that treated discharges would result in temporarily and localized reduction in water and sediment quality, but this would not result in mortality or injury to marine mammals and sea turtles. The proponent indicated that explosives would not be used in wellhead removal, and well abandonment activities using mechanical means are not anticipated to produce sounds that pose a mortality or injury risk to marine mammals or sea turtles.

4.2.1. Views Expressed

Federal Authorities

DFO indicated that it did not have any significant concerns with the effects of the Project on marine mammals and sea turtles based on: the relatively short duration of noise disturbance; the understanding that the proponent would adhere to or exceed the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*; and the lack of critical habitat for marine mammal species at risk in the in the zone of influence for effects from the Project on marine mammals and sea turtles. It advised the Agency that the mitigation measures, monitoring commitments and follow-up programs proposed by the proponent and recommended by the Agency would adequately address the potential effects of the Project on marine mammals and sea turtles.

Indigenous Peoples

Several Indigenous groups raised concerns about the effects of sound emissions and vessel traffic on marine mammals and sea turtles. Groups recommended: timing drilling to avoid North Atlantic Right Whale migration periods; the use of passive acoustic monitoring[5] or equivalent technology to detect marine mammals in the vicinity of the Project; requiring the shut-down of air source array(s) when any marine mammal or sea turtle species within the 500-metre safety zone is observed, as opposed to the minimum requirement of shut-down if a species at risk is sighted; and increasing the size of the marine mammal observation safety zone and required observation time period prior to VSP surveys. Speed limits for supply vessels were also recommended to reduce the potential for collisions with marine mammals and sea turtles. Additionally, Indigenous groups suggested the need for follow-up to verify sound predication and effects on marine species.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

The World Wildlife Fund – Canada expressed its concern regarding the effectiveness of mitigation measures to reduce the impacts of noise on marine mammals. In particular, it noted that visual observation of marine mammals can be very difficult and often ineffective, and that Marine Mammal Observers are often not sufficiently trained, nor sufficiently rested, nor are they necessarily listened to when they indicate a marine mammal sighting. The World Wildlife Fund – Canada also questioned the effectiveness of VSP sound source ramp up and recommended that the proponent use the most up-to-date advice on how to mitigate noise impacts on marine species using the recently released *Canadian Science Advisory Secretariat Science Advisory Report "Review of the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment"* DFO 2020a). DFO advised that this Advisory Report may inform an update to the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*; the proponent would be required to implement the up-to-date version of that guidance when conducting VSP surveys.

The Balaena Institute for Cetacean Conservation Studies raised concerns about potential adverse effects of exploratory drilling on Northern Bottlenose Whales and their habitat, and noted its unpublished research on the distribution of this and other cetacean species. Public participants have also raised concerns about potential impacts of sound on marine species, such as disruption of migration routes and interference with marine mammal communications, as well as the ability of observers to identify marine mammals or sea turtles at risk.

4.2.2. Agency Analysis and Conclusion

Analysis of Effects

The Project may adversely affect marine mammals and sea turtles, including species at risk. Several species of marine mammals could be present year-round in the project area, including in the proponent's exploration licences, while others may be present in higher abundance during summer and fall.

Sound emissions from the MODU or VSP surveys may potentially result in injury to marine mammals and sea turtles or affect the quality and use of their habitats. Notably, the acoustic environment is of importance to marine

[5] Passive Acoustic Monitoring: means a technology that may be used to detect the subsea presence of vocalizing cetaceans (DFO, 2007).

mammals as many species emit sound and rely, in part, on their acoustic sense for communication, social interaction, navigation, foraging and predator avoidance. The Project could result in exceedances of thresholds for both auditory injury (as far as 3.3 kilometres from an operating MODU or 9.66 kilometres from the VSP sound source) and behavioural effects (as far as 56.8 kilometres in the summer and slightly further in the winter) in marine mammals. However, auditory injury would require continuous exposure over a 24-hour period and marine mammals are not likely to remain in areas that could cause permanent auditory injury. Short-term behavioural effects of sound emissions on sea turtles could include increased and erratic swimming behavior and avoidance behaviour.

To mitigate the effects of sound emissions from VSP activities, the proponent would follow the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment,* including gradual ramp up of the sound source and delay of ramp up if a marine mammal or sea turtle is observed within the safety zone. To account for longer dive times of some marine mammal species (e.g., Beaked Whales), the proponent would be required to extend the observation period for marine mammals prior to the start of the VSP to 60 minutes. Importantly, the proponent would be required to develop a Marine Mammal and Sea Turtle Monitoring Plan and provide it to DFO for review. The proponent would be required to report the findings of monitoring to government and Indigenous groups.

The Agency notes that the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment* requires the use of cetacean detection technology under certain circumstances and conditions. It states that passive acoustic monitoring or equivalent technology must be used if the full extent of a safety zone is not visible or if a survey is in an area where vocalizing cetaceans listed as endangered or threatened in Schedule 1 of the *Species at Risk Act* are likely to be encountered. The Agency notes that visibility can be hindered in the foggy conditions and rough sea states known to occur in the eastern Newfoundland offshore area, and that species at risk, such as Northern Bottlenose Whales, have the potential to occur in the project area. Based on these considerations, DFO has advised that it would support a requirement that the proponent use passive acoustic monitoring or equivalent technology, noting that marine mammal species of concern for detection by this technology would include baleen whales (e.g., Blue Whale, Fin Whale, North Atlantic Right Whale), as well as beaked whales (e.g., Northern Bottlenose Whale, Sowerby's Beaked Whale), which may be detected but would be difficult to differentiate by species.

With respect to the size of the safety zone for marine mammal and sea turtle observations during VSP, the Agency notes that the peak threshold for auditory injury would not likely extend beyond 120 metres from the source (based on CNOOC's modelling). Thresholds for auditory injury for 24 hours of sound exposure would be reached at greater distances; however, marine mammals and sea turtles would be expected to move away within a 24-hour period. As such, and given that there is no designated critical habitat within the zone of influence for project-related underwater sound from VSP, DFO has recommended the standard 500-metre minimum safety zone for this project. However, it also advised that as a precautionary measure, it would support extending the requirement for immediate shut-down of air source array(s) to include the observation of any marine mammal or sea turtle species within the 500-metre safety zone, as opposed to the minimum requirement of shut-down if a species at risk is sighted.

Although DFO is generally supportive of the proponent's analysis related to marine mammals and sea turtles, it advised that there is uncertainty with respect to predictions related to the extent of sound emissions from drilling units. Given this uncertainty, DFO has advised that it would support a requirement for the proponent to verify effects predictions related to underwater sound emissions from the MODU.

Marine mammals and sea turtles may be struck by project vessels, resulting in injury or mortality. Specifically, in recent years a number of North Atlantic Right Whale deaths have been reported in the Gulf of St. Lawrence. The incident reports for these deaths suggested trauma from vessel collisions as one of the causes. Although there have been no incidents reported off eastern Newfoundland, the Project may contribute to an increased chance of collisions with species susceptible to strikes. DFO has advised that the Fin Whale is the most frequently ship-struck whale species in the world. The Atlantic population of this species is listed as special concern by the *Species at Risk Act*. Other species susceptible to ship strike include the Humpback Whale, which is also regionally abundant, and the endangered North Atlantic Right Whale, for which there is some uncertainty about migration routes and potential presence in the eastern Newfoundland offshore. The EIS states that North Atlantic Right Whale has a low incidence of opportunistic sightings in the project area, with only one observation recorded based on DFO, Ocean Biographic Information System and the proponent's marine mammal observer records. The proponent indicated that the Project would not result in an increase in vessel traffic outside of that already assessed in the Flemish Pass Exploration Drilling Project. Following consultation with DFO, the Agency is of the opinion that the slight increase in vessel traffic due to the Project would be unlikely to substantially increase the probability of collisions. As a precautionary measure, the proponent would be required to limit vessel speeds when a marine mammal or sea turtle is observed or reported in the vicinity of a vessel. DFO has advised that it would support the requirement for vessel speed to be reduced to seven knots (approximately 13 kilometres per hour) when within 400 metres of a marine mammal or sea turtle. The proponent should determine whether modified or additional mitigation measures are required based on the results of their monitoring programs, including those listed above. Additional mitigation could also be prescribed by DFO should it be determined that the proponent requires a permit under the *Species at Risk Act.*

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public in identifying the following key measures to mitigate the Project's effects on marine mammals and sea turtles:

- conduct VSP surveys in accordance with or exceeding the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound* in the Marine Environment, including:
    - establishing a safety (observation) zone of a minimum of 500 metres around the sound source;
    - implementing cetacean detection technology, such as passive acoustic monitoring, concurrent with visual observations;
    - gradually increasing the sound source intensity over a period of at least 20 minutes (ramp up), adopting a pre-ramp up watch of 60 minutes whenever survey activities are scheduled to occur and delaying ramp up if a marine mammal or sea turtle is observed within the safety zone;
    - shutting down the sound source upon observing or detecting any marine mammal or sea turtle within the 500-metre safety zone;
- to reduce risks of collisions with marine mammals and sea turtles (except during an emergency):
    - limit supply vessels movement to established shipping lanes where they are available;
    - when and where such speeds do not present a risk to safety of navigation, reduce supply vessel speed to seven knots (13 kilometres per hour) when a marine mammal or sea turtle is observed or reported within 400 metres of the vessel;

- in consultation with DFO, develop a Marine Mammal and Sea Turtle Monitoring Plan which includes marine mammal observer requirements using qualified individuals. Provide the plan to the C-NLOPB and DFO for review and approval 30 days prior to initiating activities. The plan would describe:
    - monitoring during VSP surveys, including information on visual monitoring and specific passive acoustic or equivalent technology monitoring configuration that would be implemented, to enable verification that species that may occur within the safety zone can be detected and to ensure the ability to effectively monitor for all marine mammal vocalization frequencies that may occur within the exploration licences; and
- implement all mitigation listed in Section 4.1 Fish and Fish Habitat related to abandonment procedures, chemical selection, disposal of spent synthetic-based muds and waste discharge.

Follow-up

The Agency identified the following measures as part of a follow-up program to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on marine mammals and sea turtles:

- record and report the activities, observations and results of the Marine Mammal and Sea Turtle Monitoring Plan to the C-NLOPB and DFO;
- promptly report any collisions with marine mammals or sea turtles to the C-NLOPB, DFO and the Canadian Coast Guard Environmental Emergencies Reporting Number (1 800 565-1633) and notify Indigenous groups;
- verify effects predictions related to underwater sound levels with field measurements during the first well in the exploration licence. Provide the plan on how this would be conducted to the C-NLOPB and DFO in advance of drilling and the monitoring results after well suspension or abandonment, as directed by C-NLOPB and DFO; and
- provide follow-up program results to Indigenous groups and post online for public access.

Agency Conclusion

The Agency is of the view that the adverse residual environmental effects of the Project on marine mammals and sea turtles would be negligible (e.g., effects from wellhead decommissioning) to low (e.g., effects from the presence and operation of a MODU) in magnitude and would occur locally, within the immediate vicinity of the project activity or component (e.g., effects from waste discharges and wellhead decommissioning), or could extend to the local study area (e.g., effects from the presence and operation of the MODU and from supply and servicing operations). These effects would be sporadic (e.g., effects from VSP surveys or vessel collisions), regular (e.g., effects from waste emissions) or continuous (e.g., effects from drilling sound emissions) for the duration of the activity, and would cease upon well abandonment.

Taking into account the implementation of the mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on marine mammals and sea turtles.

4.3. Migratory Birds

The mainland cliffs, offshore islands, and offshore waters of eastern Newfoundland and Labrador define the migratory bird community potentially occurring within the project area. The project area primarily provides foraging and migratory habitat for pelagic seabirds (e.g., cormorants, gannets, phalaropes, gulls and terns, storm-petrels,

and tubenoses [fulmars, petrels and shearwaters]), which are the group of marine-associated birds most likely to be found in the project area. Waterfowl, divers, shorebirds and migratory and/or coastal-associated landbirds may also be found in the project area; however, most of these species tend to prefer coastal habitats and are unlikely to occur frequently in the offshore.

Several bird species at risk have been identified as potentially occurring in the project area, including the Ivory Gull and the Red-necked Phalarope. The proponent also considered effects on avian species listed on the International Union for the Conservation of Nature Red List of Threatened Species (e.g., Bermuda Petrel, Leach's Storm-petrel, Atlantic Puffin).

The Agency considered the proponent's analysis, expert advice from federal authorities and comments from Indigenous groups and the public, and identified the following key interaction and resulting potential effect of exploration drilling on migratory birds:

- attraction to light emissions from the MODU, supply vessels and flaring activities, which could result in possible injury or mortality through collisions or disorientation.

The proponent indicated that the distance at which Project-related lighting in the offshore environment (and thus, its likely zone of influence) would vary based on site-specific factors, and that disturbances to migratory birds appear to occur most frequently during periods of drizzle and fog and in overcast conditions.

The proponent indicated that additional potential effects on migratory birds could result from waste discharges and sound emissions. Wastes would be treated in accordance with the *Offshore Waste Treatment Guidelines* and discharged below the water surface, limiting the effects on surface water quality in the immediate area of the discharge. With proper management of waste discharge, the proponent indicated the duration of exposure to surface sheens by marine and migratory birds and any related effects would be short-term. The proponent further indicated that deep-diving birds have a higher potential to be exposed to underwater noise from seismic sound sources (e.g., VSP) that could result in injury or changes in behaviour. However, migratory birds are unlikely to be affected by underwater noise due to the short term and localized nature of the seismic sound sources and sound energy associated with these activities. The proponent noted established bird colonies would be avoided where possible and that helicopters would avoid known coastal seabird colonies, thereby avoiding potential noise disturbance.

4.3.1. Views Expressed

Federal Authorities

ECCC advised that drilling operations emit considerable amounts of light that would be detectable to birds in the area, and raised concern regarding the presence of artificial lighting along the foraging flight path for Leach's Storm-petrel and other nocturnal seabirds. ECCC also noted that uncertainty remains as to the distance at which seabirds detect light and at what distance bird behaviour is altered by artificial light at sea; therefore, the effects of artificial light may not necessarily be of low magnitude, as suggested by the proponent. ECCC confirmed that there is no critical habitat for migratory birds identified within the proponent's exploration licences and provided information on key western Atlantic migration routes, which are generally closer to the coast than further offshore where the Project would take place.

ECCC provided advice and guidance on mitigation planning for flaring activities, as well as monitoring and follow-up measures that should be implemented, including a recommendation for a systematic monitoring protocol for

stranded migratory birds on the MODU and supply vessels to address the uncertainty related to the number of strandings and mortality caused by offshore infrastructure.

ECCC advised the Agency that the mitigation measures, monitoring and follow-up programs proposed by the proponent and recommended by the Agency would adequately address the potential effects of the Project on migratory birds.

Indigenous Peoples

Concerns raised about the potential effects of offshore exploration drilling on migratory birds included: effects on migration patterns and behaviour; effects on habitat from exposure to oil and other discharges and emissions; and interactions with other project components and activities.

Indigenous groups expressed concern about the potential effects of flaring on birds, recommending that an alternative to flaring with less environmental effect should be used. The C-NLOPB would ultimately determine the required methods of well testing to validate the presence of hydrocarbons. Several factors would need to be considered to determine if an alternative technology is suitable, including the properties of the reservoir, the data to be collected, the availability of technology, and C-NLOPB requirements. The C-NLOPB has advised that using a drill pipe conveyed test assembly or other alternative formation testing technology may be possible depending on site-specific conditions and data requirements.

Other concerns of Indigenous groups included recommendations for helicopter routes to avoid established seabird colonies, measures to minimize bird attraction (e.g., alternate light colour or intensity, strobing lights, reduced outward emissions) as well as use of dedicated and qualified onsite observers and automated sensors on platforms to reduce uncertainty about seabird attraction to platforms, mortality events and chronic spills and discharges.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

Public comments included concerns regarding ambient light in the project area, the use of spectral modified lighting to mitigate for potential effects, and potential for effects of discharges on migratory birds. The C-NLOPB noted that exploratory drilling projects do not normally generate produced water, which is the primary source of sheens around production projects, and that monitoring of retained synthetic-on-cuttings is required by the *Offshore Waste Treatment Guidelines*.

4.3.2. Agency Analysis and Conclusion

Analysis of Effects

The Agency notes that night foragers and migrants, such as the Leach's Storm-petrel often use the stars as navigational tools and may mistake drilling installations and/or vessel lights as celestial lights. The situation is exacerbated during foggy or rainy weather when cloud cover is low and birds fly at lower altitudes. Birds can become "entrapped" by light sources and they are reluctant to fly out into the darkness once inside a beam of light. Fatigue sets in, collisions with other birds or the structure occurs, or the birds simply collapse from exhaustion, frequently dying from injuries or falling prey to predators.

As exploration licences 1159 and 1160 are 36 and two kilometres from the White Rose production facility, respectively, the Project would be considered in an area where artificial lighting already exists. The addition of a source of artificial lighting to an area with a large amount of existing lighting may have a comparatively smaller direct effect than a new artificial lighting source in an unlit area. However, the Project may increase the cumulative effects of lighting on migratory birds by increasing the cumulative artificial lighting footprint of the offshore environment, especially given the Project is adjacent to additional exploration drilling programs and production facilities. Attraction has been demonstrated at distances of less than two kilometres from gas flares and up to five kilometres from production facility lighting; however, attraction from distances much greater than five kilometres cannot be ruled out as some studies have found that seabirds may be attracted to land-based light sources from up to 16 kilometres away. Based on this available information, the Agency used the 16-kilometre distance in the analysis for the potential zone of influence of light on migratory birds.

Nocturnal migrants and night-flying seabirds, such as Leach's Storm-petrel are particularly susceptible to colliding with light structures. The Agency agrees with ECCC that the effects of the Project on these species would not necessarily be of low magnitude and the effects predictions cannot be made with a high level of certainty. To address ECCC's concern related to uncertainty around estimates of strandings and mortality, the proponent would be required to develop and implement an adaptive avian follow-up monitoring program, which would include monitoring for marine birds at the MODU and support vessels, as well as developing and implementing a protocol for systematic daily monitoring of the MODU and supply vessels for the presence of stranded birds. The proponent would be required to control project lighting, including the direction, timing, intensity and glare of light fixtures, to the extent that is feasible while meeting operational, health and safety requirements, incorporating new technology for monitoring as it becomes available. The proponent will also be required to provide awareness training regarding seabird strandings to offshore workers.

Flaring may have an effect on birds including incinerating birds that are attracted to the flare or causing birds to deplete energy resources because they become disoriented. Alternative formation testing technology should be considered, such as using formation testing while tripping to eliminate the requirement to flare. If flaring is proposed, the proponent would be required to follow C-NLOPB's *Measures to Protect and Monitor Seabirds in Petroleum-Related Activity in the Canada-Newfoundland and Labrador Offshore Area,* including measures to avoid potential effects on migratory birds. Prior to authorizing the flaring, the C-NLOPB would consult with ECCC on the plans and appropriateness of proposed mitigation measures, which may include delaying or altering the timing of the flaring activity.

The Agency notes that the proponent indicated that water curtains are sometimes deployed during flaring operations to protect the MODU from the generated heat. Although the effectiveness of water curtains in mitigating potential effects from flaring on migratory birds is not fully known, the Agency is of the view that such measures would provide an overall net benefit and may deter some birds away from flare events. . During flaring activities, the proponent would be required to have a trained observer monitor and document bird behaviour around the flare to assess the effectiveness of mitigation measures.

The Agency acknowledges that uncertainties remain regarding the potential effects of project lighting and flaring on migratory birds and therefore recommends the proponent contribute to research to identify changes in light spectrum, type and/or intensity that may further reduce attraction for storm-petrels and other seabirds. The Agency also recommends that the follow-up program include an evaluation of the effectiveness of the change in mitigating light attraction by documenting any changes the proponent makes to its lighting regime. The limited spatial and temporal nature of the Project, relative to the large ranges of migratory seabird species and vast expanse of the Northwest Atlantic Ocean, would lessen the potential for extensive effects on migratory birds. In

addition, activities associated with each well would take approximately 35 to 65 days, further limiting the duration of the potential effects. Furthermore, there is no critical habitat identified within the proponent's exploration licences and the Agency notes that key western Atlantic migration routes are generally closer to the coast than further offshore where the Project would take place.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public in identifying the following key measures to mitigate the Project's effects on migratory birds:

- follow ECCC's (2016) *Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada*, which identifies procedures for safe capture and handling of different types of birds;
- control project lighting, including the direction, timing, intensity and glare of light fixtures, while meeting operational, health and safety requirements;
- where acceptable to the C-NLOPB, conduct formation testing while tripping, or similar technology, rather than formation testing with flaring;
- limit the duration of flaring to the length of time required to characterize the wells' hydrocarbon potential;
- if formation testing while flaring is required, notify the C-NLOPB to request an authorization at least 30 days in advance of flaring to:
    - determine whether the flaring would occur during a period of migratory bird vulnerability (identified in consultation with ECCC);
    - identify how adverse environmental effects on migratory birds would be avoided, including opportunities to reduce nighttime flaring (e.g., by commencing flaring as early as practicable during daylight hours) and reduce flaring in poor weather conditions;
- operate a water-curtain barrier around the flare during flaring;
- include awareness regarding seabird strandings as part of overall training/orientation programs for offshore workers; and
- implement all mitigation listed in Section 4.1 Fish and Fish Habitat related to chemical selection, waste discharge and the disposal of spent synthetic-based muds, as well as those in Section 4.4 Special Areas related to the maintenance of buffers for supply and support vessels and helicopters over active bird areas and special areas for birds.

Follow-up

The Agency has identified the need for an adaptive follow-up monitoring program to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on migratory birds. The proponent shall:

- prepare a follow-up program in consultation with ECCC that includes:
    - monitoring for marine birds at the MODU and support vessels using a trained observer whose primary responsibility is observing migratory seabirds and who follows ECCC's *Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms* (Gjerdrum et al. 2012) and makes observations and collects migratory seabird survey data during these activities;

  - developing and implementing a protocol for systematic daily monitoring of the MODU and supply vessels for the presence of stranded birds. The protocol would include information on the frequency of searches, reporting procedures and training requirements, including qualifications of those delivering the training;

- when flaring occurs, have a dedicated trained observer monitor and document bird behaviour around the flare, and assess the effectiveness of water curtains and flare shields in mitigating interactions between migratory birds and flares;
- if stranded birds are observed, follow ECCC's (2016) Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada;
- document and report the results of any monitoring carried out, including information on the level of effort when no birds are found and a discussion of whether the mitigation measures (e.g., water curtain) were proven effective and if additional measures are required;
- incorporate any technology (e.g., radar, infrared imaging, high definition aerial surveys, telemetry studies, etc.) that becomes available into seabird monitoring to complement research on the mitigation of light attraction;
- document any changes made to lighting regimes to allow for an evaluation of the effectiveness of the change in mitigating light attraction;
- contribute to a research program to identify changes in light spectrum, type and/or intensity that may further reduce attraction for storm-petrels and other seabirds; and
- provide the monitoring and follow-up program and its results to the C-NLOPB and ECCC. Results should be provided to Indigenous groups and posted online for public access.

Agency Conclusion

The Agency is of the view that the adverse residual environmental effects of the Project on migratory birds would be negligible (e.g., for effects from VSP on habitat quality and use) to low (for all other project effects) in magnitude, but could be moderate for certain species, such as Leach's Storm-petrel. Residual adverse effects would either be localized within the immediate vicinity of the Project activity or component (e.g., effects from discharges), or could extend several kilometres (e.g., for effects from the presence and operation of a MODU). The effects could occur for the duration that the MODU is present, but would be unlikely (e.g., effects from VSP surveys on change in habitat quality and use), or would occur sporadically (e.g., effects from supply and servicing) or regularly (e.g., effects from MODU lighting), but would cease upon well abandonment.

Taking into account the implementation of the mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on migratory birds.

4.4. Special Areas

Special areas (designated because of ecologically or biologically sensitive features) which overlap with the proponent's exploration licences and/or the potential transit route, as well as those within the zone of influence, are listed in Table 3. The zone of influence is defined as a 56.8-kilometre buffer around the exploration licences and represents the predicted distance at which behavioural effects on marine mammals related to underwater sound may occur, based on the proponent's comparison of recent sound modelling conducted in the Flemish Pass. This zone of influence is inclusive of the zones of influence for light (16 kilometres) and drill cuttings

dispersion (up to 1.4 kilometres with a sediment thickness over 1.5 millimetres). A common defining feature of several of these special areas is the presence of important benthic habitats such as sponge and coral grounds, which are particularly sensitive because of their high biological productivity and slow recovery rates. Other special areas include marine habitats for bird, fish, mammal and sea turtle species. Special areas in proximity to the Project are depicted in Figure 2 and listed in Appendix E.

Oil and gas exploration activities are not prohibited within the special areas that overlap with the exploration licences.

Table 3: Special Areas Within the Zone of Influence[6] of Routine Project Activities or Overlapping the Transit Route

Special Area	Distance from Closest Exploration Licence	Features of the Special Area
Ecologically and Biologically Significant Areas[a]		
Northeast Slope	49 kilometres from exploration licence 1159	High aggregations of Greenland Halibut and Spotted Wolffish, cetaceans, pinnipeds and corals.
United Nations Convention on Biological Diversity Ecologically and Biologically Significant Areas[b]		
Slopes of the Flemish Cap and Grand Bank	Overlaps with exploration licence 1159 and 1160	A high diversity of marine taxa, including threatened and listed species, are found within this area.
NAFO Fisheries Closure Areas[c]		
Flemish Pass/Eastern Canyon (2)	2 kilometres from exploration licence 1160	Closed to bottom fishing to protect extensive sponge grounds.
Northwest Flemish Cap (11)	52 kilometres from exploration licence 1159	Closed to bottom fishing to protect high coral and sponge concentrations.

[a] Identified by DFO through formal scientific assessments.

[b] Identified by United Nations Convention on Biological Diversity.

[c] Under mandate of the Food and Agriculture Organization of the United Nations and NAFO (2020).

Adverse environmental effects on a special area could degrade its ecological integrity such that it no longer protects the components of the ecosystem for which it was designated (e.g., protection of sensitive or commercially important species). The proponent assessed potential environmental effects of routine project activities on special areas that overlap with the exploration licences, as well as those within the zones of influence for effects (Figure 2).

[6] The zone of influence is defined as a 56.8-kilometre buffer around the exploration licences and represents represents the predicted maximum distance at which behavioural effects on marine mammals related to underwater sound may occur. This zone of influence is inclusive of the zones of influence for light (16 kilometres) and drill cuttings dispersion (1.4 kilometres).

The Agency considered the proponent's analysis, expert advice from federal authorities and comments from Indigenous groups and the public, and identified the following key interactions and potential effects on special areas:

- potential effects on the seabed (benthic) environment and species due to physical disturbance of the substrate (and associated sedimentation) and the discharge and deposition of drill cuttings and fluids including alteration of sediment and water quality and potential smothering of sensitive, habitat-forming benthic fauna; and
- potential disturbance of seabird colonies along the coast and transit route by Project-related helicopter and vessel traffic.

The proponent indicated additional potential effects on special areas could result from effects of underwater sound, light and waste emissions and potential attraction of marine species to MODUs and vessels, with increased potential for injury, mortality, contamination or other interactions. Information on these potential effects of project activities within special areas on associated valued components are provided in Sections 4.1, 4.2, 4.3 and 4.6.

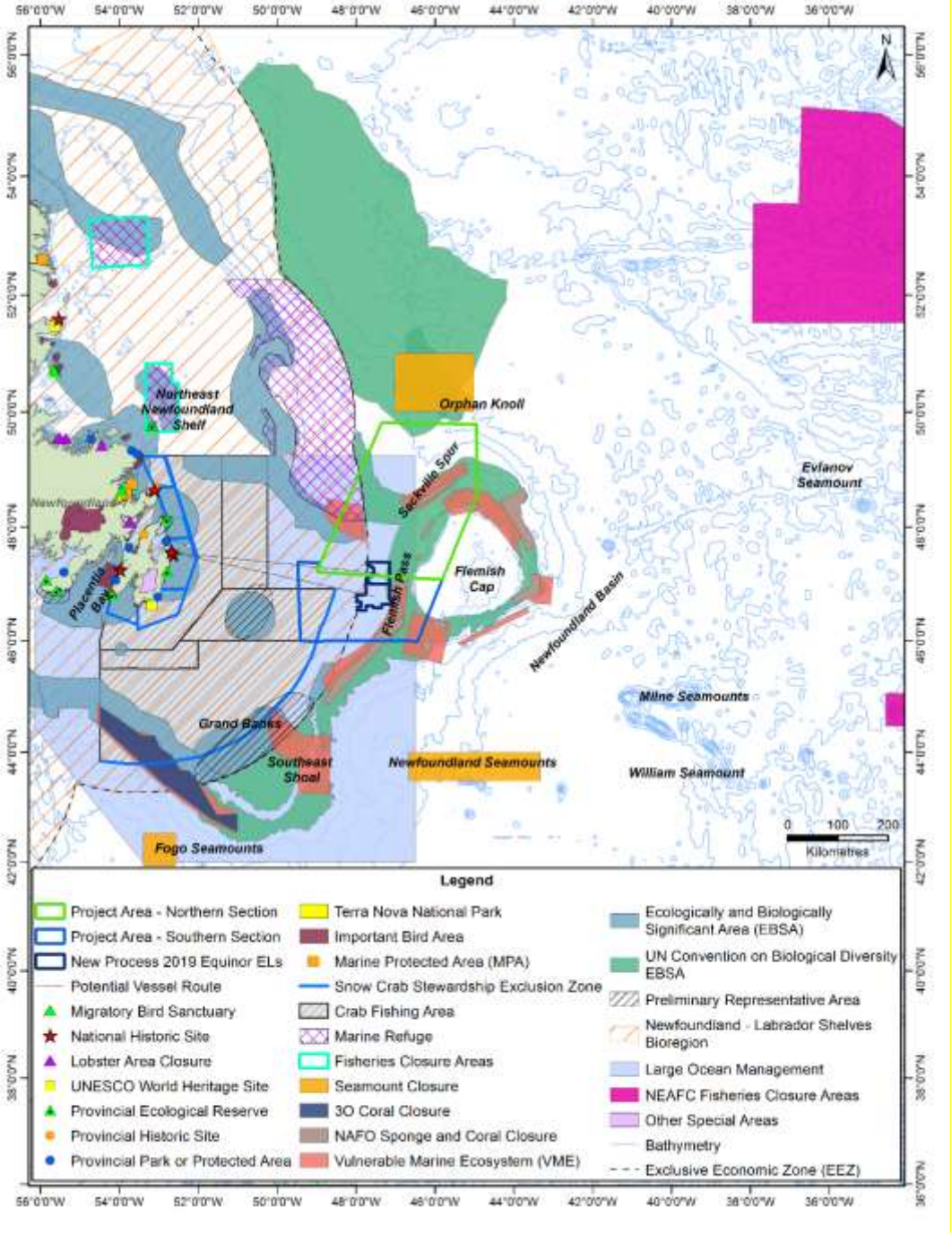


Figure 2: Special Areas in Proximity to the Project

Source: Equinor Canada Ltd. 2020

4.4.1. Views Expressed

Federal Authorities

DFO and ECCC provided technical review and expert advice on the special areas that may interact with the project, potential effects, and required mitigation.

DFO advised that although oil and gas exploration activities have been prohibited in Marine Protected Areas designated under the *Oceans Act*, there are no Marine Protected Areas that overlap the Project's exploration licences. The special areas that overlap with the Project's exploration licences include Ecologically and Biologically Significant Areas, which have no prohibitions related to oil and gas activities. DFO has indicated it will undertake a risk-based approach to prohibiting or allowing oil and gas activities in special areas where other effective area-based conservation measures are in place. As such, site specific information would be required prior to drilling should wells be drilled within an area where other effective area-based conservation measures are in place. ECCC provided the *Guidelines to Avoid Disturbance to Seabird and Waterbird Colonies in Canada, 2017* and advised that the colonies of greatest concern are the coastal Important Bird and Biodiversity Areas in closest proximity to St. John's.

DFO and ECCC advised that the mitigation measures, monitoring and follow-up programs proposed by the proponent as well as those recommended by the Agency would adequately address the potential effects of the Project on special areas.

Indigenous Peoples

Several Indigenous groups expressed concern about the effects of project-related activities on special areas that are adjacent to or overlap with the project area. Particular concern was expressed regarding sponges and corals, as they are easily disturbed and slow to recover, and KMKNO stressed the need to ensure consideration of effects of drill cuttings, water-based muds, synthetic-based muds, and barite on marine species in special areas.

Other comments included the suggestion that buffer zones around protected areas be considered as a means to reduce effects on special areas, that any infrastructure, such as wellheads, should be required to be removed from special areas, as well as the recommendation for a monitoring program using seabed video and/or benthic sampling to determine infaunal recolonization rates following drilling.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

The Fish, Food and Allied Workers Union recommended that closures intened to focus on marine conservation must restrict all marine industrial activities. A member of the public also expressed concern with respect to the reversibility of effects given the slow recovery rates for corals and sponges.

4.4.2. Agency Analysis and Conclusion

Analysis of Effects

Four special areas that have been identified because of ecologically or biologically significant features overlap with the proponent's exploration licences, the potential transit route, or are within 56.8 kilometres of the exploration licences (i.e., the predicted zone of influence for behavioural effects on marine mammals related to sound). A number of these special areas are designated, at least in part, based on the presence of sensitive benthic features, including aggregations of corals and sponges. These features could be affected by the Project, most notably from local sedimentation and burial due to discharge of drilling muds and cuttings (refer to Section 4.1 for information on how sensitive benthic features could be affected by drilling waste). The proponent predicted that drill cuttings deposition would exceed the most conservative no-effects threshold to a maximum distance of 1.4 kilometres from a wellhead (see Table 1), representing a total area of 0.063 square kilometres. The proponent indicated that cuttings are not expected to be deposited in an even layer, but in patches due to variations in ambient ocean currents. Benthic features within special areas that are located more than 1.4 kilometres from the exploration licences or that overlap only with the transit route are not expected to be affected by the Project.

The Agency determined that 15 percent of exploration licence 1159 and ten percent of exploration licence 1160 overlaps with the Slopes of the Flemish Cap and Grand Bank Ecologically and Biologically Significant Area, respectively. This special area has a high diversity of marine species and encompasses all of the current NAFO Fisheries Closure Areas designated to protect corals and sponges. It is also believed to provide a plentiful food source for Northern Bottlenose Whales and Greenland Halibut as well as being the only known area in international waters of the Northwest Atlantic where sponge grounds and sea pen concentrations have been identified, including a new species of Dictyaulus sponge identified in 2013 (UN Environment, n.d.). The Slopes of the Flemish Cap and Grand Bank Ecologically and Biologically Significant Area is approximately 88 000 square kilometres and the overlap with each exploration licence represents less than one percent of the special area, respectively. The Agency notes that the drilled wells in exploration licences 1159 and 1160 would result in comparatively limited footprints and zone of potential effects as the exploration licences are relatively large (total area of 4126.44 square kilometres). Further, taken in the context of the much larger area of the Slopes of the Flemish Cap and Grand Bank Ecologically and Biologically Significant Area, the potential effects of the Project within this special area would be comparatively limited.

The Flemish Pass / Eastern Canyon NAFO Vulnerable Marine Ecosystem is located within two kilometres of exploration licence 1160. This area was designated to protect corals and sponges, and drilling muds and cuttings could potentially impact this area if drilling occurred near the eastern edge of exploration licence 1160. However, based on the proponent's dispersion modelling, drilled wells would have limited footprints and the zone of influence was predicted to be less than two kilometres from a wellhead, resulting in limited potential effects within this special area.

The Agency is of the view that key mitigation measures for fish and fish habitat (Section 4.1) and marine mammals and sea turtles (Section 4.2) would also mitigate the potential effects within the Slopes of the Flemish Cap and Grand Banks Ecologically and Biologically Significant Area, the Flemish Pass / Eastern Canyon (2) NAFO Fisheries Closure Area, as well other special areas which may have overlap with the Project's effects. The Agency notes advice from DFO that habitat-forming aggregations of corals and sponges are not limited to designated special areas and that protections for these features should not be limited to special areas. It is recommended that coral and sponge surveys and associated site-specific mitigation planning be consistently

applied to ensure protection of sensitive benthic habitat at every well site, regardless of special area designation. The Agency further notes DFO indicated that if drilling would occur in a special area where there is an other effective area-based conservation measure in place, the proponent would be required to determine, in consultation with DFO and the C-NLOPB, an appropriate course of action, including developing and implementing additional mitigation measures to limit the adverse effects of the Project on the conservation objectives for that special area and any follow-up measures. The Agency notes that the Northeast Newfoundland Slope Closure marine refuge does not overlap with exploration licences 1159 or 1160.

As outlined in Section 4.1, the proponent would be required to conduct benthic surveys prior to drilling to determine the presence of aggregations of habitat-forming corals or sponges or any other environmentally sensitive features. Should these features be identified, the proponent would be required to relocate the well and/or redirect discharges, unless not technically feasible, to ensure that sensitive features would not be affected. If it is determined that it is not technically feasible to relocate the well or redirect cuttings discharges, the proponent would be required to conduct a comprehensive assessment of the benthic habitat in consultation with DFO and the C-NLOPB prior to drilling to determine the potential for non-compliance with the fish and fish habitat protection provisions of the *Fisheries Act* and related options for mitigation to reduce any identified risks.

In addition to the mitigation measures that would be consistently applied across all areas of the exploration licences, the proponent would also be required to conduct specific follow-up monitoring when drilling in or adjacent to a special area. Taking into account these mitigation and follow-up measures, DFO has advised that potential effects to benthic habitat, including within special areas, would likely be negligible.

As described in Section 4.3, helicopters and supply vessels may disrupt birds along the transit route or coastal seabird colonies. Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas, located within the Eastern Avalon Ecologically and Biologically Significant Area, are approximately 23 and 32 kilometres, respectively, from St. John's. These distances are such that during a straight-line approach to the St. John's area, it is unlikely that they would be disturbed; however, the Agency notes that ECCC has identified them as the colonies of greatest concern in closest proximity to the St. John's region, the terminus of the helicopter and supply vessel route. Generally, the Agency is of the view that key mitigation measures for migratory birds (Section 4.3) would also mitigate the effects on this and other migratory bird special areas. ECCC guidelines state that helicopters and other aircraft should keep well away from breeding colonies and that vessels should generally keep a minimum distance of 300 metres from colonies. In consideration of those guidelines, input from ECCC, and using a precautionary approach, the proponent would be prohibited from operating aircraft over the Witless Bay Islands Important Bird and Biodiversity Area at an altitude of less than 300 metres or motorized vessels within 20 to 100 metres of the area during the nesting season as per Newfoundland and Labrador's *Seabird Ecological Reserve Regulations, 2015*. Also, supply vessels would use common vessel travel routes where they exist and would not be in the immediate vicinity of either the Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public. The Agency expects that mitigation measures proposed for fish and fish habitat (Section 4.1), marine mammals and sea turtles (Section 4.2), and migratory birds (Section 4.3) would also mitigate potential effects on special areas. The Agency has identified the following additional key measures to mitigate the Project's effects on special areas:

- restrict helicopter flying altitude to a minimum altitude of 300 metres (except during take-off and landing) over active bird colonies and to a lateral distance of 1000 metres from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas (unless there is an emergency situation);
- ensure supply and other support vessels maintain a 300-metre buffer from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas (unless there is an emergency situation);
- implement all mitigation listed in Section 4.1 Fish and Fish Habitat, Section 4.2 Marine Mammals and Sea Turtles, Section 4.3 Migratory Birds and Section 4.6 Commercial Fisheries.

Follow-up

The Agency has identified the following measures as part of a follow-up program, to be developed in consultation with C-NLOPB and DFO, to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on special areas:

- conduct specific follow-up monitoring when drilling in special areas, or adjacent to or near a special area, such that drill cuttings dispersion modelling predicts that cuttings deposition could occur within the special area at a level above the biological effects threshold. Monitoring would include:
    - measurement of sediment deposition extent and thickness post-drilling and prior to departing the location to verify drill cuttings dispersion modelling predictions;
    - survey of benthic fauna present after drilling has been concluded;
    - reporting of results, including a comparison of modelling results to in situ results, to the C-NLOPB and DFO; and
    - results should be provided to Indigenous groups and posted online for public access.

Agency Conclusion

The Agency is of the view that the adverse residual environmental effects of the Project on special areas would be low-magnitude, occur locally and occur continuously (e.g., operation of the MODU), regularly (e.g., waste discharges), or sporadically (e.g., VSP surveys) during drilling operations but would cease upon well abandonment. Effects would be reversible once drilling has concluded, with the exception of burial effects on sensitive benthic species.

Taking into account the implementation of the mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on special areas.

4.5. Species at Risk

Federal species at risk are those that are listed in Schedule 1 of the *Species at Risk Act* as extirpated, endangered, threatened or special concern. For this EA, and as a matter of good practice, the Agency also considered species that have been identified by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened or of special concern. Collectively, these are referred to as species at risk for the purposes of this EA. The Agency has considered Leach's Storm-petrel in its analysis of effects on migratory birds given its particular vulnerability to light attraction. The Agency assessed the effects to species at risk in their associated valued component chapter and focused this chapter on the effects to critical habitat.

Several fish, marine mammal, sea turtle, and bird species at risk protected by *the Species at Risk Act* or designated by COSEWIC have been identified as potentially occurring in the project area (see Appendix D). Several of these species may be found in the project area year-round, while others may be present only during certain times of year on a transient basis or be unlikely visitors. For example, many of the identified bird species at risk are shorebirds and land birds, which would not regularly be found offshore but could be present during fall migration.

For species listed on Schedule 1 of the *Species at Risk Act,* management plans, recovery strategies and/or action plans, depending on the category of risk, are required. These documents describe the potential threats to the species, habitats and actions required to ensure protection of the species. The proponent took into consideration threats identified in recovery strategies, action plans and management plans and the contribution of the Project to these threats.

The proponent noted there is no critical habitat for birds, marine mammals or sea turtles in or near the project area. Critical habitats for Northern and Spotted Wolffish overlap the project area but do not overlap either of the two exploration licences. Northern and Spotted Wolffish are listed on Schedule 1 of the *Species at Risk Act* as threatened. The proponent predicted that the type and nature of the potential effects of the Project on species at risk would be the same as the effects assessed in previous sections of the report (i.e., Section 4.1 Fish and Fish Habitat, Section 4.2 Marine Mammals and Sea Turtles, Section 4.3 Migratory Birds), and that the same mitigation measures planned to reduce or avoid effects to these valued components would also be used to avoid or reduce adverse effects to species at risk.

4.5.1. Views Expressed

Federal Authorities

ECCC and DFO provided advice and comments related to fish and fish habitat, marine mammals and sea turtles, and migratory birds, including information applicable to species at risk and their critical habitat. The departments confirmed that the potential effects on species at risk would be the same as those effects described for fish and fish habitat, marine mammals and sea turtles, and migratory birds, and that the information provided satisfies requirements under subsection 79(2) of the *Species at Risk Act*. ECCC and DFO advised the Agency that the mitigation measures, monitoring and follow-up programs proposed by the proponent, as well as those recommended by the Agency, would adequately address the potential effects of the project on species at risk.

DFO provided information regarding potential impacts to critical habitats located in the regional study area for Northern and Spotted Wolffish, noting that critical habitats, as identified in the *Recovery Strategy for the Northern Wolffish (Anarhichas denticulatus) and Spotted Wolffish (Anarhichas minor) and Management Plan for Atlantic Wolffish in Canada* (DFO 2020b), were identified based on the species' preference for the associated depth and temperatures, and that these environmental features are not predicted to be affected by Project activities.

Indigenous Peoples

Indigenous groups provided comments on a variety of matters including: effects of sound emissions on North Atlantic Right whales and other marine mammal species at risk; monitoring and follow-up, including research on Atlantic salmon; reporting of injured individuals of bird species at risk; monitoring of water quality to determine potential contamination of species at risk; whether pre-drill surveys would include identification of species at risk; and suggesting that a biologist or trained professional should be present during pre-drill surveys. Other comments

from Indigenous groups related to marine fish (including Atlantic Salmon), marine mammals and sea turtles, and migratory birds, including applicable species at risk, are included in Sections 4.1, 4.2 and 4.3.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

A member of the public commented that the EAs of exploratory drilling offshore of Newfoundland and Labrador should consider bird species classified on the International Union for Conservation of Nature Red List of Threatened Species, which includes Leach's Storm-petrel.

4.5.2. Agency Analysis and Conclusion

Analysis of Effects

The Agency relied on advice and input from DFO and ECCC, which are the lead federal agencies for administering the *Species at Risk Act* within their respective areas of responsibility (i.e., aquatic species and birds, respectively). Based on this input, the Agency is in agreement with the proponent that potential effects on species at risk would mirror the effects described for fish and fish habitat, marine mammals and sea turtles, and migratory birds. Refer to Sections 4.1, 4.2, and 4.3 for additional detail on the Project's potential effects to fish and fish habitat, marine mammals and sea turtles, and migratory birds, respectively.

Northern Wolffish and Spotted Wolffish critical habitats overlap the project area, and are 2 kilometres and 46 kilometres from the nearest point of exploration licence 1159, respectively.[7] The Agency further notes that critical habitats have been identified in this area due to the wolffish preference for particular depths and temperatures. Since the Project would not have any impact on depths or water temperatures in the area, the Agency is of the view that its effect on wolffish and its critical habitats would be limited. At the minimum distance of 2 kilometres from any potential well site, the critical habitats are outside the predicted zones of influence for drill cuttings dispersion and effects from sound on fish and fish habitat (see Table 1).

The Agency also notes that the *Recovery Strategy for the Northern Wolffish and Spotted Wolffish and Management Plan for Atlantic Wolffish* states that potential effects of routine operational exploratory drilling activity are likely to be highly localized and insignificant to the population as a whole. DFO advised that effects on these critical habitats would be similar in magnitude and duration as those described for fish and fish habitat (Section 4.1).

Key Mitigation Measures to Avoid Significant Effects

The Agency is of the view that the measures to mitigate potential effects on fish and fish habitat (Section 4.1), marine mammals and sea turtles (Section 4.2), and migratory birds (Section 4.3) would also mitigate potential effects on species at risk and critical habitat.

[7] Agency-measured, based on coordinates provided in DFO (2020b). Recovery Strategy for the Northern Wolffish (*Anarhichas denticulatus*) and Spotted Wolffish (*Anarhichas minor*), and Management Plan for Atlantic Wolffish (*Anarhichas lupus*) in Canada (final). Feb. 27, 2020.

Follow-up

The Agency is of the view that the proposed follow-up measures for fish and fish habitat, marine mammals and sea turtles, and migratory birds are also appropriate for the species at risk and critical habitat identified in this section.

Agency Conclusion

Taking into account the implementation of the mitigation measures described for fish and fish habitat, marine mammals and sea turtles, and migratory birds, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on federal species at risk and critical habitat.

4.6. Commercial Fisheries

Offshore Newfoundland and Labrador fishing activity and location vary throughout the year and timing can be year-round or during well-defined seasons, depending on the fishery. Exploration licences 1159 and 1160 and the project area are primarily located outside of Canada's exclusive economic zone; portions of the vessel route and regional study area are located within and outside Canada's exclusive economic zone. As such, there are Canadian domestic (inside and outside the exclusive economic zone) and international fisheries (outside the exclusive economic zone) occurring in the project area. The proponent indicated that domestic fishing intensity is higher in the southern part of the project area than in the northern part. Average domestic harvest between 2011 and 2015 from commercial fisheries within the project area was 78 299 tonnes. Based on NAFO 2010 to 2015 harvest data, international harvest is taking place in NAFO Divisions 3K, 3L, 3M, 3N, and 3O, which overlap the project area and regional study area. The proponent indicated that international fishing effort is highest within NAFO divisions 3L and 3K, which overlap the project area, and that Canada has historically dominated commercial landings in the international fisheries in the region.

The commercial domestic fisheries occurring offshore Newfoundland and Labrador, operating primarily inside Canada's exclusive economic zone and within the Flemish Pass and along the shelf edge and slopes of the Grand Banks (see Figure 3), include those targeting groundfish, pelagics, shellfish and other invertebrates. Key species commercially fished in and near the project area include Northern Shrimp and Snow Crab, with Yellow Flounder, Greenland Halibut, redfish, American Plaice, and other groundfish species accounting for other landings in the project area. Atlantic Herring, capelin, sea urchins, scallops and American Lobster have recorded landings in the regional study area.

Five Indigenous groups in Newfoundland and Labrador hold communal commercial fishing licences[8] for a variety of species that overlap with the project area, including groundfish, shrimp, and tuna. Most Indigenous groups located in Nova Scotia, New Brunswick and Prince Edward Island (as listed in Section 3.1) also hold communal commercial licences within the project area, including licences for tuna and swordfish. The domestic landings and harvest information presented above for the project area includes communal commercial fishing.

[8] Communal commercial licences are issued by the Minister of Fisheries and Oceans to an aboriginal organization to carry on fishing related activities. (Section 4(1) *Aboriginal Communal Fishing Licences Regulations*, SOR 93-332)

Domestic commercial harvesting locations off the coast of Newfoundland and Labrador between 2013 and 2017 are illustrated in Figure 3.

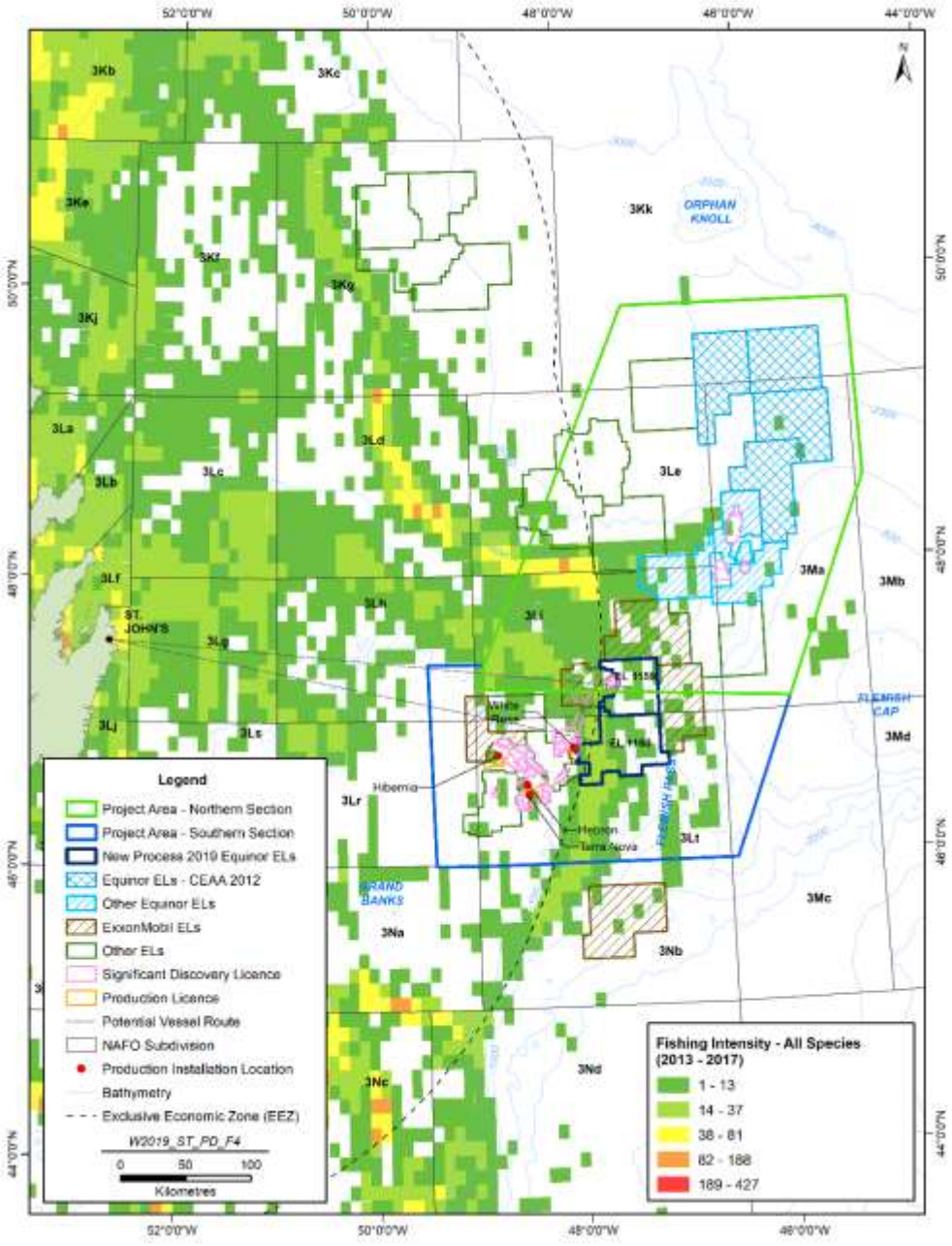


Figure 3: Domestic (Canadian) Harvesting Locations, All Species, All Gear Types 2013-2017

Source: Equinor Canada Ltd. 2020

The Agency considered the proponent's analysis, expert advice from federal authorities and comments from Indigenous groups and the public, and identified the following key interactions and resulting potential effects on commercial fisheries:

- safety exclusion zones around project components could cause temporary loss of access to established fishing grounds, with a resulting decrease in value (economic or otherwise) of these fishing activities; and
- project vessels, equipment, emissions or discharges could cause damage to fishing gear, vessels, and equipment.

The proponent indicated additional potential effects on commercial fisheries, including price implications resulting from market or consumer perception of a reduced quality of commercial fish species (e.g., taint), and potential indirect effects on fisheries due to changes in the abundance, distribution or availability of fish species on established fishing grounds. Drilling waste discharges will adhere to the *Offshore Waste Treatment Guidelines*, and the proponent indicated that the high dilution and dispersion of drilling muds and cuttings indicate there should not be substantial interaction with pelagic species. Although a closure of one or more areas to fishing or research activities is possible, the proponent noted that the closure would be temporary and that a Notice to Shippers would provide timely notice of closure areas. The Agency has determined that adverse effects on fish and fish habitat are not likely to be significant, as described in Section 4.1 of this report.

4.6.1. Views Expressed

Federal Authorities

DFO provided technical review of commercial fisheries baseline information and analysis, including clarification on mechanisms for distribution of information to international fishers about project operations, and advised the Agency that the mitigation measures, monitoring and follow-up programs proposed by the proponent and recommended by the Agency would adequately address the potential effects of the Project on commercial fishing.

Indigenous Peoples

Indigenous groups noted the importance of communal commercial fishing licences to their communities and expressed concern regarding the impacts of offshore exploratory drilling on commercial fisheries, including potential loss of access to fishing grounds and potential effects on species that are harvested commercially.

Several Indigenous groups noted the need for involvement of Indigenous groups in the development of the proposed compensation programs for damaged or lost fishing gear. Sipekne'katik First Nation pointed out differences between communal commercial licences and commercial licences, requesting that these differences be considered in the development and implementation of the compensation program. The Agency notes that any damages incurred by Indigenous fishers, including the loss of communal-commercial fisheries, would require compensation in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*.

Further information was requested on the Fisheries Communication Plan, including participating in its development, and how Indigenous groups would be engaged throughout the life of the Project and mechanisms for adaptive management. Several groups also expressed concern about the long-term viability of abandoned exploration wells, and Miawpukek First Nation stated that if removal of wellheads reduced the likelihood of accidents or malfunctions, it should be done in all circumstances. The C-NLOPB advised that with respect to the risk for accidents and malfunctions, the integrity of abandoned wells would not be affected by where (or if) a

wellhead is cut; well decommissioning would be permanent, and designed in compliance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations* to ensure long-term environmental protection.

Additional comments from Indigenous groups identified the potential for effects on actual or perceived quality of commercial fish species, and the need for research on fish and fish habitat, including species targeted by commercial fisheries. Potential effects on fish and fish habitat and required mitigation and follow-up are discussed in Section 4.1.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

The Fish, Food and Allied Workers Union commented on the potential physical and socioeconomic effects on commercial fisheries, including consideration of cumulative effects with respect to seismic exploration and other offshore activities. Concerns included restricted access to fishing areas, the need to alter fishing to mitigate issues related to increased vessel traffic, potential effects on fishing gear from wellheads left in place, and the timelines and procedures for the compensation consistent with the C-NLOPB/C-NSOPB *Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity*. Concerns were also raised regarding damage or loss of fishing gear as a result of transit routes not being established, and the lack of mention of a specific Fisheries Communication Plan for commercial fishers in the proponent's EIS.

4.6.2. Agency Analysis and Conclusion

Analysis of the Effects

Commercial fishing is a key economic activity offshore Newfoundland and Labrador, including domestic fisheries for groundfish, pelagics, shellfish and other invertebrates. The extent of commercial fishing varies between areas in the Newfoundland and Labrador offshore, as illustrated in Figure 3. Based on the proponent's EIS and a review of available data on the Agency's GIS Decision-Support Tool, the Agency notes that domestic and international harvests have been recorded within the exploration licences and project area boundaries.

Access to fishing grounds may be temporarily lost or restricted due to displacement caused by safety exclusion zones required around the MODU. The exploration licences are located within NAFO Division 3L, of which only a fraction (i.e., maximum of 0.012 percent) would be affected by safety exclusion zones (Table 4). The Agency recognizes that based on data available, fishing activity is not uniform throughout NAFO Division 3L, and that several factors may influence the degree of overlap with any particular fishery. However, given the short-term duration of drilling, the Agency is of the view that restricted access would be limited and resulting economic effects would be negligible. The proponent noted that although unlikely, it is possible that two MODUs could be used for top hole drilling, and that should this occur, at least 500 metres space would be needed to operate the MODUs; therefore, there it is unlikely the wells would be close enough to each other to have overlapping impacts.

Table 4: Area and Overlap between Exploration Licences 1159 and 1160, NAFO Division 3L and Safety Exclusion Zones

Area and Overlap	Central Ridge Exploration Drilling Project
Total Area of Exploration Licences (1159 and 1160)	4126.44 square kilometres
Area of NAFO Division 3L	195 393.15 square kilometres
Percentage of NAFO Division 3L that would Overlap with Exploration Licences	2.11 percent
Size of Safety Exclusion Zone for One MODU	0.79 – 12.57 square kilometres
Size of Safety Exclusion Zone for Two MODUs	1.57 – 25.13 square kilometres
Percentage of NAFO Division 3L that would Overlap with Safety Exclusion Zone for One MODU	0.0004 – 0.006 percent
Percentage of NAFO Division 3L that would Overlap with Safety Exclusion Zones for Two MODUs	0.0008 – 0.12 percent

Safety exclusion zone area calculated with a minimum radius of 500 metres (without anchors) and a maximum radius of 2 kilometres (with anchors).

Damage to fishing gear could potentially occur as a result of interactions between project vessels and fishing vessels. The proponent would utilize common vessel travel routes where they exist or otherwise follow a straight-line approach to exploration licences. Within the exploration licences where drilling associated activity is occurring, most activity would be focused in or near the MODU safety exclusion zone. Effective communication between the proponent and domestic/communal commercial fisheries would help reduce the potential for interactions, with the compensation program available in case of an incident.

Following completion of exploration drilling, wells may be secured and suspended to return for later testing or abandonment, but in most cases, wells would be secured and abandoned after drilling is complete, with the wellhead removed, cut near the seafloor. If a well is suspended (for a period limited by the C-NLOPB) or if all or a portion of the wellhead remains after abandonment, there is potential for interaction between wellhead infrastructure and fishing gear, in particular mobile gear such as trawl gear, resulting in damaged or lost gear. As part of a proponent's *Application for Approval to Drill a Well,* the proponent must include information on planned well termination (e.g., temporary suspension or abandonment), including the appropriateness of the planned approach to well termination. Through consultation with DFO (as necessary), the C-NLOPB would consider the potential for the wellhead to interfere with fisheries, including the geographic location and water depth. If interference with fisheries was deemed unlikely to occur and suspension or abandonment was determined to be a reasonable approach, fishers would be notified of the wellhead abandonment strategy and location of the abandoned wellhead.

The C-NLOPB has advised the Agency that interference between suspended or abandoned wellhead infrastructure and fishing gear has not been documented in the region. In the unlikely event that damage or loss of fishing gear was caused by contact with wellhead infrastructure, the proponent would be required to provide compensation to the injured party consistent with its obligations in civil law. The C-NLOPB approval of a well termination does not extinguish the proponent's liability for any damage to fishing gear caused by contact between the wellhead and fishing activities. The proponent would be required to report annually to the C-NLOPB

on incidents of lost or damaged fishing gear associated with the Project, and make this information available to Indigenous groups and commercial fishers.The Agency notes that the proponent has committed to develop a compensation program with consideration of C-NLOPB guidelines, including the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activities*. In the event that spills, debris, dropped objects or other project related activities, including authorized activities, cause damage to fishers, the C-NLOPB would expect the proponent to consider claims in a manner that meets the requirements of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* and the spirit of the *Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity* and to act in good faith to resolve claims from fishers. If the proponent and a fisher were unable to resolve such a claim, the fisher could seek relief through a compensation claim to the C-NLOPB (if applicable) or through the court.

Supply and servicing operations have the potential to interact (e.g., direct interference and damage to some gear types) with commercial fisheries that may operate within the transit route. Fishing gear, in particular crab pots, set in the transit route area are weighted to the bottom with an attached buoy or buoys at the surface creating potential for entanglement. The Agency notes however, the supply and servicing vessels would not be towing sub-surface equipment and therefore pose no additional risk of conflict.

The Agency is of the view that the potential effects on commercial fishing, including effects on communal commercial fisheries, could be mitigated through early identification and proper communication of restricted zones (e.g., safety exclusion zones) and information about the location of suspended or abandoned wellheads. The proponent would be required to develop and implement a Fisheries Communication Plan. The plan would be developed in consultation with both Indigenous and commercial fishers and the C-NLOPB. It would include communication objectives, participants and key contacts, and would provide guidance and instruction related to ensuring interested parties are kept up to date with respect to operational activities and accidental events. Parties would also have the ability to provide feedback.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public in identifying the following key measures to mitigate the Project effects on commercial fisheries:

- in consultation with Indigenous groups and commercial fishers, develop and implement a Fisheries Communication Plan to address communications prior to and during drilling, testing and abandonment of each well. The plan should include:
    - a description of planned project activities;
    - information on safety exclusions zones and suspended and abandoned wellheads;
    - information on vessels travelling between Newfoundland and Labrador and exploration licences (e.g., number per week, general route);
    - procedures to notify fishers a minimum of two months prior to the start of drilling each well;
    - regular updates to provide specific information on plans for project activities and an opportunity for feedback and further exchange of information on specific aspects of interest;
    - procedures for determining the need for a Fisheries Liaison Officer and/or fisheries guide vessels during MODU movement and the use of a Fisheries Liaison Officer during geophysical programs;

  - procedures to notify Indigenous groups and commercial fishers in the event of a spill and communicate the results of monitoring of its potential adverse effects on the environment and human health; and
  - procedures to engage in two-way communication with Indigenous groups and commercial fisheries during a tier 2 or tier 3 spill;[9]
- prepare a well abandonment plan, including a wellhead abandonment strategy and submit it to the C-NLOPB for acceptance at least 30 days prior to abandonment of each well. If it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with commercial fishing, develop the strategy in consultation with potentially affected Indigenous groups and commercial fishers;
- ensure that details of safety exclusion zones and the locations of abandoned wellheads, if left on the seafloor, are published in Notices to Mariners, provided in Notices to Shipping and communicated to fishers;
- provide information on the locations of any abandoned wellheads, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning;
- ensure ongoing communication with the NAFO Secretariat, using established information exchange mechanisms that are in place with DFO, regarding planned project activities, including timely communication of drilling locations, safety exclusion zones and suspended or abandoned wellheads; and
- implement all mitigation listed in Section 4.1 Fish and Fish Habitat related to providing the results of the seabed investigation survey, wellhead abandonment procedures, selection of chemicals, disposal of spent synthetic-based muds and the discharge of waste.

The Agency also notes that the proponent has committed to developing a compensation program, to be developed in consideration of the C-NLOPB's *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activities* to address any unplanned interactions between the Project and commercial fishing equipment.

Follow-up

The Agency has identified the following measure as part of a follow-up program to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on commercial fisheries:

- report annually to the C-NLOPB on incidents of lost or damaged fishing gear associated with the Project, including project-related vessels, and make this information available to Indigenous groups and commercial fishers.

In addition, the envisioned Fisheries Communication Plan would provide a means of identifying potential issues recognized during the Project.

Agency Conclusion

The Agency is of the view that the adverse residual environmental effects of the Project on commercial fishing, including communal commercial fishing, are predicted to be low in magnitude, localized to the immediate vicinity of the project activity or component, and only occur for the duration that the MODU is present, except for potential effects from suspended or abandoned wellhead infrastructure which could be permanent.

[9] Tier 2 and tier 3 responses are defined in the International Association of Oil & Gas Producers' document *Tiered Preparedness and Response* (International Association of Oil & Gas Producers, 2015).

Taking into account the implementation of the mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on commercial fisheries.

4.7. Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples

Fishing for food, social and ceremonial purposes is an important activity for Indigenous communities who were included in the EIS. DFO issues fishing licences to communities to authorize fishing activities for food, social and ceremonial purposes, and most Indigenous groups included in the EIS hold these types of licences. Multiple species are being harvested for food, social and ceremonial purposes, including gaspereau, trout, Atlantic Salmon, bass, mackerel, eel, shad, groundfish (e.g., flounder, halibut, pollock), Arctic Char, smelt, Blue Shark, herring, mussel, clams, periwinkle, soft-shell clams, squid, tomcod, quahaug, razor clams, lobster, crab, and scallops. The preference for certain species varies across communities and is based on regional differences. Many communities also harvest aquatic birds and marine mammals for traditional purposes within their traditional territories. Most Indigenous communities place an important value on these country foods and are of the view that they cannot be replaced or substituted by other sources or by compensation because of their cultural and social value, as well as their nutritional qualities.

The proponent is of the understanding that none of the Indigenous groups' traditional territories (where fishing for food, social and ceremonial purposes primarily occurs) overlap with the project area. Therefore, the proponent determined that food, social and ceremonial fishing (including marine mammal and aquatic bird harvesting) is not occurring in the project area or within the potential zones of influence of the Project under normal/routine operations. As such, disruption of these activities would not occur.

Due to this lack of overlap, the assessment focused on marine migratory species which may interact with the Project, since these species then continue their migration to areas that are within the traditional territories of Indigenous groups. In particular, Atlantic Salmon and American Eel are important to Indigenous groups in the region. The proponent relied on research vessel surveys which did not identify Atlantic Salmon or American Eel in the project area, although both species could be present in the area. Based on this information, the proponent assessed that there would be a very low likelihood of interactions between routine project activities and Atlantic Salmon and American Eel (see Section 4.1 for additional information on effects to fish and fish habitat) and that there would be limited potential for any interactions to translate into a decrease in the overall nature, intensity, distribution, quality or cultural value of salmon fishing by Indigenous groups.

In addition to food, social and ceremonial fishing licences issued by DFO, various Indigenous groups consulted/engaged also hold communal commercial fishing licences for migratory species (including Atlantic salmon, swordfish and/or tuna) in NAFO divisions which overlap with the project area. DFO issues these types of licences under the *Fisheries Act* and associated *Aboriginal Communal Fisheries Licencing Regulations*, which allow Indigenous groups to commercially fish or to designate persons or vessels to fish on their behalf. The potential effects of the Project on Indigenous communal commercial licences is discussed separately in Section 4.6.

4.7.1. Views Expressed

Most of the Indigenous groups consulted/engaged expressed concerns about the potential effects of exploration drilling on migratory species, in particular Atlantic Salmon, but also swordfish, Bluefin Tuna, American Eel, migratory birds and seals, as well as other marine species of cultural significance, such as the North Atlantic Right Whale. They are concerned about potential changes in the biophysical environment as a result of exploration drilling and how these changes may affect migratory species being used for traditional purposes. Questions and concerns remain regarding whether any marine-associated species known to be used for traditional purposes may migrate through the project area and may therefore be affected by project activities; and, if the effects could result in reduced quantity or quality of these resources being available for harvesting in their traditional territories.

While a more detailed analysis of the Project's potential effects on salmon is included in Section 4.1, linkage of salmon to current use was commented on by several groups. Notably, while some Indigenous groups hold food, social and ceremonial licences for Atlantic Salmon, due to conservation efforts, they have been unable to harvest the salmon. They contend that any added stress to salmon populations could lead to the permanent removal of a culturally significant species that could not be replaced with any amount of compensation.

Indigenous groups noted the lack of primary source data and Indigenous knowledge gathered and recommended additional research studies be conducted to support a more comprehensive understanding of traditional and current land and resource use, fishing activity and socioeconomic conditions, and to better inform the resultant effects assessment.

Other Indigenous groups expressed concern that they were not involved in co-developing mitigation measures. KMKNO noted another gap in the proponent's engagement, stating that because the project area is not in the traditional territory, the proponent minimizes the significance of Indigenous knowledge regarding the marine environment. It would like the proponent to expand its understanding that the right to fish goes beyond the activity itself; it is also essential to continue the transmission of Indigenous knowledge and to the preservation of culture and identity.

Also, many Indigenous groups expressed the importance of follow-up and monitoring measures for effects on species of cultural importance. They recommend oil and gas operators move beyond sharing information about their monitoring efforts and begin co-developing their monitoring programs with Indigenous peoples, taking Indigenous knowledge into consideration in both program design and implementation.

A summary of issues raised by Indigenous groups is presented in Appendix C.

4.7.2. Agency Analysis and Conclusion

Analysis of the Effects

The most likely interaction between Indigenous peoples and the Project's routine operations would be related to potential effects on communal commercial fishing activities that could occur in the project area. These potential effects are discussed in Section 4.6 (commercial fisheries).

No food, social and ceremonial fishing was reported in the project area but it occurs in other areas, including coastal regions within the regional study area. However, it is unlikely that Indigenous peoples fishing or harvesting for food, social or ceremonial purposes would come in contact with any project components or realize any adverse impacts in their traditional territories from routine project operations. The proponent would also be

required to implement measures to mitigate effects to fish and fish habitat, marine mammals and migratory birds (refer to Sections 4.1, 4.2 and 4.3) such that there would not be a perceptible change to the current use of traditionally valued species (e.g., Atlantic Salmon) or a change in the health and socioeconomic conditions of Indigenous peoples as a result of routine project operations.

The Agency acknowledges that the potential effects from a worst-case accident or malfunction (i.e., an unmitigated subsea blowout event) would be more severe. These are discussed in Section 5.1.

Key Mitigation Measures to Avoid Significant Effects

The Agency is of the view that the measures to mitigate effects on fish and fish habitat (Section 4.1), marine mammals and sea turtles (Section 4.2), migratory birds (Section 4.3) and commercial fisheries (Section 4.6) would also mitigate effects on the current use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples.

Follow-up

The Agency has not identified any follow-up measures specific to current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples and notes that there are related measures proposed for fish and fish habitat (Section 4.1), marine mammals and sea turtles (Section 4.2), migratory birds (Section 4.3) and commercial fisheries (Section 4.6).

Agency Conclusion

The Agency is of the view that that the adverse residual environmental effects of the Project on current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples throughout the regional study area would be low/negligible in magnitude.

Taking into account the implementation of the mitigation measures described for fish and fish habitat (Section 4.1), marine mammals and sea turtles (Section 4.2), migratory birds (Section 4.3) and commercial fisheries (Section 4.6), the Agency is of the view that the Project is not likely to cause significant adverse environmental effects on the current use of lands and resources for traditional purposes or on the health and socioeconomic conditions of Indigenous peoples.

5. Other Effects Considered

5.1. Effects of Accidents and Malfunctions

The proponent identified a number of potential accident scenarios that could occur, including accidental events due to natural hazards (e.g., icebergs, hurricanes, submarine landslides), vessel collisions, dropped objects, loss of MODU stability or structural integrity and loss of well control. Although the causes and consequences of these scenarios can vary, the proponent's assessment mainly focused on the potential effects of an unplanned release of hydrocarbons as a result of one of these events. The proponent predicted that with the potential exception of effects on marine and migratory birds or on special areas, depending on the nature of the special area, residual environmental effects from an accidental event scenario would not be significant.

The proponent determined the probability of accidental spill events based on the estimated drilling duration of 35 to 65 days per well. The probability of an accidental event was lower for the shorter drilling duration of 35 days and higher for the longer drilling duration of 65 days. Based on international and national historical spill data, the proponent stated that large blowouts are relatively rare events with less than a 0.0000030, or a one in 333 333, chance of occurring. It estimated that if a blowout were to occur, there is a 56 percent chance of it lasting two days or less and a 15 percent chance of it lasting more than two weeks. For batch spills of diesel, the probability of a spill of 100 litres was predicted to be 0.012 to 0.23 per well, and that of a spill of 1000 litres was predicted to be 0.0046 to 0.0085 per well.

Modelling of subsea blowouts and batch spills of marine diesel conducted for the Flemish Pass Exploration Drilling Project and Eastern Newfoundland Exploration Drilling Project EISs was used to predict the fate and behaviour of released hydrocarbons and to inform the assessment of potential effects. In the event of a hydrocarbon spill, the trajectory, fate and resultant environmental effects would be determined by the specific location, timing and nature of the release, as well as the environmental conditions and species present at the time of the event.

Hypothetical release locations were selected to represent the range of water depths where drilling may occur and proximity to sensitive areas. The volumes of released hydrocarbons associated with potential blowout scenarios were estimated based on current knowledge of subsea properties and the types of scenarios that could occur. For subsea releases, spill durations were based on estimated maximum timelines for spill response measures to stop oil flow (i.e., installing a capping stack could take approximately 30 to 36 days; mobilizing a MODU, obtaining approvals and drilling a relief well could take approximately 113 days). The modelled scenarios assumed that no response measures would be undertaken to mitigate effects; in a real event, response measures would be implemented soon after any spill.

To analyze the probability of potential effects, the model incorporated specific thresholds for surface oil thickness, shoreline oiling and in-water oil concentration:

- surface oil average thickness:
    - socioeconomic threshold of concern: above 0.040 micrometres;
    - ecological threshold of concern: 10 micrometres;
- shoreline oil average concentration:

- socioeconomic threshold of concern: above 1.0 grams per square metre;
- ecological threshold of concern: 100 grams per square metre;

- in-water concentration:
  - socioeconomic and ecological thresholds of concern: 1.0 microgram per litre of dissolved polycyclic aromatic hydrocarbons or 100 micrograms per litre of total hydrocarbon concentration.

Fate and Behaviour of a Subsea Hydrocarbon Release

The proponent stated that previous modelling of seven hypothetical subsea hydrocarbon release scenarios representing different release durations (30 and 113 days), release rates and volumes (124 964 metres cubed to 2 802 633 metres cubed) was applicable to both exploration licences. Stochastic modelling[10] for all scenarios predicted that areas with the highest potential likelihood (over 90 percent) to exceed the socioeconomic thresholds for effects would be to the east and south of the release sites. These areas were largest for the 113-day release scenarios, where 90 percent probability threshold exceedances for subsurface oil and in water contamination were predicted to cover areas of up to 1 394 000 square kilometres and 752 400 square kilometres, respectively.

The probability of shoreline oiling predicted in the 30-day release scenarios ranged from no probability of shoreline oiling, to a small probability of up to five percent. For the 113-day subsurface release scenarios modelled, average probability of shoreline oil contamination was anywhere between one and 25 percent, with minimum time estimates for first shoreline contact between 8 and 31 days. Shoreline contact could occur along the coast of Newfoundland, Labrador, or Sable Island. The proponent stated that oil that is predicted to make contact with shorelines is expected to be highly weathered, patchy and discontinuous and the time it would take the oil to reach the shore would allow for the implementation of response measures prior to any actual shoreline contact.

The proponent also conducted deterministic modelling[11] for single releases under specific, worst-case environmental conditions. This modelling predicted that the amount of oil remaining in surface waters or on sediments on the seafloor at the end of the simulation ranged from less than 5 percent to 10 percent. A large percentage of the crude oil was predicted to evaporate (26 percent to 39 percent) and to dissolve and degrade (19 percent to 39 percent). Entrainment into the water column ranged between three percent to 47 percent. Shoreline contact was minimal for the deterministic simulations, with 0.20 percent to 0.50 percent of released oil reaching shorelines. In many of the scenarios, up to 18 percent of the released oil mass was predicted to travel outside the model domain to the south and east, further out to sea. Oil travelling outside the model domain was predicted to be highly weathered as patchy and discontinuous surface oil with low toxicity.

[10] Stochastic modelling predicts the likelihood that a specific area might experience effects from released hydrocarbons based on statistical analysis over a variety of historical environmental conditions. Tens to hundreds of individual trajectories resulting from the same release event occurring under varying environmental conditions are layered on top of one another to create a cumulative footprint of releases.
[11] Deterministic modelling predicts trajectory, oil weathering, concentrations and thickness of oil, mass balance, and shoreline contact for a single release at a given time and location and under a specific set of environmental conditions.

Potential Effects of Subsea Hydrocarbon Releases

For all valued components, the nature and severity of effects would depend on the type, size and location of a spill, the time of year, the timely implementation of mitigation and response measures, and the species present within the affected area.

The Agency is aware that accidental events such as oil spills can have important, adverse effects on marine biota, including fish, birds, mammals and turtles, leading to potential changes in their presence, abundance, distribution and health (individuals and possibly, populations). Exposure to accidental spills from a drill rig or vessel can affect marine animals directly through physical exposure or ingestion, with associated mortality, injury or other health related effects, as well as indirectly by affecting their habitats and food sources.

The Agency considered the proponent's analysis, previous EAs, expert advice from federal authorities, comments from Indigenous groups and the public, and modules 7 to 13 of the GIS Decision-Support Tool developed during the Regional Assessment, and identified the following key interactions and resulting potential effects of a hydrocarbon release:

- **Fish and fish habitat** could be affected by dissolved hydrocarbons in the water column, with potential for acute and chronic toxicity effects on exposed fish. Although oil modelling predicted limited contact with sediments, flocculation and sinking could result in effects on benthic species such as corals and sponges. Effects would be largely dependent on a variety of biotic (species, life history, behaviour, resistance) and abiotic (oceanographic conditions, exposure duration, oil type, oil treatment methods) factors.
- **Marine mammals and sea turtles** may experience a change in mortality or injury (acute or immediate effects) if directly exposed to accidentally released hydrocarbons or associated volatiles and aerosols. They may experience sub-lethal effects from direct contact with hydrocarbons or consumption of contaminated prey.
- **Migratory birds** are amongst the biota most at risk from oil spills, as they spend much of their time upon the surface of the ocean. In the event of a spill, and depending upon spill and area specific factors, coastal birds may also be at risk on beaches and in intertidal zones. Possible physical effects of oil exposure on birds include changes in thermoregulatory capability (hypothermia) and buoyancy (drowning) due to feather matting, as well as oil ingestion from excessive preening.
- **Special areas** could be reached by released oil, with resulting changes in their defining ecological and socio-cultural features. These effects would be closely linked to effects on other valued components, particularly the biological valued components which have been discussed above.
- **Commercial fisheries** could temporarily lose access to fishing areas or fish species, resulting in reduced fishing efficiency and value. Damage to fishing gear, facilities or vessels and actual or perceived reductions in the quality of fisheries resources with resulting market / price effects may also occur.
- **Indigenous communities and their activities** may also be adversely affected should any spilled oil reach their communities and traditional areas, or if important migratory species are affected.

Additional Considerations

(i) Fate, Behaviour and Effects of Batch Diesel Spills and Synthetic-Based Mud Spills

The most likely types of spills would be small (less than 200 barrels on average), operational batch spills that could occur from a MODU or supply vessel during routine operations, storage and movement of fuels or accidents; such spills often comprise instantaneous or short-duration discharges. A larger diesel spill could occur as a result of a vessel collision. However, the proponent indicated that the probability of a vessel-on-vessel collision would be very low based on more than 30 years of Newfoundland and Labrador offshore industry activity, and predicted that a nearshore spill event would result in oil moving to the east, with no shoreline contact.

Fate and behaviour modelling of hypothetical batch diesel spills predicted that less than 0.10 percent of the diesel would remain on the surface after the end of the 30-day simulation, with a significant portion evaporated (60 to 76 percent), a portion in the water column (9 to 12 percent) and the rest degraded (15 to 28 percent). No shoreline oiling and negligible oil on sediments (less than 0.020 percent) was predicted. The effects of a batch diesel spill would be similar to those of a subsurface hydrocarbon release, but likely at a much smaller scale in terms of geographic extent and magnitude.

A synthetic-based mud spill may also occur as a result of: an accidental deck release; a subsurface release through a crack or orifice in a flex joint, riser or lines; or a bottom release due to an emergency riser disconnect event. Based on historical data, the proponent predicted the probability of a batch spill of any volume of synthetic-based mud to be 0.025 per well for a 35-day drilling duration and 0.046 per well for a 65-day drilling duration. Spilled synthetic-based mud would behave much differently than spilled oil: these heavy, dense fluids sink rapidly through the water column resulting in limited effects on the water's surface. These spills could have localized effects on marine mammals and sea turtles, with the greatest potential for chronic health and bioaccumulation effects on fish, and potential smothering of benthic species. The proponent indicated that synthetic-based muds have relatively low acute toxicity and recovery of the benthic community and environment could take between one and five years.

(ii) Effects of Dispersants

Dispersants may be used to respond to spills and although they can accelerate the degradation of spilled oil, they have the potential to increase hydrocarbon exposure throughout the water column (i.e., to plankton and pelagic fish) and eventually the benthic environment (i.e., to demersal fish and benthic invertebrates). The proponent pointed out that certain concentrations and ratios of dispersants have been shown to reduce the effectiveness of some degradation pathways, which may result in increases in "marine snow" (i.e., organic matter that falls continuously from the surface in the deep ocean) and potential effects on the benthic environment. Chemically dispersed oil may have more pronounced effects on the early life stages of fish and invertebrates than on adult life stages. Additionally, chemically dispersed oil may be more toxic to corals than untreated oil solutions.

Dispersed oil has similar effects on birds to those of untreated oil (e.g., reduction in insulation capacity and waterproofing of feathers). In addition, the Agency is aware that some research indicates the potential for dispersants and dispersed oil to cause ophthalmic effects in birds. The proponent indicated that with the application of dispersants, potential exposure to floating oil on the sea surface would be reduced and overall, dispersants mitigate the potential adverse effects of oil on marine and migratory birds compared to untreated oil.

5.1.1. Views Expressed

Federal Authorities

The C-NLOPB provided advice on the general probability of blowouts for exploration drilling. Based on analysis by Holand (2017) of available data from regulated areas (United Kingdom, Norway, Netherlands, Canada East Coast, Australia, United States Pacific Outer Continental Shelf, Denmark and Brazil), excluding the Gulf of Mexico, it advised that the blowout occurrence rate for exploration wells is approximately 0.00025 per well drilled. This probability is for a blowout of any size at a single well, whether or not petroleum is released. It further noted that while 41 percent of blowouts involve the release of oil, the remainder involve the release of brine, water or gas. It indicated that the probability of having no blowout is quite high, remaining above 99 percent even for a drilling program of 30 wells. Overall, the C-NLOPB advised that the probability of having a blowout on a multi-well program is generally less than 1 percent.

DFO, ECCC, the C-NLOPB and NRCan reviewed the proponent's rationale for the applicability of previous spill modelling to confirm that model input, design and predictions were reasonable to inform the effects assessment. NRCan noted that the spill model used is limited in its ability to predict the degradation and sinking of crude oil heavy ends and corresponding smothering effects on benthic biota. NRCan advised that the model does not consider the contents of the persistent portions of the crude oil and that biodegradation rates are therefore over-estimated; however, NRCan agrees that this is an ongoing area of research and has indicated that it will conduct simulations, publish data and continue discussions with industry to further advance existing models. Despite the potential shortcoming identified by NRCan, DFO, ECCC, the C-NLOPB are of the view that the model results provide sufficient information to inform the effects predictions and to recommend mitigation and follow-up measures.

Regarding the use of dispersants, ECCC noted there was insufficient evidence to support the proponent's conclusion that dispersants would mitigate the potential adverse effects of oil on migratory birds in colder water temperatures compared to untreated oil. It indicated that applying dispersants may be beneficial for migratory birds in some situations, but may prove to be more harmful in others; therefore, the use of dispersants must be done with careful consideration on a case by case basis.

DFO noted that regarding a subsea blowout, potential effects to fish species at risk could extend beyond the Project's regional study area and could be short-term to long-term in duration.

The C-NLOPB and ECCC reviewed information on timing of spill response and mobilization of a capping stack. The C-NLOPB advised that the usual procedure for installing a capping stack may not be possible in shallow water; since the exploration licences cover water depths less than 500 metres, alternative emergency response options need to be explored. The proponent stated that water depth is indeed a variable that would directly influence the complexity of a well capping/containment operation and that shallower water wells can pose unique challenges to the installation of a capping stack. It is unlikely that a vessel would be able to deploy a capping stack from directly above the wellhead in shallow water. In such cases an offset deployment, where the vessel is not directly above the wellhead, would be required and would require additional time and resources. This could be achieved using either a large crane or using specialized equipment.

ECCC requested information related to the persistence of oil following recent spills in offshore Newfoundland and Labrador, and the applicability to potential spills during the Project. The proponent indicated that three spills were recorded in 2018 and 2019 from the White Rose and Hibernia production facilities that were one to three orders of magnitude larger than batch spills modelled for the Project. These spills produced oil slicks that dissipated quickly

(up to five days) due to evaporation and weathering, and no oiled marine life or seabirds were observed after five or six days.

Transport Canada advised that the *Canada Shipping Act, 2001* and its associated regulations apply to all vessels transiting within Canadian waters. For example, vessels of a prescribed class are required to have an arrangement with a response organization and to have a shipboard oil pollution emergency plan under the *Environmental Response Regulations* and the *Vessel Pollution and Dangerous Chemicals Regulation*s of the *Canada Shipping Act, 2001*.

Health Canada recommended that the proponent work with relevant industry stakeholders to identify the contaminants of potential concern associated with potentially spilled oil and dispersant use. In addition, it suggested that sampling and monitoring protocols for marine species consumed by Indigenous peoples or other marine users be integrated in environmental effects monitoring programs developed as part of oil spill response.

Indigenous Peoples

Multiple Indigenous groups raised concerns about the potential effects of dispersants, including potential differences between effects of subsea versus surface dispersant injection. The Agency notes that the spill impact mitigation assessment would provide information on response options.

Most Indigenous groups raised concerns about the potential effects of an accident or malfunction on Atlantic Salmon. Groups have stressed their desire to see Atlantic Salmon populations recover and are concerned that offshore oil and gas exploration could contribute to pressures on populations, particularly in the event of an accident or malfunction. Several Indigenous groups noted that data gaps regarding salmon behaviour and migration patterns still exist and it is important to acknowledge uncertainty and apply a precautionary approach in conducting the effects assessment. Groups have also stated that EAs of offshore exploratory drilling projects take a compartmentalized approach and that an ecosystem-based approach should be taken with Indigenous knowledge more sufficiently factored into the assessments. In addition, several groups have noted that, in consideration of recent declines in Atlantic Salmon populations and the possible threat of extinction for some of these populations, any adverse effects on salmon could be of high magnitude, significant and would be an impact on Aboriginal rights. Potential effects on other migratory species such as Bluefin tuna, Swordfish and American Eel were also identified as a concern.

Several Indigenous groups raised concerns related to potential contamination of harvested species in the event of a subsea release, including perceived contamination which could influence dietary changes if country foods were avoided.

Several groups expressed concern about the potential for shoreline oiling and effects on coastal species and habitats from offshore spills or nearshore vessel collisions, and about recent spills in the offshore. MTI also expressed concern about the potential for spills of synthetic-based drilling muds.

Several Indigenous groups raised concerns about the timing of spill response and mobilization of a capping stack and recommended that the proponent be required to provide up-to-date information to the C-NLOPB prior to drilling and at regular intervals during drilling related to capping stack status and the availability of vessels capable of deploying the capping stack. Several groups recommended that a capping stack, along with the appropriate capacity for equipment modification and rapid staging and deployment, should be situated in Newfoundland or Atlantic Canada to mitigate the risks associated with an uncontained blowout.

MTI requested additional detail on how a spill would be detected, questioned whether it would be possible for a spill to go undetected in certain situations, and expressed concern regarding the time between the spill, spill detection, and deploying contingency measures, such as booms, berms, and other barriers. The C-NLOPB advised that, prior to its authorization, the proponent would be required to provide information about management systems for hazard identification, risk evaluation, performance measurement, compliance monitoring, and auditing. It is also required that any spill be reported to the C-NLOPB immediately. Depending on the type and nature of the spill, it could be detected in different ways. For instance, any loss of well control, which could potentially lead to a blowout, would be detected immediately through constant well monitoring. Smaller spills during fuel transfers would be detected through a loss of pressure in the transfer line or visually by personnel. Finally, a synthetic-based mud spill would be detected by one or more of the following: visually by personnel; through status lights and alarm in the case of a riser failure or inadvertent riser unlatch; through fluid volume monitoring; or through loss of pressure. ECCC also conducts regular oil pollution monitoring operations, including analysis of satellite imagery and follows up on potential spills via aircraft surveillance.

Several Indigenous groups expressed the importance of involvement of Indigenous groups in the development and implementation of the Oil Spill Response Plan.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

The Fish, Food and Allied Workers Union stated that oil spills are a major threat to the fishing industry. It acknowledged that oil companies have protocols and practices in place to prevent spills from occurring and that regulatory agencies are involved in monitoring these companies but maintained that the threat of an oil spill is imminent. It also noted that the spill impact mitigation assessment and the decision to employ measures such as dispersants require public discussion.

The World Wildlife Fund – Canada recommended that a capping stack be a necessary safety measure that is in place prior to further exploration drilling programs, especially given the desire by the province of Newfoundland and Labrador to ramp up activity in this sector.

A member of the public expressed concern that any birds in contact with spilled oil would suffer high mortality.

5.1.2. Agency Analysis and Conclusion

Analysis of the Effects

Offshore exploratory drilling happens in a dynamic environment and unplanned pollution events associated with these activities have occurred in the past; however, the vast majority of these events have been relatively minor. More serious events, such as a large-scale subsea release, are far less likely to occur but could have major consequences. The C-NLOPB advised that the blowout occurrence rate for exploration wells is approximated to be 0.00025 per well drilled, representing a one-in-4 000 chance of a blowout of any size during the drilling of a single well. It further advised that the majority of blowouts do not involve the release of oil, and that the probability of having no blowout remains above 99 percent even when accounting for the drilling of multiple wells.

The Agency is aware that the C-NLOPB verifies that proponents have appropriate measures in place for spill prevention and preparedness. The proponent must comply with the requirements in regulations and be able to demonstrate that it meets the C-NLOPB's expectations for facility safety, pollution prevention and emergency response capability. The C-NLOPB has advised the Agency that its authorization of drilling activities would be

contingent on its confidence that the proponent has a satisfactory approach to risk management and would take all reasonable measures to minimize the probability of malfunctions and accidents. The proponent would be required to sufficiently demonstrate its preparedness to appropriately respond in the event of an accident or malfunction (e.g., batch spills, subsea releases). This would include demonstration of financial resources to meet a minimum liability obligation of $1 billion to pay for incident response and actual losses or damages as a result of the incident, and provision to the C-NLOPB a minimum of $100 million in “financial responsibility” for any costs incurred. The proponent would also be required to prepare a detailed Oil Spill Response Plan that meets the C-NLOPB’s regulatory standards and complete an exercise of it to address any deficiencies prior to the commencement of project activities. Among other elements, the Oil Spill Response Plan would incorporate recommendations and guidance from ECCC on measures for wildlife response, protection and rehabilitation, including wildlife surveillance, wildlife deterrent techniques, and the collection and storage of deceased wildlife.

The proponent would also be required to undertake a spill impact mitigation assessment to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences. Certain response measures, such as the use of dispersants and in-situ burning, would also require approval from the C-NLOPB prior to actual implementation.

The proponent would have primary barriers to maintain well control and prevent kicks (e.g., continuous monitoring, managing and controlling drilling and formation fluid density, pressure and circulation) and secondary barriers (e.g., blowout preventer system) to regain well control. In the event that these measures fail and an uncontrolled subsea hydrocarbon release occurs, the proponent would be required to begin the immediate mobilization of a capping stack and associated equipment to the site. Simultaneous to the mobilization of a capping stack, the proponent would be required to commence mobilization of a relief well drilling installation.

If required, a capping stack would be sourced from Norway and/or Brazil and would be transported directly to the well site by a specialized vessel. Although air freight is an option to mobilize the capping stack system, vessel transport would be preferred because shipping by air requires breaking down the equipment for transport and rebuilding and testing prior to deployment. The proponent estimated that the capping stack could be mobilized and deployed within 18 to 36 days and that having a capping stack system located in St. John’s would be unlikely to reduce the overall time for installation due to the lack of specialized infrastructure, including proper maintenance and storage facilities, transport and installation vessels with capabilities required and appropriate yard space. The C-NLOPB confirmed that capping and containment of a blown out well requires mobilization of equipment to prepare the subsea release site before use of a capping stack. This equipment would be transported by air to begin site preparation, which would include clearing of the site and cutting away of debris to ready the well for capping stack installation. The C-NLOPB has considered the various activities involved in source control and well capping and agrees with the proponent’s assessment that the deployment of the capping stack is unlikely to be the critical path determining the overall timeline to put a capping stack in place. The C-NLOPB would require the Well Capping and Containment Plan contain a discussion of any potential options to reduce overall timelines (e.g., detailed accounting of timelines for mobilization and installation of capping stacks from various locations; review of opportunities to conduct preparatory work that may reduce timelines [e.g., permitting requirements, Canadian Customs and Border Services Agency requirements]). The proponent would be required to review environmental conditions at different times of the year to determine potential impacts on the time required to mobilize a capping stack, resulting in the need for additional mitigation.

The Well Capping and Containment Plan would include information on options and requirements for relief well drilling, including the locations of potential MODUs that would be available to the proponent to drill a relief well.

The proponent would be required to demonstrate that it has arrangements in place to access the necessary drilling installation in a manner that would minimize the time required to drill a relief well, taking into consideration location and logistics. Considering the time for unit mobilization as well as additional activities that would be required (e.g., additional surveying, ranging, well capping), the proponent estimated it could take approximately 100 to 113 days to drill the relief well. The C-NLOPB would review the plans as part of its authorization process.

The Agency is aware that there have been a number of spills of synthetic-based mud offshore Newfoundland and Labrador over the past 20 years and 136 000 litres of untreated synthetic-based muds were accidentally released offshore Nova Scotia in 2018. Offshore of Newfoundland, there have been batch spills of 250 000 litres of oil in November 2018 from the SeaRose platform, and an estimated 12 000 litres of oil from the Hibernia platform in July 2019 (C-NLOPB 2019). The proponent would be required to have appropriate measures in place to prevent batch spills, including spills of synthetic-based mud. Spill prevention and response would be described in the proponent's Environmental Protection Plans and Oil Spill Response Plans, which would be reviewed as part of the C-NLOPB's authorization process.

Despite the measures the proponent would implement to prevent and respond to a spill, the potential effects on fish and fish habitat, marine mammals and sea turtles, and migratory birds could, in a worst-case scenario and under worst-case conditions, result in both individual and population level effects. These effects could be especially detrimental to populations of species that are particularly sensitive to such an event (e.g., seabirds) or are at risk (e.g., endangered North Atlantic Right Whale, Atlantic Salmon (Inner Bay of Fundy population)). The Agency also notes that a large subsea release, although unlikely, could affect special areas and critical habitats, such as the critical habitats for Northern and Spotted Wolffish, several of the special areas listed in Appendix E (e.g., Slopes of the Flemish Cap and Grand Bank Ecologically and Biologically Significant Area), and special areas beyond the regional study area (e.g., Sable Island National Park Reserve). Although unlikely, significant environmental effects could result depending on the nature of the special area and the extent and duration of the spill event.

Indigenous and non-Indigenous fishers with commercial and communal commercial fishing licences could also be affected by accidental spills. A large batch spill or subsea release could result in the closure of fishing areas, the fouling of gear and vessels, a reduction in the marketability of commercial fish products, as well as effects on fish and fish habitat. In addition, Indigenous peoples could be affected if a spill affects species that migrate through the spill area to areas where they are harvested for food, social or ceremonial reasons (e.g., Atlantic Salmon). The Agency agrees with comments from Indigenous groups that, even if effects on these species are relatively minor, perceived contamination may discourage individuals from engaging in certain traditional practices or consuming certain species which may have interacted with a spill. Although the probability of contamination of resources harvested by Indigenous communities would likely be low due to spill behavior and implementation of spill response, the Agency is of the view that, in the event of a subsea release, actual and perceived environmental changes could potentially result in effects on socioeconomic conditions of Indigenous peoples, including effects to traditional foods. Perceived contamination would be addressed by follow-up sampling, and the proponent would be required to communicate the results to Indigenous groups as part of the Fisheries Communication Plan. For both Indigenous and non-Indigenous fishers, any damages, including the loss of commercial or food, social and ceremonial fisheries, would require compensation in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*. Views provided by Indigenous groups would be considered in the development of the Spill Response Plan and groups would be provided the approved version.

The proponent would be required to implement a follow-up monitoring plan to identify the effects of a spill and the effectiveness of the response measures. The plan would be specific to the spill and developed in consultation with the C-NLOPB. Monitoring could include taint and contamination testing of harvested fish species, marine mammal and migratory bird monitoring, and monitoring of benthic species and habitat in the event of a synthetic-based mud spill or other event that could result in smothering or localized effects to the benthic environment. In the event of an emergency response in the Newfoundland offshore area, ECCC's National Environmental Emergencies Centre would be available to chair an Environmental Emergencies Science Table as needed in support of the C-NLOPB. Through this process, relevant experts from various government departments and agencies could be engaged to provide scientific advice and inform response actions.

The Agency notes the proponent's conclusion that with the potential exception of effects on migratory birds or on some special areas, residual environmental effects from an accidental event would not likely be significant. However, after considering the views of Indigenous groups and applying a precautionary approach to its own conclusions, the Agency is of the view that, although very unlikely, the potential effects of a worst-case accident could also be significant for other valued components including fish and fish habitat, and marine mammals and sea turtles. For fish and marine mammals and sea turtles, the potential for significant effects is linked primarily to the potential presence of species at risk (e.g., Atlantic Salmon Inner Bay of Fundy population, marine mammals and sea turtles species at risk). While uncertainty exists within these predictions (e.g., presence, abundance, migration patterns), even small impacts to a species at risk may be significant at a population level and affect their potential recovery. By extension, this could also result in an effect on the potential ability of Indigenous groups to harvest these species in the future. The Agency notes that the uncertainty may be addressed through further research proposed by the proponent.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered the mitigation measures proposed by the proponent, expert advice from federal authorities and comments from Indigenous groups and the public in identifying the following key measures to prevent accidents and malfunctions and to mitigate associated effects:

- undertake all reasonable measures to prevent accidents and malfunctions that may cause adverse environmental effects and effectively implement emergency response procedures and contingencies developed for the Project;
- submit a Well Capping and Containment Plan, which includes strategies and measures for well capping, containment of fluids lost from the well and the drilling of a relief well(s), as well as options to reduce overall response timelines. The Well Capping and Containment Plan must include procedures to provide up-to-date information to the C-NLOPB prior to drilling and at regular intervals during drilling, related to the availability of appropriate capping stacks and vessels, and appropriate drilling rigs capable of drilling a relief well at the project site;
- prior to drilling, submit a Spill Response Plan that takes into account the results of spill modelling and must include:
    - procedures to respond to an oil spill (e.g., oil spill containment, oil recovery) and spills of other types (e.g., synthetic-based mud or cuttings spill);
    - reporting thresholds and notification procedures;
    - measures for wildlife response, protection and rehabilitation (e.g., collection and cleaning of marine mammals, birds and sea turtles, including species at risk) and for shoreline protection and clean-up, developed in consultation with the C-NLOPB and ECCC;

  - specific role and responsibility descriptions for offshore operations and onshore responders and the list of authorities to notify of a spill, including when they will be notified and the means to notify them;
- provide Indigenous groups with an opportunity to review and provide feedback on a draft version of the Spill Response Plan. Provide the approved version to Indigenous groups, and make it publicly available on the Internet prior to drilling;
- conduct an exercise of the Spill Response Plan prior to the commencement of project activities and adjust the plan to address any deficiencies identified during the exercise. Provide results of the exercise and any subsequent updates to Indigenous groups following review by the C-NLOPB;
- review and update the Spill Response Plan as required during drilling and before commencing a new well, and provide the update to Indigenous groups;
- prepare a plan for avoidance of collisions with vessels and other hazards which may reasonably be expected in the exploration licence and submit to the C-NLOPB for acceptance prior to drilling;
- undertake a spill impact mitigation assessment to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences and provide it to the C-NLOPB for review. Relevant federal government departments would provide advice to the C-NLOPB through the ECCC Environmental Emergency Science Table. Publish the spill impact mitigation assessment on the Internet;
- in the event of an uncontrolled subsea release from the well, begin the immediate mobilization of a capping stack and associated equipment to the site of the uncontrolled subsea release. Simultaneously, commence the mobilization of a relief well MODU;
- if drilling is anticipated in water depths of 500 metres or less, undertake further analysis to confirm the capping stack technology selected can be deployed and operated safely at the proposed depth and submit this analysis to the C-NLOPB for approval;
- compensate for any damages, including the loss of food, social and ceremonial fisheries in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*;
- include in the Fisheries Communication Plan a procedure to notify fishers in the event of an accident or malfunction and communicate the results of any associated monitoring and any potential health risks. Information that is provided to Indigenous groups and fishers needs to present a realistic estimation of potential health risks on consuming country foods, such that their consumption is not reduced unless there is a likely health risk from the consumption of these foods or specific quantities of these foods. If there is a potential health risk, consumption advisories should be considered; and
- include procedures in the Fisheries Communications Plan to engage in two-way communication with Indigenous groups and commercial fishers in the event of a spill requiring a tier 2 or tier 3 response.

Follow-Up

The Agency has identified the following measures as part of a follow-up program to ensure the effectiveness of mitigation measures and to verify accuracy of predicted effects in the event of a spill:

- as required by and in consultation with the C-NLOPB, monitor the environmental effects of a spill on components of the marine environment until specific endpoints identified in consultation with expert government departments are achieved. As applicable, monitoring shall include:
  - sensory testing of seafood for taint and chemical analysis for oil concentrations and any other contaminants, as applicable;

  - measuring levels of contamination in recreational, commercial and traditionally harvested fish species with results integrated into a human health risk assessment to be submitted to relevant authorities including those responsible for fishing area closures;
  - monitoring marine mammals, sea turtles and birds for signs of contamination or oiling and reporting results to the C-NLOPB;
  - monitoring benthic organisms and habitats in the event of a synthetic-based mud spill or other event that could result in smothering or localized effects to the benthic environment; and
- develop a procedure to communicate monitoring results to Indigenous and commercial fishers, as well as Indigenous groups.

Agency Conclusion

In taking a precautionary approach, the Agency is of the view that the potential effects of a worst-case accident or malfunction from the Project (i.e., unmitigated subsea release) on migratory birds and special areas could be significant. Similarly, considering the potential presence of species at risk, the Agency concludes that the potential effects of a worst-case accident or malfunction on fish and fish habitat and marine mammals and sea turtles could also be significant. By extension and particularly considering potential effects on populations of Atlantic Salmon and their recovery, as well as the context provided by Indigenous groups, the Agency concludes that the potential effects on the current (or future, as it pertains to at-risk Atlantic Salmon populations) use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples could be significant. With the implementation of mitigation measures, including the requirement to compensate for any damages to commercial fishing caused by an accident or malfunction, the Agency concludes that the potential effects of a worst-case accident or malfunction from the Project on commercial fisheries would not be significant.

However, the Agency recognizes that the probability of occurrence for a major event is very low and thus, these effects are unlikely to occur. Taking into account the implementation of the key mitigation measures, the Agency is of the view that the Project is not likely to cause significant adverse environmental effects as a result of accidents and malfunctions.

5.2. Effects of the Environment on the Project

Severe environmental conditions or events can increase the probability of an accident or malfunction that could in turn affect the environment. For this reason, the effects of the environment on a project are considered.

The Project could be affected by environmental phenomena such as weather conditions, oceanographic conditions, sea ice, icebergs, MODU and vessel icing, and geological stability and seismicity. The MODU selected would function within the environmental conditions likely or known to be encountered.

Weather and Oceanographic Conditions

Poor visibility resulting from fog, rain or snow conditions could increase the potential for accidental events. From April/May through July, when warm air masses move over cold water, a reduction in visibility to less than one kilometre occurs from 40 to 50 percent of the time. Visibility and ceiling restrictions may be a factor for shipping or for helicopter support activities. Severe sea states can occur year-round with maximum significant wave heights ranging from a low of 7 metres in July to over 14 metres in December and January. Extreme wind and wave

conditions could result in MODU failure or capsizing of a vessel. Currents also have the potential to increase stress on a MODU, including the riser, which could result in malfunctions and accidental events.

Sea Ice, Icebergs and Superstructure Icing

Although sea ice and icebergs occur in the project area, a well-designed and implemented ice management plan would minimize risk for interaction with the MODU or with infrastructure on or near the seabed. Ice is a navigational hazard and may increase the risk of an accidental event.

The accumulation of ice on a ship's superstructure is also a potential risk during the winter and could result in a higher centre of gravity, slower vessel speed and maneuvering difficulty, as well as problems with equipment. The icing potential in the project area is likely to occur between November and May, with the highest frequency typically occurring in February. If icing is not properly managed, damage could occur and there could be an increased likelihood of an accidental event.

Geological Stability and Seismicity

A tectonic event could cause an earthquake of a significant size that results in seafloor instability. Subsequently, landslides could damage subsea infrastructure, disrupt project activities and increase the risk of potential accidental events. Between 1985 and 2017, nine seismic events have occurred in the project area, the largest of which had a magnitude of 4.5. The majority of recorded seismic events had epicentres in the southwest portion of the project area. The MODU would be designed to accommodate and withstand seismic and related environmental loads.

The proponent indicated that although the project area has been classified as having a low seismic hazard, a seismic event could contribute to sediment and seafloor instability or tsunami conditions and increase the risk of potential accidental events. Should a tsunami or tectonic event occur, the MODU would have the capability to quickly disconnect the riser from a well reducing the risk of damage to the well, riser and MODU.

5.2.1. Views Expressed

Federal Authorities

The C-NLOPB advised that the level of uncertainty with respect to geohazards would be considered through a risk assessment during the Approval to Drill a Well process as required by the *Newfoundland Offshore Petroleum Drilling and Production Regulations*.

ECCC noted the need for an assessment of ice conditions along the marine transportation routes to consider predicted climate change and its possible effect on the timing of ice formation in the future. ECCC also noted the need for the proponent to consider extratropically transitioning hurricanes, including "dynamic-fetch wave" climatology. The C-NLOPB advised that ECCC will be consulted on the physical environmental monitoring program.

The C-NLOPB, ECCC, NRCan and DFO advised the Agency that, as applicable to their respective mandates and areas of expertise, the proponent's analyses were adequate for the purpose of the EA. The C-NLOPB advised that the proposed mitigation measures are appropriate in the context of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* and associated regulations.

Indigenous Peoples

Indigenous groups raised questions about monitoring of iceberg movement and collision potential and emergency evacuation and shut-down, and requested that Indigenous groups be notified of iceberg collision potential and how iceberg activity may alter or restrict the drilling program. Risks associated with operating a MODU in harsh weather were also noted, and the development and implementation of procedures and training specific to emergency riser disconnection was also recommended. It was observed that the number of disconnections required for other nearby projects appear to be rising with the increase in severe weather events. Given the potential impacts of climate change, this risk may continue to increase and should be considered in the assessment. It was further suggested that a conservative approach should be taken to establish sea state parameters and associated operating thresholds.

The C-NLOPB has advised that the proponent would be required to submit a safety plan for approval. This plan would address the possibility of pack sea ice or drifting icebergs at the drill site and the measures to protect the installation, including systems for ice detection, surveillance, data collection, reporting, forecasting and, if appropriate, ice avoidance or deflection. Through the C-NLOPB's incident disclosure policy, information on iceberg collisions would be posted on the C-NLOPB's website. More broadly, the proponent would also be required to implement a physical environment monitoring program and establish and enforce practices and limits for operating in all conditions that may be reasonably expected.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

Public comments on exploratory drilling offshore of eastern Newfoundland expressed concern that an accident could occur similar to the November 2018, Husky Energy SeaRose production platform flowline spill, which resulted when the production platform was restarted during a storm where wave heights were recorded at 8.4 metres.

5.2.2. Agency Analysis and Conclusion

Analysis of the Effects

Severe environmental conditions or events can increase the probability of an accident or malfunction that could in turn affect the environment. The Project could be affected by weather conditions, oceanographic conditions, sea ice, icebergs, MODU and vessel icing, and geological instability and seismicity. These environmental conditions can affect the overall stability and functioning of the MODU or support vessels. In extreme situations these conditions may result in a required evacuation, failure of the MODU or vessel capsizing or result in a spill or another unplanned event.

The proponent would obtain a Certificate of Fitness for the MODU as required by the *Newfoundland Offshore Certificate of Fitness Regulations* to ensure it is fit for purpose and can function as intended. Meteorological and oceanographic monitoring programs would also be implemented over the life of the Project to forecast and respond to severe environmental conditions. The *Offshore Physical Environmental Guidelines* describe the requirements for monitoring and reporting of environmental conditions. The development and implementation of an Ice Management Plan is required by the *Newfoundland Offshore Petroleum Drilling and Production Regulations* as part of the Safety Plan submitted by the proponent with an application for authorization by the C-NLOPB. The Ice Management Plan would outline methods for monitoring iceberg and pack ice and the measures

to protect installations, including systems for ice detection, surveillance, data collection, reporting, forecasting and potentially ice avoidance or deflection. The proponent would be required to establish and enforce practices and limits for operating in all severe environmental conditions and to ensure that the MODU has the ability to quickly disconnect the riser from the well.

With regard to geological stability and seismicity, NRCan advised that slope stability is not considered a widespread hazard, but the potential for geohazards in the exploration licences is unknown due to a lack of geological data. The C-NLOPB advised that a geohazards assessment is required as part of the Approval to Drill a Well process as required by the *Newfoundland Offshore Petroleum Drilling and Production Regulations* and that the C-NLOPB can require additional mitigations based on the assessment of risk. The C-NLOPB further advised that fit for purpose MODUs would further reduce the risk of accidents or malfunctions, and that it will not issue a drilling approval until geohazards have been assessed and adequately mitigated.

Key Mitigation Measures to Avoid Significant Effects

The Agency has considered measures proposed by the proponent, comments from an Indigenous group and advice from federal authorities in identifying key measures to mitigate the effects of the environment on the Project. The proponent shall:

- in consultation with the C-NLOPB and ECCC, develop and implement a physical environment monitoring program in accordance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations* and meet or exceed the requirements of the *Offshore Physical Environmental Guidelines*;
- in consultation with the C-NLOPB, establish and enforce practices and limits for operating in all conditions that may be reasonably expected, including poor weather, severe sea state, or sea ice or iceberg conditions;
- in consultation with the C-NLOPB and as part of the required Safety Plan, develop an Ice Management Plan including procedures for detection, surveillance, data collection, reporting, forecasting and avoidance or deflection of icebergs; and
- in consultation with the C-NLOPB, implement measures to ensure that the MODU has the ability to quickly disconnect the riser from the well in event of an emergency or severe weather conditions.

Follow-up

The Agency has identified the following measure as part of a follow-up program:

- in accordance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations,* report annually to the C-NLOPB on whether there has been a need to modify operations based on severe environmental conditions and on the efficacy of the practices and limits established for operating in poor weather, high sea state, or sea ice or iceberg conditions.

Agency Conclusion

Based on commitments made by the proponent and with the implementation of the mitigation and follow-up measures listed above and required by the C-NLOPB, the Agency is satisfied that the effects of the environment on the Project have been adequately considered and are not likely to result in significant adverse environmental effects.

5.3. Cumulative Environmental Effects

Cumulative environmental effects assessment considers the overall effect on valued components as a result of the Project's predicted residual environmental effects and those of other projects and activities that have occurred, are ongoing or are expected to occur in the future. The proponent used the same spatial boundaries for the cumulative environmental effects assessment as for the project-specific effects assessment of each valued component (Section 2.1 and Figure 1). Projects and activities that were considered in the cumulative environmental effects assessment are listed in Table 5. Figure 4 illustrates the existing and proposed development and exploratory drilling projects currently in the offshore of Newfoundland and Labrador.

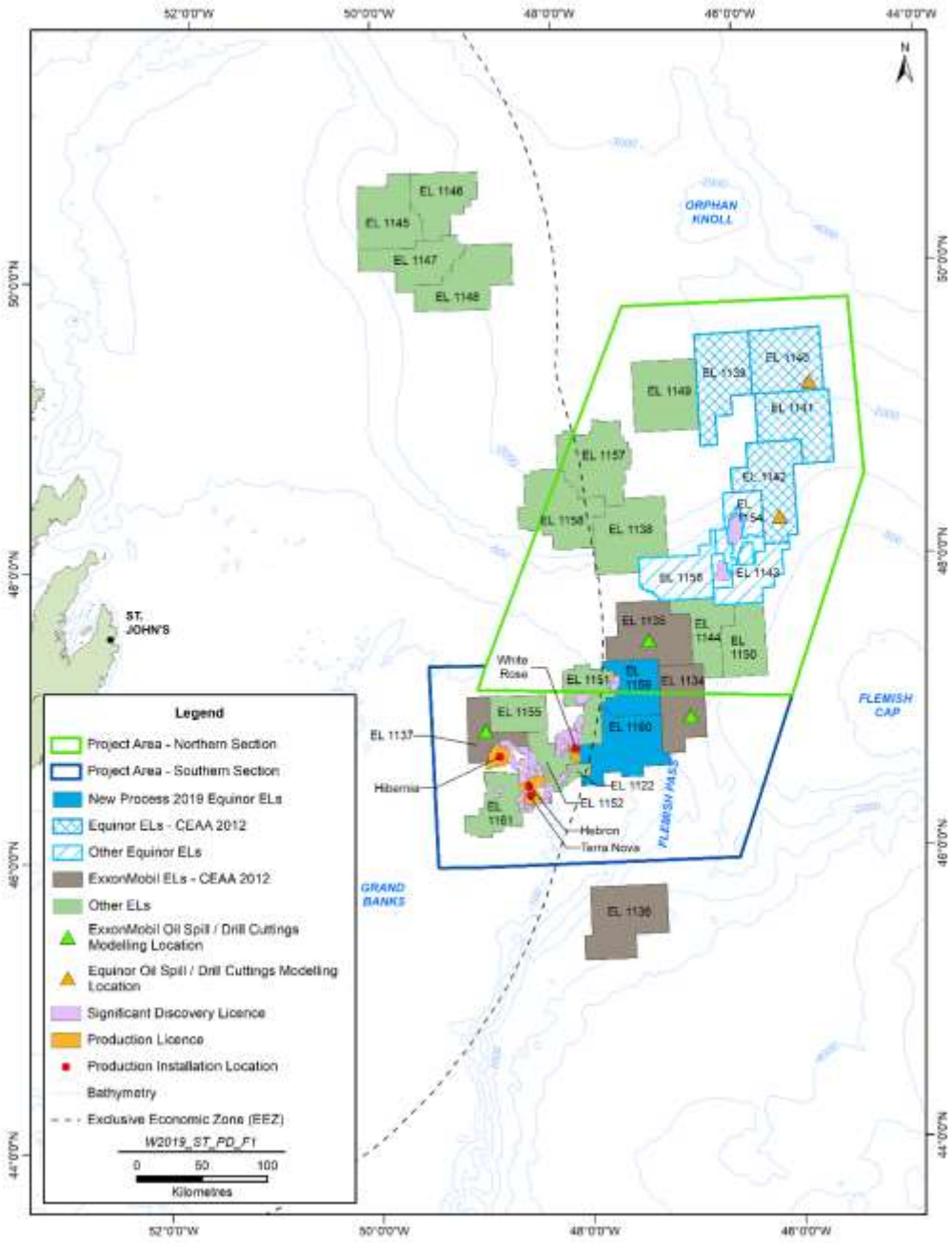


Figure 4: Ongoing and Proposed Oil and Gas Exploration Licences and Production Projects

Source: Equinor Canada Ltd. 2020

Table 5: Projects and Activities Considered in the Cumulative Environmental Effects Assessment

Project / Activity	Overview
Existing and Proposed Petroleum Production Projects	As of May 2020, no development wells have been drilled in the Eastern Newfoundland land tenure area (C-NLOPB 2020). Several existing petroleum production projects are in the Jeanne d'Arc land tenure area, located to the west of exploration licences 1159 and 1160, with production anticipated to extend throughout the temporal duration of the Project (distances to exploration licence 1160 are closest and are shown in brackets): • Hibernia oilfield (60 kilometres); • Terra Nova oilfield (40 kilometres); • Hebron oilfield (40 kilometres); and • White Rose oil and gas field, and White Rose Extension (two kilometres). Additionally, should the proposed Bay du Nord Development Project (located 39 kilometres from 1159 and 80 kilometres from exploration licence 1160) be allowed to proceed, it would be the first development project in the Eastern Newfoundland land tenure area. Potential effects from the Bay du Nord Development Project could potentially overlap temporally and spatially with the zone of influence from the Project.
Offshore Petroleum Exploration - Drilling	As of May 2020, a total of 99 exploration wells and 57 delineation wells have been drilled in the Jeanne d'Arc and Eastern Newfoundland land tenure areas (C-NLOPB 2020). In these areas, there are also five approved and four proposed offshore exploratory drilling programs that have the potential to temporally overlap with the Project. Six of these projects have exploration licences within the predicted zone of influence for the behavioural effects of sound on marine mammals.
Offshore Petroleum Exploration – Geophysical and Other Exploration Activities	Offshore geophysical surveys may include two-dimensional, three-dimensional or four-dimensional geophysical data acquisition (e.g., seismic surveys). While geophysical and other exploration activities are multi-year programs that can cover large offshore areas, the type and level of activity conducted each year varies. There are approximately 15 offshore geophysical programs in the Jeanne d'Arc and Eastern Newfoundland land tenure areas in various stages of approval which have the potential to temporally overlap with the Project.
Fishing Activity	Commercial fisheries within and around the project area are extensive and diverse, with potential effects on fish and fish habitat, including benthic species.
Vessel Traffic	Vessel traffic occurs year-round throughout the region and includes offshore oil tanker and supply vessels, cargo ships, navy ships, fishing vessels, and research vessels, with potential effects from sound emissions and potential interaction with commercial fishing activity.
Hunting Activity	Although little or no hunting is expected to occur in the project area, hunting in nearshore areas of Newfoundland and Labrador affects bird and seal populations that occur in the regional study area.

The Agency considered the proponent's analysis, expert advice from federal authorities and comments from Indigenous groups and the public, and identified the following key potential cumulative effects of the Project in combination with the above-noted projects and activities:

- potential cumulative loss of fish and fish habitat and associated mortality and health effects on fish and benthic organisms resulting from drill waste discharges at multiple wells;
- potential injury and behavioural effects on marine mammals and sea turtles resulting from cumulative effects of sound emissions from the Project, other offshore exploration and production activities, and vessel traffic;
- potential injury or mortality of migratory birds resulting from cumulative effects of light emissions from multiple offshore sources; and
- potential reduction of access to fishing grounds resulting from cumulative effects of multiple safety exclusion zones associated with the Project and other offshore exploration and production activities.

The proponent considered additional potential cumulative effects of the Project in combination with: commercial fishing and subsistence hunting pressure on fish, marine mammals and migratory bird populations; vessel and helicopter traffic and associated risk of migratory bird and marine mammal strikes; fishing gear entanglement; persistent oil from chronic small releases; and atmospheric sound emissions. Potential cumulative effects on special areas were also considered by the proponent. The proponent noted that given the distance from Indigenous communities and activities, there would be a low likelihood of interactions that could result in a negative effect on traditional activities.

The proponent indicated that the life cycles of several marine fish species, marine and migratory birds, and marine mammals and sea turtles include long-distance movement within the regional study area, and individuals of these species could be affected by the combined residual environmental effects of the Project and other physical activities. However, it also noted that residual effects are not expected to alter the long-term viability of local or regional populations. The proponent indicated that its commitments to mitigation, monitoring and follow-up programs for valued components would also be relevant to limiting the potential for cumulative environmental effects, and stated that compliance monitoring would assure that environmental regulations and requirements are being followed.

5.3.1. Views Expressed

Federal Authorities

DFO noted that the cumulative effects analysis for sound should consider VSP sound emissions and the spatial overlap between sound generated from the Project as well as other projects.

ECCC advised that the exploration licences are located in an area that already has a large artificial lighting footprint, given the proximity to the existing production and exploration projects in offshore Newfoundland. ECCC noted that the Project would contribute to the overall cumulative artificial lighting footprint in the offshore environment, but would have a comparatively smaller direct effect on migratory birds than a new light source in a previously dark area. ECCC also noted that the presence of artificial lighting along a foraging flight path should be the basis of a cumulative analysis (rather than overlapping light sources). On this basis, the same individual or individuals from the same population could be affected by light from production facilities and/or exploration facilities located far away from one another and outside their individual zones of influence. For example, Leach's

Storm-petrel pass through existing producing oilfields between their nesting colonies and deep-water foraging areas, and these artificial light footprints have the potential to cumulatively affect the nesting population of Baccalieu Island and Gull Island.

The C-NLOPB advised that a number of regulatory and practical considerations would prevent or limit cumulative effects of exploration activities and other activities. These include the establishment of required safety zones around MODUs and the worldwide availability of drill rigs capable of operating in the Newfoundland and Labrador offshore, therefore limiting the potential for multiple drilling operations occurring simultaneously and in close proximity to each other.

DFO and ECCC advised that the mitigation measures, monitoring and follow-up programs proposed by the proponent and recommended by the Agency would adequately address the potential cumulative environmental effects on migratory birds, fish and fish habitat, marine mammals, sea turtles, including applicable species at risk, as well as on commercial fishing and special areas.

Indigenous Peoples

Several Indigenous groups expressed concern with the level of analysis conducted by the proponent, particularly in light of the exploration and development activity in the eastern Newfoundland offshore area. Concerns expressed included potential cumulative:

- losses of benthic species and fish habitat from increasing exploration and production drilling in the eastern Newfoundland offshore;
- effects on swordfish, Bluefin Tuna, and Atlantic Salmon, with Elsipogtog First Nation noting that the approximately 10-year duration of exploration licences represents the lifespan of more than two generations of Atlantic Salmon;
- effects of sound on North Atlantic Right Whales, including a request for hydrophones to be installed at the drill site to support ongoing monitoring and recovery efforts;
- increased risk of injury or mortality of marine mammals and sea turtles resulting from increased vessel traffic; and
- effects on seasonal migration patterns of birds resulting from Project light emissions in combination with light from existing nearby production platforms could affect the seasonal migration patterns.

Follow-up was recommended by several Indigenous groups to manage cumulative effects, and to inform future activities, including a recommendation for an Indigenous environmental monitoring program for routine and accidental events or malfunctions.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Public

Fish, Food and Allied Workers raised the concern that there could be cumulative effects on commercial fisheries resulting from avoidance of high vessel traffic areas or areas where abandoned wellheads are left in place due to concern for damages to fishing gear. Additionally, concern was expressed that the cumulative effects analyses did not fully examine the effects of seismic programs, drilling, produced water and oil spills on fish and fish habitat for projects over the last 60 years of offshore exploration and development. A member of the public also expressed concern about potential cumulative effects on migratory birds, particularly with respect to attraction to project-related light sources.

5.3.2. Agency Analysis and Conclusion

Analysis of the Effects

The Agency is of the opinion that the residual environmental effects of the Project could interact cumulatively with the effects of other projects and activities.

Marine fish and their habitats have been and are being affected by a variety of anthropogenic and natural influences including ongoing fishing activity, offshore petroleum exploration and production, general vessel traffic and other human activities, as well as the effects of climate change. While most mobile fish species, including Atlantic Salmon, have higher potential to interact with multiple projects and activities, these species also generally have higher avoidance capabilities and access to alternative habitats. Furthermore, given the limited zone of influence and short-term nature of project-related disturbances (e.g., sound emissions, waste discharges) on these species, potential cumulative effects of the Project would be limited.

The Agency notes concerns expressed by Indigenous groups about potential cumulative effects on benthic habitat from ongoing and proposed petroleum exploration and production drilling in the eastern Newfoundland offshore. In consideration of this concern and comments from federal authorities and Indigenous groups about the importance of quantitative analysis of cumulative effects, the Agency reviewed available information and the proponent's modelling of drill cuttings deposition to quantify potential cumulative effects from accumulation of drill cuttings from multiple wells associated with the Project. Based on a review of the Agency's GIS Decision-Support Tool, two historical wells were drilled within each of the two exploration licences for the Project (https://nloffshorestudy.iciinnovations.com/mapviewer/). The proponent predicted that drill cuttings would be deposited on the seabed with a thickness greater than 1.5 millimetres (i.e., the no-effects threshold) across a maximum area of 0.063 square kilometres. If all six potential exploration wells were drilled in one of the exploration licences, the maximum area covered with drill cuttings above the no-effects threshold would be 0.38 square kilometres, or 0.024 and 0.015 percent of the total area of exploration licences 1159 and 1160, respectively. If the two previously drilled wells are included and the same area were covered by drill cuttings, it is assumed the percent covered would increase to 0.030 percent in exploration licence 1159 and 0.020 percent in exploration licence 1160. The southwestern boundary of exploration licence 1160 is within two kilometres of the White Rose production facility. Although there is potential for cumulative effects from drill cuttings from the White Rose project, the proponent's modelling predicted that deposition thicknesses would be below the threshold for effects to sensitive benthic species at a maximum of 1.4 kilometres from a well.

The Agency also notes that ongoing environmental effects monitoring programs for petroleum production projects have demonstrated localized (i.e., less than 10 kilometres) geographic effects on fish habitat from drill cuttings and chemical contaminants. This suggests a limited potential for cumulative environmental effects in activities bordering the southwest portion of exploration licence 1160 and ongoing petroleum production projects. The Agency notes that, depending on well location, project activities could be undertaken in areas that are or have been previously subject to bottom fishing, contributing to the potential for cumulative effects on previously disturbed benthic areas. However, cumulative environmental effects on corals and sponges are predicted to be unlikely or minimal given the requirement for the proponent to relocate drilling activities or discharges, as required, if aggregations of coral and sponges or other environmentally-sensitive species are identified during pre-drill surveys. Cumulative environmental effects on special areas protected based on the presence of sensitive benthic features would similarly be unlikely or minimal. Finally, the Agency notes the regulatory and practical considerations such as required safety zones and the limited availability worldwide of MODUs capable of

operating in the Newfoundland and Labrador offshore, therefore limiting the potential for multiple drilling operations to occur simultaneously and in close proximity to each other.

Marine mammals and sea turtles in the eastern Newfoundland offshore area may be affected by the Project in combination with effects of other exploration and production activities as well as effects of vessels from shipping, fishing and other activities, such as seismic programs. The potential cumulative effects of sound on marine mammals are of particular concern. Based on the proponent's predicted zone of influence for sound and information available for other offshore exploration and production projects in the region, the Agency has identified that at least three existing development projects, one potential development project (the Bay du Nord Development Project), and six approved or proposed exploratory drilling projects with zones of influence for sound effects that could spatially overlap with the Project's. Marine mammals and sea turtles can generally travel across great distances and may experience disturbances from multiple anthropogenic sound sources across a relatively large region, beyond the zone of influence for sound effects for the Project. In addition, although the mobile nature of marine mammals and sea turtles may allow them to avoid or pass through disturbed areas, avoidance of otherwise suitable habitat is in itself a negative effect and is of concern when considering potential cumulative effects from multiple projects.

Despite the potential for cumulative effects to marine mammals and sea turtles, the Agency notes that Project activities producing potential behavior-altering sound in the marine environment would be generally short-term, transient and temporary (e.g., VSP surveys, vessel traffic, drilling), which would limit the potential for the Project's effects to temporally overlap with the effects from other projects and activities. The proponent would be required to implement mitigation measures to reduce the effects of the Project on marine mammals and sea turtles (Section 4.2), including measures to reduce effects from sound (e.g., conduct VSP surveys in accordance with the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*) and from vessel transits (e.g., reduce vessel speed under certain scenarios), which would in turn reduce the Project's contribution to cumulative effects. In addition, given uncertainties about the effects of sound, the proponent would be required to verify sound predictions related to underwater sound and provide the results to DFO and the C-NLOPB to determine whether additional mitigation measures are required for subsequent wells.

With respect to migratory birds, the Project would contribute to an increase in night lighting in the eastern Newfoundland offshore area. Of particular concern with respect to light emissions are Leach's Storm-petrels, for which recent declines in four of seven major colonies in Atlantic Canada (including all three major Newfoundland colonies) have been attributed to strandings due to attraction to lighted structures as well as predation, ingestion of marine contaminants, collisions and contact with hydrocarbons. The majority of strandings reported by offshore petroleum operators occur in September and October, corresponding with the departure of Leach's Storm-petrel fledglings from breeding colonies and with fall landbird migration.

As noted in Section 4.3, there is uncertainty with respect to attraction distances to lighting and flares. Based on available information, the Agency has estimated a zone of influence for lighting of 16 kilometres; as such, a MODU in exploration licence 1160 may have light effects which overlap with those produced by the existing White Rose Oilfield and Extension located approximately two kilometres from the edge of exploration licence 1160. In addition, there is potential for overlapping zones of influence from project lights with the ExxonMobil Canada Limited Eastern Newfoundland Offshore, Jeanne d'Arc Basin and CNOOC International Flemish Pass exploration drilling projects, should drilling occur at the same time.

Additionally, the Agency notes ECCC's advice that the basis for the cumulative effects analysis should be the presence of artificial lighting along flight paths and not spatially overlapping light sources. In this context, the

Project has a greater potential to act cumulatively with the effects of other offshore projects and activities on migratory birds. However, the Agency notes that the presence of the MODU would be short-term (approximately 35 to 65 days per well) and the effects of light would be spatially limited relative to the overall regional study area. In addition, the proponent would be required to implement mitigation to reduce light attraction (e.g., controlling project lighting, reduced flaring duration, employing alternatives to flaring) and implement a protocol for daily monitoring for the presence of stranded birds. The results of monitoring would also be shared and would increase the level of information regarding potential effects and inform the need for additional mitigation, if applicable.

In addition to the potential for the effects of the Project to interact cumulatively with those of other projects and activities in the region, the Agency notes that the proponent may operate two MODUs simultaneously, which would result in potential overlapping effects within the Project. These overlapping project effects would be similar in nature to potential cumulative effects between the project and simultaneous exploratory drilling in adjacent exploration licences, and the cumulative effects assessment would be similarly applicable. The short-term nature of exploratory drilling and the relatively limited spatial extent of many of its effects, along with the required mitigation and follow-up, would limit the potential overlapping effects from two MODUs operating simultaneously.

Commercial fishing could be affected by the Project and other petroleum activities given that additional safety exclusion zones would be created as part of the Project. The Agency also notes the concern expressed by the Fish, Food and Allied Workers Union regarding potential cumulative effects of increased vessel traffic and abandoned wells from multiple exploration projects, which could result in avoidance of fishing areas due to concern for fishing gear damage. However, the Agency predicts that the contribution of the Project to cumulative environmental effects would be minor given the small size and short-term duration of safety exclusion zones as well as the short-term duration of Project-related vessel traffic. The proponent would be required to develop a Fisheries Communication Plan to ensure effective communication with domestic and communal commercial fisheries, which would help reduce the potential for interactions, with the compensation program available in case of an incident.

The potential for cumulative environmental effects in the eastern Newfoundland offshore area have been raised as a concern by Indigenous groups due to the number of potential projects that could occur. Given these potential activities, the Government of Canada, the Province of Newfoundland and Labrador and the C-NLOPB worked together on the Regional Assessment for offshore exploratory drilling in the offshore area of eastern Newfoundland, which aimed to examine the effects of existing and anticipated offshore oil and gas exploratory drilling, including cumulative environmental effects. The Regional Assessment developed scenarios for future exploration activity in the offshore east of Newfoundland and Labrador, and identified potential overlap of predicted exploratory wells with ongoing and future activities in the region. It concluded that experience to date and the future exploratory drilling scenarios developed do not suggest a high level of spatial and temporal clustering of activity and effects in the region. The Committee noted that there is uncertainty around future activities and the environment's response to these, and recommended the information and analysis provided in the Regional Assessment be considered by the C-NLOPB in future decisions as part of the scheduled land tenure process. The Regional Assessment included the development of a GIS Decision-Support Tool that consolidates available environmental data for the eastern Newfoundland offshore area; this tool will be reviewed and updated as new information becomes available, and can be used to inform the required project-specific plans and programs (e.g., seabed investigation survey, marine mammal monitoring program) for offshore exploratory drilling projects. In addition to the Regional Assessment, operators have been working together to conduct effects analyses (including for this Project), engage Indigenous groups and identify research needs (e.g., migration and effects to Atlantic Salmon).

In conducting the review of this Project, the Agency has identified a series of mitigation measures, as well as follow-up and monitoring, related to fish and fish habitat, marine mammals and sea turtles, migratory birds, special areas and commercial fisheries. These measures would reduce project-specific effects, reducing their contribution to cumulative effects, and verify the accuracy of the predictions made during the EA. This proposed monitoring and follow-up would also enhance the understanding of and reduce uncertainty with respect to the potential effects from offshore exploratory activities.

Key Mitigation Measures to Avoid Significant Effects

Mitigation, follow-up and monitoring for this Project would contribute to the mitigation or monitoring of cumulative environmental effects.

Agency Conclusion

Taking into account the implementation of the mitigation measures proposed for the Project, the Agency is of the view that the Project is not likely to cause significant adverse cumulative environmental effects.

6. Impacts on Potential or Established Aboriginal or Treaty Rights

6.1. Potential or Established Aboriginal or Treaty Rights

The Project is located in the Northwest Atlantic Ocean, with the nearest potential drilling location approximately 375 kilometres from St. John's and roughly 577 kilometres from the nearest Indigenous community on the island of Newfoundland, and 650 kilometres from the nearest community in Labrador. There are no traditional territories or recognized treaties overlapping the exploration licences or the larger project area. Since there are no Aboriginal or treaty rights being exercised in the project area, the pathways for potential impacts to rights of Indigenous groups are through impacts from project activities to migratory species that migrate through the project area and are then harvested or fished within the traditional territories of Indigenous groups.

Migratory species of particular concern to Indigenous groups include Atlantic Salmon, seals, whales, migratory birds as well as American Eel. Effects assessments on migratory species are summarized in Section 4.1 Fish and Fish Habitat, Section 4.2 Marine Mammals and Sea Turtles and Section 4.3 Migratory Birds.

6.1.1. Labrador

The NunatuKavut Community Council asserts an Aboriginal right to hunt, fish and gather throughout its asserted traditional territory within Labrador and to resources along the offshore area immediately adjacent to the Labrador coast. The NunatuKavut Community Council holds food, social and ceremonial fishing licences for species that may migrate between the project area and the Labrador coast.

Sheshatshiu Innu First Nation in central Labrador and Mushuau Innu First Nation on the north coast of Labrador assert Aboriginal rights to hunt, fish and gather resources within Labrador and along the Labrador coast. The Innu Nation, which represents both communities, holds food, social and ceremonial fishing licences for species that may migrate between the project area and the Labrador coast.

The Nunatsiavut Government is an Inuit regional government within Newfoundland and Labrador, which was established in 2005 under the *Labrador Inuit Land Claim Agreement* between the Province of Newfoundland and Labrador, the Government of Canada and Inuit of Labrador. The project area is located greater than 500 kilometres southeast of the Labrador Inuit Settlement Area; however, the Nunatsiavut Government holds food, social and ceremonial fishing licences for species that may migrate between the project area and the Labrador Inuit Settlement Area.

6.1.2. Nova Scotia, New Brunswick and Prince Edward Island

Nova Scotia, New Brunswick and Prince Edward Island[12] Indigenous groups (Maritime First Nations) are signatories to Peace and Friendship Treaties, which provide them with the right to fish for a moderate livelihood[13]. In addition, the Maritime First Nations have an established Aboriginal right to harvest migratory species within their traditional territories for food, social and ceremonial purposes, both on land and in the marine environment. Although the Project is located between 1100 to 1500 kilometres east of the First Nation communities in the Maritime provinces, endangered Atlantic Salmon populations, which Maritime First Nations have traditionally harvested in their territories, may pass through the project area as they migrate to or from their natal rivers located within these territories.

6.1.3. Quebec

Les Innu de Ekuanitshit and Première Nation des Innus de Nutashkuan, who reside on the north shore of the Gulf of St. Lawrence, assert an Aboriginal right to harvest Atlantic Salmon (and other migratory species) for food, social and ceremonial purposes in their territories, including on Anticosti Island, Quebec. Atlantic Salmon populations from the Gulf of St. Lawrence may pass through the project area during migration to or from their natal rivers located within the territories of these Innu Nations.

The three Mi'gmaq communities represented by the MMS, Micmacs of Gesgapegiag, La Nation Micmac de Gespeg, and the Listuguj Mi'gmaq Government, are part of the Peace and Friendship Treaties, which provide them the right to fish for a moderate livelihood. In addition, these Mi'gmaq communities in Quebec have an established Aboriginal right to harvest migratory species within their traditional territories for food, social and ceremonial purposes, including Atlantic Salmon that may pass through the project area as they migrate to or from their natal rivers located within these territories.

6.2. Potential Adverse Impacts of the Project on Potential or Established Aboriginal or Treaty Rights

Most project-related activities would take place in an offshore marine environment, hundreds of kilometres from Indigenous groups, and there are no food, social and ceremonial licences within or near the project area or the local study area. Should Indigenous groups fish in those areas in the future, the proponent noted that due to the limited, localized and short-term nature of Project effects and the associated small safety exclusion zone, adverse effects to any such fishing activity would not be anticipated. Similarly, Project-related effects would be unlikely to extend to or affect the physical or social health and well-being or other socioeconomic conditions of an Indigenous community.

[12] See Section 3.1- Crown Consultation with Indigenous People-of this EA Report for a list of Nova Scotia, New Brunswick and Prince Edward Island Indigenous groups the Agency consulted

[13] All 34 Mi'kmaq/Mi'gmaq communities in Nova Scotia, PEI, New Brunswick and the Gaspe Peninsula of Quebec, plus the six Wolastoqiyik First Nations and Peskotomuhkati at Skutik in New Brunswick are signatories to the Peace and Friendship Treaties

The key pathway for potential impacts to rights of Indigenous groups are through impacts from project activities to migratory species that are harvested or fished within Indigenous groups' traditional territories.

Individuals from some populations of Atlantic Salmon could migrate through the project area, and could congregate south of the project area prior to migrating back to natal rivers. The proponent stated that there is little to no data to support the project area being used by Atlantic Salmon as overwintering habitat or as a major feeding area, and that potential effects of planned project activities and overall risks to Atlantic Salmon is low and would not contribute to or exacerbate declines in salmon populations.

For other migratory species of interest to Indigenous groups, like whales, birds and American Eel, the Proponent predicted that routine project activities would not significantly affect populations. Further, there would be no change in the ability to harvest these species in the traditional territories of all Indigenous groups consulted by the Agency for the Project.

Effects assessments on migratory species of interest to Indigenous groups are summarized in Sections 4.1, 4.2 and 4.3.

With respect to accidental spills, modelling showed a limited potential for oil to reach traditional territories of Indigenous groups. Potential effects from an oil spill would therefore be largely indirect in nature, related to potential effects on migratory marine species harvested by Indigenous groups.

Views of Indigenous Groups

All participating Indigenous groups expressed concern about the potential to affect salmon and by extension to adversely impact the Aboriginal right to harvest salmon in their traditional territories. Additionally, salmon play a significant and vital role in the social and cultural fabric of Indigenous groups in the region. Project-related sound from routine operations, marine shipping associated with the project, accidents and malfunctions, and cumulative effects of greenhouse gases and continuous drilling fluid releases were all cited as pathways by which migrating salmon could be adversely affected. Indigenous groups have requested that the precautionary principle be applied to analysis and selection of mitigation owing to the endangered status of certain salmon populations, the lack of data on migration routes and overwintering locations, the high rates of at-sea mortality, climate change and the lack of information on specific effects of offshore drilling on this species. Research to address data gaps has been recommended by many Indigenous groups, some of which recommended delaying drilling activities or limiting them to certan times of the year so as not to interact with salmon migration. Additional information and analysis related to Atlantic Salmon has been summarized in Section 4.1.

MTI asked that the proponent clearly state that the effects of a spill on other migratory species of interest to Indigenous groups may lead to an impact on Aboriginal or treaty rights. MTI further stated that the communities which it represents consider their commercial fisheries to be rights-based, referring to their communal commercial licences for species such as swordfish and tuna in NAFO regions that overlap with the project area. Should a spill occur, Indigenous groups may be fishing in these area and their activities (and in turn their right to fish) may be impacted by such a spill.

Several other groups have requested that offshore oil and gas operators form an Indigenous environmental advisory committee, to be used as a mechanism for ongoing consultation and oversight on potential impacts to rights and the effectiveness of proposed mitigation/accommodation measures.

A summary of issues raised by Indigenous groups is presented in Appendix C.

Agency Analysis

Indigenous groups may fish species in their traditional territories that migrate through the project area. However, the Agency is of the view that because the Project's routine activities would likely have limited effects on these fish species (Section 4.1) it would also likely have a low/negligible impact on the potential or established Aboriginal or treaty rights of Indigenous groups with food, social and ceremonial licences to harvest migratory species. With respect to Atlantic Salmon, a species of particular concern to many Indigenous communities, DFO reviewed applicable information and confirmed that there is uncertainty regarding the at-sea migration patterns and habitat use of this species. It advised that it is possible that some salmon overwinter in the Jeanne d'Arc Basin/Flemish Pass region, and that salmon are likely to be present at some times of the year as they migrate to and from home rivers. However, this is not known to be a significant migration route or overwintering area. DFO has advised that potential effects of the Project on Atlantic Salmon are expected to be negligible to low and spatially and temporally limited. As a result, based on advice from DFO and the C-NLOPB, the Agency determined that avoiding drilling during certain times of the year, as requested by some Indigenous groups, was not warranted. With respect to data gaps regarding habitat use and migratory routes, the proponent noted that the ESRF is going to conduct research related to the presence and distribution of Atlantic Salmon in the eastern Newfoundland offshore area.

Although routine project operations would likely have limited effects on species that migrate through the project area, in the unlikely event of a major oil spill (discussed in Section 5.1 Effects of Accidents and Malfunctions), there is the potential for more serious effects on these species, particularly species at risk, and therefore potential impacts on the potential or established Aboriginal or treaty rights of Indigenous groups. The potential impacts from a spill event may decrease the quantity, quality and health of the fish harvested by Indigenous groups.

The Agency acknowledges the potential consequences of an accidental spill on Indigenous fishers and Indigenous communities. However, available data shows that the probability of a blowout is very low and therefore its potential effects would be unlikely to occur. In the unlikely event of a blowout, spill modelling predicts that shoreline oiling would be unlikely, and if it did occur, generally minimal. The Agency notes that the proponent would be required to take all reasonable measures to reduce the probability of an accidental event and ensure that it is prepared to respond effectively if an accidental event does occur. In conjunction with spill response measures, any damages incurred by Indigenous fishers, including the loss of commercial or food, social and ceremonial fisheries, would require compensation in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*. The proponent would also be required to develop and implement a Fisheries Communication Plan, which would include procedures to communicate with fishers in the event of an accident or malfunction. Views of Indigenous groups would also be considered in the development of the Spill Response Plan and groups would be provided with the approved version (see Section 5.1 for additional details).

6.3. Proposed Accommodation Measures

Mitigation measures and follow-up identified for fish and fish habitat (Section 4.1), marine mammal and sea turtles (Section 4.2), migratory birds (Section 4.3), commercial fisheries (Section 4.6) and accidents and malfunctions (Section 5.1) would also function as accommodation measures to minimize or avoid potential adverse impacts on potential or established Aboriginal or treaty rights. Key mitigation and follow-up measures identified by the Agency are provided in Appendix A. Key requirements related to potential impacts on rights include:

- ensure that all waste discharges and emissions from the MODU into the marine environment are in accordance with the *Offshore Waste Treatment Guidelines* and the *International Convention for the Prevention of Pollution from Ships*;
- plan and conduct VSP activities in consideration of the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment;
- prepare follow-up programs for fish and fish habitat, marine mammals and sea turtles, and migratory birds to verify the accuracy of the predications made during the EA and to determine the effectiveness of the mitigation measures, and share the results of these programs with Indigenous groups;
- in consultation with Indigenous fishers, develop and implement a Fisheries Communication Plan to facilitate and coordinate communication with fishers;
- provide Indigenous groups with an opportunity to review and provide feedback on a draft version of the Spill Response Plan. Provide the approved version to Indigenous groups prior to drilling. Include a procedure to communicate with Indigenous fishers in the event of an accident or malfunction in the Fisheries Communications Plan;
- require the proponent to include in its Fisheries Communications Plan procedures to engage in two-way communication with Indigenous groups in the event of a spill requiring a tier 2 or tier 3 response; and
- compensate for any damages, including the loss of food, social and ceremonial fisheries in accordance with the *Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity*.

Given the uncertainty about Atlantic Salmon and the importance of the species to Indigenous groups, the proponent has committed to contribute to research on the presence and distribution of Atlantic Salmon in Eastern Canadian offshore areas.

6.4. Issues to be Addressed During the Regulatory Approval Phase

The regulatory approval phase, during which any federal permits or authorizations would be considered, would be completed after the EA is complete. In order to proceed, the Project requires authorization by the C-NLOPB under the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act*.

The proponent may also require *Fisheries Act* authorization and a *Species at Risk Act* permit from DFO. Additional consultation with Indigenous groups would occur as appropriate prior to making these regulatory decisions. The decision to undertake additional Crown consultation would take into consideration the consultation record for the EA.

6.5. Agency Conclusion

After taking into consideration the mitigation measures, the Agency is of the view that routine project activities would likely have a low/negligible impact on potential or established Aboriginal or treaty rights of Indigenous groups. The Agency expects that any impacts would likely be low-magnitude, short-term and reversible. Mitigation measures would ensure that there would be no interruption in the practice of rights, and that rights could be

practiced in the same or similar manner as before the Project. The Agency acknowledges that a blowout incident could have more serious repercussions but has a very low probability of occurrence.

Taking into account the analysis of environmental effects of the Project and the related mitigation measures outlined for fish and fish habitat (Section 4.1), marine mammal and sea turtles (Section 4.2), migratory birds (Section 4.3), commercial fisheries (Section 4.6) and accidents and malfunctions (Section 5.1), the Agency is of the view that the potential impacts of the Project on potential or established Aboriginal or treaty rights have been adequately identified and appropriately mitigated.

No specific follow-up measures are identified in relation to potential impacts on asserted or established Aboriginal and treaty rights; however, the Agency is of the view follow-up measures outlined for fish and fish habitat (Section 4.1), commercial fisheries (Section 4.6) and effects of accidents and malfunctions (Section 5.1) would also be effective in confirming potential impacts to potential or established Aboriginal and treaty rights.

7. Agency Conclusion

The Agency considered the proponent's EIS, the proponent's previous information for the Flemish Pass Exploration Drilling Project, and responses to information requests from the Agency, as well as comments received from the public, government agencies, and Indigenous peoples during this EA and previously completed EAs of exploration drilling projects offshore of Newfoundland and Labrador. The Agency also considered the measures that would be implemented to mitigate the Project effects, as well as the follow-up (monitoring) measures to be implemented by the proponent.

The environmental effects of the Project and their significance have been determined using assessment methods and analytical tools that reflect current accepted practices of EA practitioners, including consideration of the effects of potential accidents and malfunctions.

The Agency is of the view that the proposed Central Ridge Exploration Drilling Project is not likely to cause significant adverse environmental effects, taking into account the implementation of the mitigation measures described in this EA Report.

The Agency has identified key mitigation measures and follow-up program requirements for consideration by the Minister of Environment and Climate Change in establishing conditions as part of his decision statement in the event that the Project is permitted to proceed. Following the comment period on this draft EA Report, the Agency will submit the final EA report to inform the Minister's decision whether the Project is likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures. The Agency will also recommend that the Minister establish, through his decision statement, conditions that the proponent must meet with respect to mitigation and follow-up program requirements in the event that the Project is permitted to proceed.

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Appendices

Appendix A: Key Mitigation and Follow-up Measures Identified by the Agency

Valued Component (VC)	Mitigation	Follow-up

Fish and Fish Habitat (Section 4.1)	• prepare a pre-drill seabed investigation plan for each well site and submit to DFO and the C-NLOPB for review and approval prior to implementing the survey. The plan should be designed to:
	  ○ collect high-definition visual data to confirm the presence or absence of sensitive environmental features, including aggregations of habitat-forming corals or sponges;
	  ○ identify the equipment used for the surveys, to be operated by a qualified individual; and
	  ○ include information on survey transect length and pattern around each well site, which should be based on applicable drill cutting dispersion model results. Transects around anchor sites should extend at least 50 metres from the extent of each structure;
	• based on approved plans, undertake a seabed investigation survey at each well location and around each anchor point prior to commencing drilling a well.
		• monitor the concentration of synthetic-based muds on drill cuttings to verify that the discharge meets, at a minimum, the performance target specified in the *Offshore Waste Treatment Guidelines*. Report results to the C-NLOPB;
		• for the first well on each exploration licence and for any well where drilling is undertaken in an area determined by the seabed investigation survey to be sensitive benthic habitat, conduct specific follow-up monitoring, including:
		  ○ measurement of sediment deposition extent and thickness (e.g., core samples and/or high definition visual data) post-drilling and prior to departing the location to verify drill cuttings dispersion modelling predictions;
		  ○ survey of benthic fauna present after drilling has been concluded;
		  ○ reporting of results, including a comparison of modelling results to in situ results, to the C-NLOPB and DFO; and
		  ○ results should be provided to Indigenous groups and posted online for public access;
		• contribute to research on the presence and distribution of Atlantic Salmon in Eastern Canadian offshore areas and update the C-

Valued Component (VC)	Mitigation	Follow-up
	Retain a qualified independent marine scientist to provide advice in real-time; • provide the results of the seabed investigation survey to the C-NLOPB and DFO prior to commencing drilling. In addition, provide a description of additional mitigation and monitoring based on the results of the survey and predicted areas of sedimentation and disturbance. Results of the surveys should be provided to Indigenous groups and posted online for public access; • if aggregations of habitat-forming corals or sponges or other environmentally sensitive features are identified when undertaking the survey: ○ relocate the anchors or the well and/or redirect cuttings discharges to ensure that the MODU, anchors or drilling muds and cuttings discharges will not affect them, unless not technically feasible. No drilling should occur before a decision is made by the C-NLOPB and DFO regarding appropriate mitigation and monitoring; or ○ if it is determined, to the C-NLOPB's satisfaction, that it is not technically feasible to relocate the anchors or the well or redirect cuttings discharges, conduct a comprehensive assessment of the potentially-affected benthic habitat in consultation with DFO prior to drilling to determine the potential for non-compliance with the fish and fish habitat protection provisions of the Fisheries Act and related options for mitigation to reduce any identified risk. Consultation with DFO shall include mitigation options to reduce any identified risk to	NLOPB and Indigenous groups annually on research activities. Research initiatives can be explored through organizations such as the ESRF and through input from and collaboration with Indigenous groups; and • implement the follow-up measures listed in Section 4.2 Marine Mammals and Sea Turtles related to the verification of underwater sound as a result of the Project.

Valued Component (VC)	Mitigation	Follow-up
	habitat-forming coral and sponge aggregations or other environmentally sensitive features in accordance with the provisions of *the Fisheries Act*; • select chemicals to be used during the Project in accordance with the *Offshore Chemical Selection Guidelines* and use lower toxicity drilling muds and biodegradable and environmentally-friendly additives within muds and cements; • ensure that all discharges from the MODU meet the *Offshore Waste Treatment Guidelines*; • transport spent or excess synthetic-based muds that cannot be re-used during drilling operations to shore for disposal at an approved facility; • ensure that all discharges from supply vessels meet or exceed the standards established in the MARPOL; • conduct a pre-drill survey with qualified individual(s) at each well site to determine the presence of any unexploded ordnance or other seabed hazards. If any such ordnance or seabed hazard is detected, avoid disturbing or manipulating it and contact the nearest Joint Rescue Coordination Centre and the C-NLOPB prior to commencing drilling to determine an appropriate course of action; and • implement mitigation listed in Section 4.2 Marine Mammals and Sea Turtles related to the conduct of VSP surveys.	

Valued Component (VC)	Mitigation	Follow-up

Marine Mammals and Sea Turtles (Section 4.2)	• conduct VSP surveys in accordance with or exceeding the *Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment*, including:
	  ○ establishing a safety (observation) zone of a minimum of 500 metres around the sound source;
	  ○ implementing cetacean detection technology, such as passive acoustic monitoring, concurrent with visual observations;
	  ○ gradually increasing the sound source intensity over a period of at least 20 minutes (ramp up), adopting a pre-ramp up watch of 60 minutes whenever survey activities are scheduled to occur and delaying ramp up if a marine mammal or sea turtle is observed within the safety zone; and
	  ○ shutting down the sound source upon observing or detecting any marine mammal or sea turtle within the 500-metre safety zone;
	• to reduce risks of collisions with marine mammals and sea turtles (except during an emergency):
	  ○ limit supply vessels movement to established shipping lanes where they are available; and
	  ○ when and where such speeds do not present a risk to safety of navigation, reduce supply vessel speed to seven knots (13 kilometres per hour) when a marine mammal or sea turtle is observed or reported within 400 metres of the vessel;
	• in consultation with DFO, develop a Marine Mammal and Sea Turtle Monitoring Plan which includes marine
		• record and report the activities, observations and results of the Marine Mammal and Sea Turtle Monitoring Plan to the C-NLOPB and DFO;
		• promptly report any collisions with marine mammals or sea turtles to the C-NLOPB, DFO and the Canadian Coast Guard Environmental Emergencies Reporting Number (1 800 565-1633) and notify Indigenous groups;
		• verify effects predictions related to underwater sound levels with field measurements during the first well in the exploration licence. Provide the plan on how this would be conducted to the C-NLOPB and DFO in advance of drilling and the monitoring results after well suspension or abandonment, as directed by C-NLOPB and DFO; and
		• provide follow-up program results to Indigenous groups and post online for public access.

Valued Component (VC)	Mitigation	Follow-up
	mammal observer requirements using qualified individuals. Provide the plan to the C-NLOPB and DFO for review and approval 30 days prior to initiating activities. The plan would describe: ○ monitoring during VSP surveys, including information on visual monitoring and specific passive acoustic or equivalent technology monitoring configuration that would be implemented, to enable verification that species that may occur within the safety zone can be detected and to ensure the ability to effectively monitor for all marine mammal vocalization frequencies that may occur within the exploration licences; • implement all mitigation listed in Section 4.1 Fish and Fish Habitat related to abandonment procedures, chemical selection, disposal of spent synthetic-based muds and waste discharge.	
Migratory Birds (Section 4.3)	• follow ECCC's (2016) *Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada*, which identifies procedures for safe capture and handling of different types of birds; • control project lighting, including the direction, timing, intensity and glare of light fixtures, while meeting operational, health and safety requirements; • where acceptable to the C-NLOPB, conduct formation testing while tripping, or similar technology, rather than formation testing with flaring;	• prepare a follow-up program in consultation with ECCC that includes: ○ monitoring for marine birds at the MODU and support vessels using a trained observer whose primary responsibility is observing migratory seabirds and who follows ECCC's *Eastern Canada Seabirds at Sea Standardized Protocol for Pelagic Seabird Surveys from Moving and Stationary Platforms* (Gjerdrum et al. 2012) and makes observations and collects migratory seabird survey data during these activities; ○ developing and implementing a protocol for systematic daily monitoring of the MODU and supply vessels for the

Valued Component (VC)	Mitigation	Follow-up

	• limit the duration of flaring to the length of time required to characterize the wells' hydrocarbon potential;
	• if formation testing while flaring is required, notify the C-NLOPB to request an authorization at least 30 days in advance of flaring to:
	  ○ determine whether the flaring would occur during a period of migratory bird vulnerability (identified in consultation with ECCC); and
	  ○ identify how adverse environmental effects on migratory birds would be avoided, including opportunities to reduce nighttime flaring (e.g., by commencing flaring as early as practicable during daylight hours) and reduce flaring in poor weather conditions);
	• operate a water-curtain barrier around the flare during flaring;
	• include awareness regarding seabird strandings as part of overall training/orientation programs for offshore workers; and
	• implement all mitigation listed in Section 4.1 Fish and Fish Habitat related to chemical selection, waste discharge and the disposal of spent synthetic-based muds, as well as those in Section 4.4 Special Areas related to the maintenance of buffers for supply and support vessels and helicopters over active bird areas and special areas for birds.
		presence of stranded birds. The protocol would include information on the frequency of searches, reporting procedures and training requirements, including qualifications of those delivering the training;
		• when flaring occurs, have a dedicated trained observer monitor and document bird behaviour around the flare, and assess the effectiveness of water curtains and flare shields in mitigating interactions between migratory birds and flares;
		• if stranded birds are observed, follow ECCC's (2016) *Procedures for Handling and Documenting Stranded Birds Encountered on Infrastructure Offshore Atlantic Canada*;
		• document and report the results of any monitoring carried out, including information on the level of effort when no birds are found and a discussion of whether the mitigation measures (e.g., water curtain) were proven effective and if additional measures are required;
		• incorporate any technology (e.g., radar, infrared imaging, high definition aerial surveys, telemetry studies, etc.) that becomes available into seabird monitoring to complement research on the mitigation of light attraction;
		• document any changes made to lighting regimes to allow for an evaluation of the effectiveness of the change in mitigating light attraction;
		• contribute to a research program to identify changes in light spectrum, type and/or intensity that may further reduce attraction for storm-petrels and other seabirds; and
		• provide the monitoring and follow-up program and its results to the C-NLOPB and ECCC. Results should be provided to Indigenous groups and posted online for public access;

Valued Component (VC)	Mitigation	Follow-up
Special Areas (Section 4.4)	• restrict helicopter flying altitude to a minimum altitude of 300 metres (except during take-off and landing) over active bird colonies and to a lateral distance of 1000 metres from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas (unless there is an emergency situation); • ensure supply and other support vessels maintain a 300-metre buffer from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas (unless there is an emergency situation); and • implement all mitigation listed in Section 4.1 Fish and Fish Habitat, Section 4.2 Marine Mammals and Sea Turtles, Section 4.3 Migratory Birds and Section 4.6 Commercial Fisheries.	• conduct specific follow-up monitoring when drilling in special areas, or adjacent to or near a special area, such that drill cuttings dispersion modelling predicts that cuttings deposition could occur within the special area at a level above the biological effects threshold. Monitoring would include: ○ measurement of sediment deposition extent and thickness post-drilling and prior to departing the location to verify drill cuttings dispersion modelling predictions; ○ survey of benthic fauna present after drilling has been concluded; ○ reporting of results, including a comparison of modelling results to in situ results, to the C-NLOPB and DFO; and ○ results should be provided to Indigenous groups and posted online for public access.
Federal Species at Risk (Section 4.5)	The Agency is of the view that the measures to mitigate potential effects on fish and fish habitat (Section 4.1), marine mammals and sea turtles (Section 4.2), and migratory birds (Section 4.3) would also mitigate potential effects on species at risk and critical habitat.	The Agency is of the view that that the proposed follow-up measures for fish and fish habitat, marine mammals and sea turtles, and migratory birds are also appropriate for the species at risk and critical habitat identified in this section.
Commercial Fisheries (Section 4.6)	• in consultation with Indigenous groups and commercial fishers, develop and implement a Fisheries Communication Plan to address communications prior to and during drilling, testing and abandonment of each well. The plan should include: ○ a description of planned project activities; ○ information on safety exclusions zones and suspended and abandoned wellheads;	• report annually to the C-NLOPB on incidents of lost or damaged fishing gear associated with the Project, including project-related vessels, and make this information available to Indigenous groups and commercial fishers. In addition, the envisioned Fisheries Communication Plan would provide a means of identifying potential issues recognized during the project.

Valued Component (VC)	Mitigation	Follow-up
	○ information on vessels travelling between Newfoundland and Labrador and exploration licences (e.g., number per week, general route); ○ procedures to notify fishers a minimum of two months prior to the start of drilling each well; ○ regular updates to provide specific information on plans for project activities and an opportunity for feedback and further exchange of information on specific aspects of interest; ○ procedures for determining the need for a Fisheries Liaison Officer and/or fisheries guide vessels during MODU movement and the use of a Fisheries Liaison Officer during geophysical programs; ○ procedures to notify Indigenous groups and commercial fishers in the event of a spill and communicate the results of monitoring of its potential adverse effects on the environment and human health; ○ procedures to engage in two-way communication with Indigenous groups and commercial fisheries during a tier 2 or tier 3 spill;[14] • prepare a well abandonment plan, including a wellhead abandonment strategy and submit it to the C-NLOPB for acceptance at least 30 days prior to abandonment of	

[14] Tier 2 and tier 3 responses are defined in the International Association of Oil & Gas Producers' document *Tiered Preparedness and Response* (International Association of Oil & Gas Producers, 2015).

Valued Component (VC)	Mitigation	Follow-up
	each well. If it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with commercial fishing, develop the strategy in consultation with potentially affected Indigenous groups and commercial fishers; • ensure that details of safety exclusion zones and the locations of abandoned wellheads, if left on the seafloor, are published in Notices to Mariners, provided in Notices to Shipping and communicated to fishers; • provide information on the locations of any abandoned wellheads, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning; • ensure ongoing communication with the NAFO Secretariat, using established information exchange mechanisms that are in place with DFO, regarding planned project activities, including timely communication of drilling locations, safety exclusion zones and suspended or abandoned wellheads; and • implement all mitigation listed in Section 4.1 Fish and Fish Habitat related to providing the results of the seabed investigation survey, wellhead abandonment procedures, selection of chemicals, disposal of spent synthetic-based muds and the discharge of waste. The Agency also notes that the proponent has committed to developing a compensation program, to be developed in consideration of the C-NLOPB's *Compensation Guidelines Respecting Damages Relating to Offshore*	

Valued Component (VC)	Mitigation	Follow-up
	Petroleum Activities to address any unplanned interactions between the Project and commercial fishing equipment.	
Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples (Section 4.7)	The Agency is of the view that the measures to mitigate effects on fish and fish habitat (Section 4.1), marine mammals and sea turtles (Section 4.2), migratory birds (Section 4.3) and commercial fisheries (Section 4.6) would also mitigate effects on the current use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples.	The Agency has not identified any follow-up measures specific to current use of lands and resources for traditional purposes and health and socioeconomic conditions of Indigenous peoples and notes that there are related measures proposed for fish and fish habitat (Section 4.1), marine mammals and sea turtles (Section 4.2), migratory birds (Section 4.3) and commercial fisheries (Section 4.6).
Accidents and Malfunctions (Section 5.1)	• undertake all reasonable measures to prevent accidents and malfunctions that may cause adverse environmental effects and effectively implement emergency response procedures and contingencies developed for the Project; • submit a Well Capping and Containment Plan, which includes strategies and measures for well capping, containment of fluids lost from the well and the drilling of a relief well(s), as well as options to reduce overall response timelines. The Well Capping and Containment Plan must include procedures to provide up-to-date information to the C-NLOPB prior to drilling and at regular intervals during drilling, related to the availability of appropriate capping stacks and vessels, and appropriate drilling rigs capable of drilling a relief well at the project site; • prior to drilling, submit a Spill Response Plan that takes into account the results of spill modelling and must include:	• as required by and in consultation with the C-NLOPB, monitor the environmental effects of a spill on components of the marine environment until specific endpoints identified in consultation with expert government departments are achieved. As applicable, monitoring shall include: ○ sensory testing of seafood for taint and chemical analysis for oil concentrations and any other contaminants, as applicable; ○ measuring levels of contamination in recreational, commercial and traditionally harvested fish species with results integrated into a human health risk assessment to be submitted to relevant authorities including those responsible for fishing area closures; ○ monitoring marine mammals, sea turtles and birds for signs of contamination or oiling and reporting results to the C-NLOPB;

Valued Component (VC)	Mitigation	Follow-up
	○ procedures to respond to an oil spill (e.g., oil spill containment, oil recovery) and spills of other types (e.g., synthetic-based mud or cuttings spill); ○ reporting thresholds and notification procedures; ○ measures for wildlife response, protection and rehabilitation (e.g., collection and cleaning of marine mammals, birds and sea turtles, including species at risk) and for shoreline protection and clean-up, developed in consultation with the C-NLOPB and ECCC; ○ specific role and responsibility descriptions for offshore operations and onshore responders and the list of authorities to notify of a spill, including when they will be notified and the means to notify them; • provide Indigenous groups with an opportunity to review and provide feedback on a draft version of the Spill Response Plan. Provide the approved version to Indigenous groups, and make it publicly available on the Internet prior to drilling; • conduct an exercise of the Spill Response Plan prior to the commencement of project activities and adjust the plan to address any deficiencies identified during the exercise. Provide results of the exercise and any subsequent updates to Indigenous groups following review by the C-NLOPB; • review and update the Spill Response Plan as required during drilling and before commencing a new well, and provide the update to Indigenous groups;	○ monitoring benthic organisms and habitats in the event of a synthetic-based mud spill or other event that could result in smothering or localized effects to the benthic environment; and • develop a procedure to communicate monitoring results to Indigenous and commercial fishers, as well as Indigenous groups.

Valued Component (VC)	Mitigation	Follow-up
	• prepare a plan for avoidance of collisions with vessels and other hazards which may reasonably be expected in the exploration licences and submit to the C-NLOPB for acceptance prior to drilling; • undertake a spill impact mitigation assessment to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences and provide it to the C-NLOPB for review. Relevant federal government departments would provide advice to the C-NLOPB through the ECCC Environmental Emergency Science Table. Publish the spill impact mitigation assessment on the Internet; • in the event of an uncontrolled subsea release from the well, begin the immediate mobilization of a capping stack and associated equipment to the site of the uncontrolled subsea release. Simultaneously, commence the mobilization of a relief well MODU; • if drilling is anticipated in water depths of 500 metres or less, undertake further analysis to confirm the capping stack technology selected can be deployed and operated safely at the proposed depth and submit this analysis to the C-NLOPB for approval; • compensate for any damages, including the loss of food, social and ceremonial fisheries in accordance with the Compensation Guidelines Respecting Damages Relating to Offshore Petroleum Activity; • include in the Fisheries Communication Plan a procedure to notify fishers in the event of an accident or	

Valued Component (VC)	Mitigation	Follow-up
	malfunction and communicate the results of any associated monitoring and any potential health risks. Information that is provided to Indigenous groups and fishers needs to present a realistic estimation of potential health risks on consuming country foods, such that their consumption is not reduced unless there is a likely health risk from the consumption of these foods or specific quantities of these foods. If there is a potential health risk, consumption advisories should be considered; and • include procedures in the Fisheries Communications Plan to engage in two-way communication with Indigenous groups and commercial fishers in the event of a spill requiring a tier 2 or tier 3 response.	
Effects of the Environment on the Project (Section 5.2)	• in consultation with the C-NLOPB and ECCC, develop and implement a physical environment monitoring program in accordance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations* and meet or exceed the requirements of the *Offshore Physical Environmental Guidelines*; • in consultation with the C-NLOPB, establish and enforce practices and limits for operating in all conditions that may be reasonably expected, including poor weather, severe sea state, or sea ice or iceberg conditions; • in consultation with the C-NLOPB and as part of the required Safety Plan, develop an Ice Management Plan including procedures for detection, surveillance, data collection, reporting, forecasting and avoidance or deflection of icebergs; and	• in accordance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations*, report annually to the C-NLOPB on whether there has been a need to modify operations based on severe environmental conditions and on the efficacy of the practices and limits established for operating in poor weather, high sea state, or sea ice or iceberg conditions.

Valued Component (VC)	Mitigation	Follow-up
	• in consultation with the C-NLOPB, implement measures to ensure that the MODU has the ability to quickly disconnect the riser from the well in event of an emergency or severe weather conditions.	
Cumulative Environmental Effects (Section 5.3)	Mitigation measures for this Project would contribute to the mitigation or monitoring of cumulative environmental effects.	Follow-up and monitoring measures for this Project would contribute to the mitigation or monitoring of cumulative environmental effects.

Appendix B: Agency Rationale for Selection of Valued Components and Corresponding Valued Components Selected by the Proponent

Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected by the proponent
Effects identified under subsection 5(1) of CEAA 2012			
Fish and Fish Habitat	Yes	Included due to the ecological importance and legislated protection of fish and fish habitat, as well as associated species at risk, and the socioeconomic importance of fisheries resources. There is also a high likelihood of project-valued component interactions. Includes corals and sponges.	Marine Fish and Fish Habitat (including Species at Risk)
Marine Plants	Yes	Potential effects on marine plants were included in the Agency's assessment of effects on fish habitat.	Marine Fish and Fish Habitat (including Species at Risk)
Marine Mammals and Sea Turtles	Yes	Included due to the ecological importance and legislated protection of marine mammals, as well as associated species at risk. There is also a high likelihood of project-valued component interactions.	Marine Mammals and Sea Turtles (including Species at Risk)
Migratory Birds	Yes	Included due to the ecological importance and legislated protection of migratory birds, as well as associated species at risk. There is also a high likelihood of project- valued component interactions.	Marine and Migratory Birds (including Species at Risk)
Current Use of Lands and Resources for Traditional Purposes and Health and Socioeconomic Conditions of Indigenous Peoples	Yes	Migratory species of importance to Indigenous communities (e.g., Atlantic Salmon, some species of migratory birds), may pass through the project area before moving to areas subject to traditional harvesting. Indigenous fisheries or harvesting could also be affected by an accident or malfunction associated with the Project. The contamination (or perception thereof) of fish and seafood in the event of a major spill could affect country food consumption in some Indigenous communities. Indigenous communal commercial fishing licences overlap with the exploration licences included in the Project. These were considered in the Agency's assessment of effects on commercial fishing (below).	Indigenous Communities and Activities; Commercial Fisheries and Other Ocean Users

Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected by the proponent
Effects identified under subsection 5(1) of CEAA 2012 (continued)			
Physical or Cultural Heritage of Indigenous Peoples and Historical, Archaeological, Paleontological or Architectural Sites or Structures of Indigenous Peoples	No	The exploration licences would be located approximately 375 kilometres offshore. Project activities and components are not anticipated to result in any changes to the environment that would have an effect on physical and cultural heritage.	None
Special Areas (Marine)	Yes	There are several marine special areas that may be affected by the Project.	Special Areas
Air Quality and Greenhouse Gas Emissions	No	During offshore exploration drilling, routine (i.e., exhaust from MODU, supply vessels and aircraft) and non-routine activities would result in emissions of greenhouse gases. While there are direct emissions of greenhouse gases from the Project, there are no upstream emissions (i.e., emissions from other projects or industrial activities that could occur earlier in the lifecycle of a resource or other product). The Project would be short-term and routine activities would contribute a relatively small amount to provincial and national total annual emissions). The overall greenhouse gas emissions over the Project are estimated to be between approximately 345 906 and 518 532 tonnes of total carbon dioxide equivalent (annual average between approximately 141 615 and 207 036 tonnes of total carbon dioxide equivalent annually). This would represent between approximately 1.3 and 1.9 percent of Newfoundland and Labrador's average annual greenhouse gas emissions, and approximately 0.020 to 0.30 percent of Canada's annual emissions. Industrial facilities that emit more than 10 000 tonnes of carbon dioxide equivalent per year are required to quantify and report greenhouse gas emissions to Environment and Climate Change Canada (ECCC 2018).	None

Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected by the proponent
		The Project would adhere to applicable regulations and standards, including the Newfoundland and Labrador Air Pollution Control Regulations; the federal National Ambient Air Quality Objectives and the Canadian Ambient Air Quality Standards; and regulations and emission limits under the International Convention for the Prevention of Pollution from Ships (MARPOL). Given its location approximately 375 kilometres offshore, the project area is not close to permanent receptors sensitive to atmospheric emissions.	
Effects identified under subsection 5(2) of CEAA 2012			
Commercial Fisheries	Yes	The project area overlaps with commercial fishing activity, including potential Indigenous communal commercial fishing, which could be affected by routine operations (e.g., safety exclusion zones) or by accidental events.	Commercial Fisheries and Other Ocean Uses
Recreational Fisheries	No	There is no known recreational fishing activity within the project area which is approximately 375 kilometres offshore from the island of Newfoundland. There are recreational fisheries in nearshore and coastal waters. Routine project activities and components are not expected to interfere with nearshore recreational fisheries beyond current levels because supply vessels would use existing routes and harbour approaches, avoiding interference with nearshore activities outside the approaches. Nearshore recreational fishing may be affected by accidental events associated with the Project. Measures proposed to mitigate effects on fish and fish habitat and commercial fisheries would mitigate similar environmental effects on recreational fisheries.	Commercial Fisheries and Other Ocean Uses
Special Areas (Coastal)	Yes	There are several coastal areas of importance in the regional study area. These may be affected by the Project in the event of an unmitigated subsea blowout.	Special Areas
Human Health	No	Other than human presence on MODUs, there is intermittent human presence on fishing and other vessels in the exploration licences, approximately 375 kilometres from the island of Newfoundland. Therefore, routine project activities would not expose the general public to a health risk. Similarly, the distance from land and anticipated spill	None

Environmental component	Included in Agency's analysis?	Agency rationale	Corresponding valued component selected by the proponent
		trajectories in the event of a large-scale spill offshore would have low potential for shoreline oiling and associated effects on coastal communities and human health.	
Effects identified under subsection 79(2) of the *Species at Risk Act*			
Federal Species at Risk	Yes	The *Species at Risk Act* requires consideration of listed species when conducting an EA under CEAA 2012. The Agency also examined effects on species assessed by the COSEWIC as endangered, threatened or of special concern.	Incorporated within analyses of effects on fish and fish habitat, marine mammals and sea turtles, and migratory birds.

Appendix C: Summary of Indigenous Concerns

The table below provides a summary of concerns raised by Indigenous groups and the Agency's responses. This table is not intended to be a cumulative collection of all concerns raised across the exploration drilling projects, but a summary of key concerns and the Agency's responses. The concerns were raised during comment periods and other opportunities for input that occurred during the EA for this project or previous Eastern Newfoundland Offshore exploration drilling projects. Similarly, the Agency's responses are informed by information received on this and previous projects, from proponents' EISs, responses to information requirements where applicable, Indigenous groups' comments and federal authorities' information.

Source	Subject	Comment or Concern	Agency Response
Fish and Fish Habitat			
KMKNO MTI Les Innus de Ekuanitshit Qalipu First Nation WNNB	Effects on American Eel	Concern related to potential changes to habitat quality (e.g., due to noise from drilling or seismic), food availability and quality, and migration patterns. This species has particular cultural importance for Indigenous communities, and any increase in potential threats to it as a result of the Project should be carefully assessed and mitigated. Further research on American Eel should be carried out to help fill data gaps related to this species. Additional information on avoidance and mitigation measures for the American Eel is required.	DFO reviewed applicable information on American Eel and advised the Agency that the mitigation measures, monitoring and follow-up programs proposed by the proponent and recommended by the Agency would adequately address the potential effects of the Project on fish and fish habitat, including American Eel. The Agency has identified key mitigation measures and proposed EA conditions for fish and fish habitat and marine mammals and sea turtles, which would mitigate effects on American Eel. These are described in Sections 4.1, 4.2, and Appendix A, and include selecting chemicals to be used in accordance with the *Offshore Chemical Selection Guidelines,* using lower toxicity drilling muds and biodegradable and environmentally friendly additives within muds and cements where feasible, and ensuring that all discharges from a MODU meet the *Offshore Waste Treatment Guidelines*.
Elsipogtog First Nation	Effects on Atlantic Salmon	Concern about potential impacts of the Project on migrating Atlantic Salmon	DFO reviewed applicable information and confirmed that there is uncertainty regarding the

Source	Subject	Comment or Concern	Agency Response
Innu Nation KMKNO L'nuey Les Innus de Ekuanitshit Miawpukek First Nation MMS MTI Millbrook First Nation NunatuKavut Community Council Première Nation des Innus de Nutashkuan Qalipu First Nation WNNB Woodstock First Nation		populations and the Aboriginal right to fish this species. Effects may include those related to project-related sound, increased shipping, and accidents and malfunctions. The precautionary principle should be considered in the assessment owing to the declining status of populations, including several being designated as endangered, the lack of data on migration routes and overwintering locations, the high rates of at-sea mortality, climate change and the lack of information on specific effects of offshore drilling on this species. Appropriate mitigation and accommodation measures should be outlined. Recommended that no activities take place between January-August so as not to interact with Atlantic Salmon.	at-sea migration patterns and habitat use of this species. It advised that it is possible that some salmon overwinter in the Jeanne d'Arc Basin/Flemish Pass region and that salmon are likely to be present at some times of the year as they migrate through to and from home rivers but this is not known to be a significant migration route or overwintering area. The Agency acknowledges the proponent's commitments to pursuing ongoing research related to Atlantic Salmon migration and behaviour at sea. The Agency is of the view that a complete ban on activities between January and August would be impractical and unnecessary. DFO has advised that potential effects of the Project on Atlantic Salmon are expected to be negligible to low and spatially and temporally limited. The Agency has identified key mitigation measures and proposed EA conditions for fish and fish habitat and marine mammals and sea turtles, which would mitigate effects on Atlantic Salmon. These are described in Sections 4.1, 4.2 and Appendix A, and include selecting chemicals to be used in accordance with the *Offshore Chemical Selection Guidelines*, using lower toxicity drilling muds and biodegradable and environmentally friendly additives within muds and cements where feasible, and ensuring that all discharges from a MODU meet the *Offshore Waste Treatment Guidelines*.

Source	Subject	Comment or Concern	Agency Response
Elsipogtog First Nation KMKNO Miawpukek First Nation MTI Première Nation des Innus de Nutashkuan WNNB Woodstock First Nation	Atlantic Salmon - follow-up and monitoring	Given the lack of data on Atlantic Salmon in the project area and their migration, as well as uncertainty with respect to impact predictions, it is recommended that follow-up monitoring for the potential presence of Atlantic Salmon in the project area be implemented. The proponent should provide funding for tracking studies of Atlantic Salmon (e.g., using satellite pop-up tags) to be completed before any exploration activities take place. Installation of acoustic receivers on the MODUs should be considered. Potential research collaborations should consider that key concerns and research priorities would differ amongst Indigenous communities. Given the proposed work by the Atlantic Salmon Federation, it would be prudent to maximize resources and efforts and collaborate with them to collect biological samples (e.g., Atlantic Salmon scales and fin tissue, phytoplankton, zooplankton) from all their tagged individuals/sampling locations to build upon the previous work of Soto et al. (2018) to better understand feeding and resource use. This information cannot be provided by telemetry studies.	The Agency notes that, to address knowledge gaps regarding Atlantic Salmon migration identified during this and other EAs of exploration projects in offshore Newfoundland and Labrador, the ESRF issued a call for proposals for environmental and social studies related to Atlantic Salmon. The selection process for research proposals is ongoing. Please check for announcements regarding the selected program, on the ESRF's website at: https://www.esrfunds.org/181
Elsipogtog First Nation	Atlantic Salmon, Swordfish, Bluefin	Indigenous knowledge about Atlantic Salmon, Swordfish, and Bluefin Tuna	Section 4.2.2 of the *Guidelines for the Preparation of an Environmental Impact*

Source	Subject	Comment or Concern	Agency Response
Innu Nation Miawpukek First Nation Millbrook First Nation MTI NunatuKavut Community Council Qalipu First Nation	Tuna - Indigenous Knowledge	populations has not been factored into management planning and EAs. Indigenous traditional and ecological knowledge regarding aquatic, nearshore and offshore environments should be considered and integrated into the EAs.	*Statement* for offshore oil and gas exploration projects stipulates the following related to traditional (Indigenous) knowledge: "The proponent will incorporate into the EIS the community knowledge and Aboriginal traditional knowledge to which it has access or that is acquired through public participation and engagement with Indigenous groups, in keeping with appropriate ethical standards and obligations of confidentiality." The Agency is of the opinion that this proponent and other offshore oil and gas proponents have - to the best of their ability - incorporated the available Indigenous knowledge into their project EAs. The Agency also acknowledges that Indigenous groups would like to see more Indigenous knowledge being used in EAs for offshore oil and gas projects.
KMKNO Les Innus de Ekuanitshit MTI NunatuKavut Community Council Première Nation des Innus de Nutashkuan	Effects assessment-Indigenous knowledge	Indigenous knowledge must be applied in conducting EAs to accurately determine the impacts to Aboriginal rights and to assist in the development of mitigation and monitoring. Indigenous knowledge can also contribute to providing an ecosystem perspective in EAs and follow-up. Proponents should expand their understanding of Indigenous knowledge as a system of knowledge that is inclusive of values and beliefs. If specific studies on current use of lands and resources for traditional	Proponents are directed by the Agency to engage Indigenous communities in the preparation of the EIS and consider Indigenous knowledge in their studies/analyses. The Agency has considered comments received from Indigenous groups following their reviews of the EISs. The Agency received additional information while conducting previous exploration drilling EAs. The Agency also consulted Indigenous groups through phone calls, emails, letters and in-person meetings. For example, the Agency organized four information sessions with Indigenous groups in October 2017, in which the proponent also participated.

Source	Subject	Comment or Concern	Agency Response
		purposes are not undertaken as part of the EA, rationale for not undertaking these studies should be provided, particularly given that Indigenous harvesting activities in the vicinity of shorelines could be impacted by an oil spill.	The Agency received a copy of the Indigenous Knowledge Study completed by MTI in August 2018 and considered the information presented in its analysis.
KMKNO Miawpukek First Nation Première Nation des Innus de Nutashkuan	Primary and secondary productivity of marine ecosystems	Concern related to potential effects of the Project on primary and secondary productivity of marine ecosystems, including on zooplankton and forage fish such as capelin. The proponent should provide additional information on these effects and how they may affect marine ecosystems and food sources.	The Agency has identified key mitigation measures and proposed EA conditions related to fish and fish habitat. These are described in Section 4.1 and Appendix A and include selecting chemicals to be used in accordance with the *Offshore Chemical Selection Guidelines,* using lower toxicity drilling muds and biodegradable and environmentally friendly additives within muds and cements where feasible*,* transporting spent or excess synthetic-based mud that cannot be re-used during drilling operations to shore for disposal at an approved facility, and ensuring that all discharges from a MODU meet the *Offshore Waste Treatment Guidelines*.
KMKNO Miawpukek First Nation Qalipu First Nation WNNB	Effects on corals and sponges	It is unclear how the proponent would avoid or mitigate harm to corals and sponges where they are observed in proximity to a proposed well site. Recommend pre-drill surveys leading to avoidance as key mitigation. Seabed investigation should be conducted via underwater video system (not via drop camera/video system) at each well site and mooring location and not only in areas where coral gardens or sponge	The Agency has identified key mitigation measures, follow-up requirements and proposed EA conditions that would require the proponent to prepare a pre-drill seabed investigation for each well site and submit to DFO and the C-NLOPB for review prior to implementing the survey. The survey would include the collection of high-definition visual data to confirm the presence or absence of sensitive environmental features, including aggregations of habitat-forming corals or sponges, around well sites and anchor/mooring locations.

Source	Subject	Comment or Concern	Agency Response
		grounds are known or likely to be present. A fish habitat compensation plan should be required for the loss of fish habitat on sea bed from drilling activities. Concern related to the cumulative loss of corals and sponges from the hundreds of wells that have been drilled in the Newfoundland offshore area. The cumulative footprint of all the wells should be estimated and the cumulative loss in coral and sponge ecosystem function should be described.	If aggregations of habitat-forming corals, sponges or other environmentally sensitive features are identified, the proponent would be required to relocate the well or redirect cuttings discharges, if technically feasible. No drilling would occur before a decision is made by the C-NLOPB and DFO that mitigation and monitoring are appropriate. If it were determined, to the C-NLOPB's satisfaction, that it would not be technically feasible to relocate the well or redirect cuttings discharges, the proponent would be required to conduct a comprehensive assessment of the potentially-affected benthic habitat in consultation with DFO prior to drilling to determine the potential for serious harm or alteration of coral and sponge aggregations and related options for mitigation to reduce any identified risk. For the first well on each exploration licence, for any well where drilling is undertaken in an area determined by pre-drill seabed investigations to be sensitive benthic habitat, or for any well where drilling is undertaken in a special area, the proponent would also be required to conduct specific follow-up monitoring to verify drill waste deposition modelling predictions. Results of pre-drill seabed investigations and follow-up monitoring would be provided to Indigenous groups and posted online for public access. Cumulative environmental effects of the Project are discussed in Section 5.3 of the EA Report. Two historical wells were drilled within each of the two exploration licences. If all six potential

Source	Subject	Comment or Concern	Agency Response
			exploration wells were drilled in one of the exploration licences, the maximum area covered with drill cuttings above the no-effects threshold would be 0.38 square kilometres or 0.024 and 0.015 percent of the total area of exploration licences 1159 and 1160, respectively. Further, cumulative environmental effects on corals and sponges are predicted to be unlikely or minimal given the requirement for the proponent to relocate drilling activities or discharges, as required, if aggregations of coral and sponges or other environmentally-sensitive species are identified during pre-drill surveys. The Agency is of the view that the mitigation, follow-up and monitoring for this Project would also contribute to the mitigation and monitoring of cumulative environmental effects.
KMKNO Miawpukek First Nation MTI NunatuKavut Community Council	Routine discharges	Concerned about impacts of routine discharges to the environment. Recommend that the proponent undertakes follow-up monitoring to detect the accumulation of any contaminants in marine organisms. Proponent should be required to use the least harmful drilling fluid regardless of cost.	The Agency has identified key mitigation measures and proposed EA conditions that would mitigate the effects of drilling wastes and marine discharges on the marine environment. These are described in Section 4.1 and Appendix A. The proponent would be required to: • select chemicals in accordance with the *Offshore Chemical Selection Guidelines* and use lower toxicity drilling muds and biodegradable and environmentally friendly additives within muds and cements where feasible; • ensure that all discharges meet the *Offshore Waste Treatment Guidelines;*

Source	Subject	Comment or Concern	Agency Response
			• transport spent or excess synthetic-based mud that cannot be re-used during drilling operations to shore for disposal at an approved facility; and • ensure that all discharges from supply vessels meet or exceed the standards established in the MARPOL. The proponent would be required to monitor the concentration of synthetic-based mud on drill cuttings to verify compliance with the performance target specified in the *Offshore Waste Treatment Guidelines.*
KMKNO	Drill waste dispersion modelling	The proponent should verify and validate the drill cuttings dispersion modelling predictions. Such a follow-up program should not, as the proponent proposes, be dependent on specific circumstances. The monitoring program should be conducted via seabed video and/or benthic sampling to determine, among other things, infaunal recolonization rates following drilling.	The Agency identified follow-up requirements to ensure the effectiveness of mitigation measures and to verify the accuracy of predictions of effects on benthic species and habitats. These are described in Section 4.1 and Appendix A and include: • providing the results of pre-drill seabed investigations to DFO and the C-NLOPB prior to commencing drilling and to Indigenous groups after each well is suspended and/or abandoned. Results would also be posted online; and • for the first well on each exploration licence and for any well where drilling is undertaken in an area determined by pre-drill seabed investigations to be sensitive benthic habitat, measuring sediment deposition extent and

Source	Subject	Comment or Concern	Agency Response
			thickness after drilling is complete and prior to departing the location to verify drill cuttings deposition modelling predictions. Results would be provided to Indigenous groups and posted online for public access.
Marine Mammals and Sea Turtles			
KMKNO Miawpukek First Nation WNNB	Effects of noise on marine mammals	Concerns related to the effects of noise, including noise from VSP surveys, on marine mammals and sea turtles. The proponent should implement measures to minimize impacts on marine mammals and sea turtles during VSP. Observers able to identify sensitive or protected species should be posted on watch during surveys. In addition, given the likely presence of endangered or threatened marine mammal species (and possible presence of Right Whales), the proponent should be required to employ passive acoustic monitoring or equivalent technology before and throughout vertical seismic profiling surveys, during periods of low visibility when observers cannot effectively observe the entire safety zone (e.g., periods of fog, at night). Dedicated marine mammal and sea turtle baseline studies should be used to determine the distribution,	The Agency has identified key mitigation measures and follow-up requirements and proposed EA conditions that would mitigate the potential effects of VSP on marine mammals and sea turtles. These measures are described in Section 4.2 (marine mammals and sea turtles) and Appendix A and include: • conducting VSP surveys in accordance with the Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment; • establishing a safety (observation) zone of a minimum of 500 metres around the sound source; • implementing cetacean detection technology, such as passive acoustic monitoring, concurrent with visual observations; • shutting down the sound source upon observing or detecting any marine mammal or sea turtle within the 500 metre safety zone;

Source	Subject	Comment or Concern	Agency Response
		occurrence and abundance of species in the project area. The proponent should also conduct follow-up monitoring studies to evaluate the effects of noise on marine wildlife, with results of these shared with Indigenous groups. Recommend that daily sighting logs for marine mammals and sea turtles should also be published on the internet for public access.	• developing a Marine Mammals and Sea Turtle Monitoring Plan; and • verifying predicted underwater sound levels with field measurements during the first well per exploration licence. The proponent would be required to provide monitoring and follow-up program results, including the results of the Marine Mammals and Sea Turtles Monitoring Plan, to Indigenous groups and post online for public access.
KMKNO Miawpukek First Nation WNNB	Effects of vessel traffic and vessel strikes	Project-related vessels should be required to reduce speeds (10-knot limit) when not in existing shipping lanes and/or whenever a marine mammal or sea turtle is observed in the vicinity of the vessel. These speed limits should also be implemented when near a raft of seabirds, and vessels should be required to avoid approaching congregations of marine birds. The proponent should state that they plan to minimize traffic during marine mammal reproduction cycles and be in compliance with the *Marine Mammal Regulations* of the *Fisheries Act*.	The Agency has identified key mitigation measures and proposed EA conditions that would mitigate the potential effects of vessels on marine mammals, sea turtles, and migratory birds. These are described in Section 4.2 and Appendix A. The proponent would be required, except during an emergency, to: • limit supply vessels' movement to established shipping lanes where they are available; and • when and where such speeds do not present a risk to safety of navigation, reduce supply vessel speed to seven knots (13 kilometres per hour) when a whale or sea turtle species at risk is observed or reported within 400 metres of the vessel. The proponent would also be required to conduct activities in accordance with all applicable acts and regulations including the *Fisheries Act* and the *Marine Mammal Regulations*.

Source	Subject	Comment or Concern	Agency Response
Migratory Birds			
KMKNO Les Innus de Ekuanitshit MTI Qalipu First Nation NunatuKavut Community Council	Effects on migratory birds	The Project could have various impacts on marine and migratory birds, including effects from exposure to oil, disruption of migration patterns and behaviour, strandings and effects on habitats. The proponent should implement monitoring and should consider the use of acoustic and/or camera based monitoring to document bird sightings and interactions with the MODU and project vessels. The proponent should provide quantifiable targets (e.g., number of bird strandings/deaths) which would be used to determine the effectiveness of mitigation measures and to serve as adaptive management thresholds. If injured avian Species at Risk are stranded on the MODU or on a vessel, every effort should be made to transport the bird to a wildlife rescue centre for rehabilitation. The proponent should consider additional mitigation measures to minimize the attraction of birds to project infrastructure (e.g., light colour, intensity, amount, timing, etc.) and to deter birds from nesting on structures. The proponent should document the presence of hydrocarbons on the	The Agency has identified key mitigation measures, follow-up requirements and proposed EA conditions related to migratory birds. These are described in Section 4.3 and Appendix A and include providing awareness training on seabird strandings for offshore workers, following appropriate procedures for safe capture and handling of stranded birds, conducting systematic daily monitoring for stranded birds, restricting flaring and conducting monitoring for marine birds from the MODU and supply vessels using a trained observer and following ECCC's protocol. The proponent would be required to provide monitoring and follow-up program results to Indigenous groups and post online for public access. Key mitigation measures identified by the Agency to reduce the effects on fish and fish habitat (Section 4.1) and marine mammals and sea turtles (Section 4.2) would also mitigate potential effects on migratory birds.

Source	Subject	Comment or Concern	Agency Response
		surface of the water and any subsequent impacts on seabirds following the drilling work. The proponent should commit to having a dedicated marine bird observer on the MODU and supply vessels, as this would provide {Indigenous groups} with greater confidence in the effectiveness of the seabird surveys.	
KMKNO Miawpukek First Nation MTI NunatuKavut Community Council	Flaring	The proponent should avoid flaring during periods when birds are more vulnerable (e.g., periods of fog, at night, etc.) and should implement additional mitigation measures to minimize the chance of episodic mass mortality at flares. Water-curtain barriers should be required around the flare during flaring. The proponent should be required to notify ECCC in advance of planned flaring to determine whether the flaring would occur during a period of migratory bird vulnerability. If an alternative to flaring is an option through which to capture similar data and the alternative poses less of an impact on the environment, then the alternative must be used.	The Agency has identified key mitigation measures and follow-up to mitigate effects of flaring on migratory birds, which are described in Section 4.3 and Appendix A, and proposed EA conditions, including the requirement for the proponent to: • limit the duration of flaring to the length of time required to characterize the wells' hydrocarbon potential; • use a drill pipe and/or wireline conveyed test assembly, or similar technology, rather than formation testing with flaring where acceptable to the C-NLOPB; • if formation testing with flaring is required, notify the C-NLOPB at least 30 days in advance of planned flaring to determine if flaring would occur during periods of migratory bird vulnerability (in consultation with ECCC) and identify how adverse environmental effects on migratory birds would be avoided,

Source	Subject	Comment or Concern	Agency Response
			including opportunities to reduce nighttime flaring (e.g., by commencing flaring as early as practicable during daylight hours) and reduce flaring in poor weather conditions; • operate a water-curtain barrier around the flare during flaring; and • when flaring occurs, have a dedicated trained observer monitor and document bird behaviour around the flare, and assess the effectiveness of water curtains and flare shields in mitigating interactions between migratory birds and flares.
KMKNO Miawpukek First Nation MTI	Helicopter traffic	Concern regarding potential effects of helicopter traffic on birds. The proponent should adhere to the minimum altitude and distance for helicopter flight to minimize disturbance to birds (e.g., altitude greater than 300 metres and lateral distance of greater than 2 kilometres from any active bird colony). Additional concern related to effects of helicopters on marine mammals and sea turtles. Recommend a visual watch be established 30-minutes prior to scheduled helicopter takeoff from the MODU. If a sea turtle or marine mammal is observed within the 500-metre safety zone, helicopter takeoff from the MODU should be restricted	The Agency has identified mitigation measures to mitigate effects of helicopters on bird colonies, which are described in Sections 4.3 and Appendix A, and include restricting helicopter flying altitude to a minimum of 300 metres (except during take-off and landing) from active bird colonies and to a lateral distance of 1000 metres from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas (unless there is an emergency situation). The Agency sought advice from DFO on the effects of helicopters on marine mammals; DFO advised that while a brief behavioural response may be possible with some species, it does not anticipate that helicopter noise will have any significant adverse effects on marine mammals/sea turtles. The Agency is of the view

Source	Subject	Comment or Concern	Agency Response
		until the sea turtle or marine mammal has moved outside of the safety zone.	that restricting helicopter takeoffs would be impractical and unnecessary.
Special Areas			
KMKNO	Impacts on special areas	Concern related to potential effects of the Project on special areas. To minimize potential impacts to sensitive benthic habitats and areas of high ecological or biological activity and significance, the location of special areas and predicted drill cuttings dispersion should be factored into well site selection.	The Agency has identified key mitigation measures, follow-up requirements and proposed EA conditions related to special areas. These are described in Section 4.4 and Appendix A. Key mitigation measures include buffers around Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas for helicopter and vessel traffic. The Agency is of the view that key mitigation measures proposed for other valued components, including fish and fish habitat, marine mammals and sea turtles, and migratory birds, would also mitigate potential effects on special areas. The Agency has identified a potential EA condition that would require the proponent to conduct follow-up monitoring when drilling in special areas, or adjacent to or near a special area, if drill cuttings dispersion modelling predicts that cuttings deposition could occur within the special area at level above the biological effects threshold. Monitoring would include: • measuring sediment deposition extent and thickness after drilling is complete and prior to departing the location to verify drill cuttings deposition modelling predictions;

Source	Subject	Comment or Concern	Agency Response
			• survey of benthic fauna present after drilling has been concluded; and • reporting of results, including a comparison of modelling results to in situ results, to the C-NLOPB and DFO. The proponent would be required to provide monitoring and follow-up program results to Indigenous groups and post online for public access.
KMKNO NunatuKavut Community Council	Shipping routes and special areas	The proponent should consider avoiding special areas and other potentially sensitive areas with supply vessels and plan routes to avoid these areas.	The Agency identified key mitigation measures and proposed EA conditions that would mitigate the potential effects of vessel traffic, including potential effects on special areas. These are described in Section 4.2.2, 4.4.2 and Appendix A. The proponent would be required to, except during an emergency: • limit supply vessels movement to established shipping lanes where they are available; and • ensure supply and other support vessels maintain a 300-metre buffer from Cape St. Francis and Witless Bay Islands Important Bird and Biodiversity Areas (unless there is an emergency situation).
Commercial Fisheries			
Innu Nation KMKNO Miawpukek First Nation	Effects on commercial fisheries and communication and consultation with	Concern related to potential impacts of offshore exploration drilling on commercial fisheries during all phases of the Project as well as potential	The Agency identified measures to mitigate effects on fishery resources and fishing activity. These are described in Section 4.6 and Appendix A. The proponent would be required to develop

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Millbrook First Nation MMS MTI NunatuKavut Community Council Première Nation des Innus de Nutashkuan Qalipu First Nation	Indigenous fishers on potential impacts or infringements on fishing rights	ongoing effects from abandoned wellheads. Concern regarding the potential for collisions between supply vessels and fishing vessels. Indigenous groups requested the proponent develop a communication plan to inform fishers and to facilitate dialogue related to any project issues affecting the commercial fishery. The proponent should be required to accommodate any impacts to commercial fishery operations resulting from the Project, including from an accident or malfunction. As a follow-up program, the proponent should ensure that issues and concerns can be raised by Indigenous groups throughout the Project's life and fishers should be provided with monthly updates (at a minimum).	and implement a Fisheries Communication Plan, including a procedure for determining the need for a Fisheries Liaison Officer and/or fisheries guide vessels during MODU movement and the use of a Fisheries Liaison Officer during geophysical programs. To reduce the risk of vessel collisions, the proponent would be required to prepare a plan for avoidance of collisions with other vessels and submit it to the C-NLOPB for acceptance prior to drilling and to limit supply vessels movement to established shipping lanes where they are available. If it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with commercial fishing, the proponent would also be required to develop a wellhead abandonment strategy in consultation with potentially affected Indigenous groups and commercial fishers. These measures would be developed in consultation with Indigenous groups and commercial fishers. In addition, in all cases where spills, debris or other project-related activities cause damage to fishers, the C-NLOPB would expect the proponent to consider claims in a manner that meets the requirements of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Act* and the spirit of the *Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity*, and to act in good faith to resolve claims from fishers. If the proponent and a fisher were unable to resolve such a claim, the fisher could seek relief through

Source	Subject	Comment or Concern	Agency Response
			a compensation claim to the C-NLOPB [if applicable] or through the court.
Miawpukek First Nation Nunatsiavut Government NunatuKavut Community Council Qalipu First Nation Sipekne'katik First Nation	Effects of drilling wastes on commercial fisheries	Concern that drilling fluids, cuttings and accidental events may adversely affect breeding and/or feeding grounds of numerous marine species, which could result in impacts to commercial and food, social and ceremonial fisheries.	The Agency is of the view that the implementation of mitigation measures identified in Section 4.1 for fish and fish habitat related to providing the results of the seabed investigation survey, wellhead abandonment procedures, selection of chemicals, disposal of spent synthetic-based muds and the discharge of waste, would mitigate indirect effects of commercial fisheries. All discharges from the MODU meet the *Offshore Waste Treatment Guidelines*.
KMKNO MMS Sipekne'katik First Nation Nunatsiavut Government WNNB	Compensation	Indigenous fishers should be compensated for any impeded access to fishing activity and for damaged or lost fishing gear. Compensation should include consideration of the cultural and mental impacts of fishing gear loss. Furthermore, in the event of a spill, the proponent must compensate for any loss of productivity of species harvested by Indigenous communities. Commit to involving Indigenous communities in the development of the compensation program. If consultation is not required, confirm if there is another means by which the Indigenous community can be involved, including a Fishery Compensation Plan.	Access to fishing grounds may be temporarily lost or restricted due to displacement caused by safety exclusion zones required around the MODU. Given the short-term duration of drilling, the Agency is of the view that restricted access would be limited and resulting economic effects would be negligible. The Agency identified measures to mitigate effects on fishery resources and fishing activity. These are described in Appendix A and Section 4.6 and include developing and implementing a Fisheries Communication Plan. The Agency notes that the proponent has also committed to compensating for any project-related damage to fishing gear. In addition, in all cases where spills, debris or other project-related activities cause damage to fishers, the C-NLOPB would expect the proponent to consider claims in a manner that meets the requirements of the *Canada-*

Source	Subject	Comment or Concern	Agency Response
			Newfoundland and Labrador Atlantic Accord Implementation Act and the spirit of the *Compensation Guidelines Respecting Damages Related to Offshore Petroleum Activity*, and to act in good faith to resolve claims from fishers. If the proponent and a fisher were unable to resolve such a claim, the fisher could seek relief through a compensation claim to the C-NLOPB [if applicable] or through the court.
Current Use of Lands and Resources for Traditional Purposes and Potential Impacts on Aboriginal Rights			
Elsipogtog First Nation	Effects on resources and harvesting within traditional territories	Request that Elsipogtog First Nation play a central role in the assessment of and decision-making respecting any development that has potential to impact fish, fish habitat, fisheries and management within their territory, including the Project.	The Agency integrated consultation and engagement activities with Elsipogtog First Nation into the EA. Elsipogtog First Nation was given the opportunity to review and submit comments on various documents and was also consulted through other methods, including phone calls, emails, letters and in-person meetings. Elsipogtog First Nation's input has been considered and incorporated into the Agency's analysis. The Agency has identified key mitigation measures which would ensure Elsipogtog First Nation continues to be appropriately involved, including through participation in the development of the Fisheries Communications Plan and Spill Response Plan.
Accidents and Malfunctions			
Innu Nation KMKNO	Capping stack location and response times; use in deep water	Concern about the amount of time required to mobilize and deploy a capping stack. Recommend a capping	The Agency relied on the C-NLOPB's expertise and advice in reviewing the proponent's analyses and proposed approach to spill response,

Source	Subject	Comment or Concern	Agency Response
Miawpukek First Nation Millbrook First Nation NunatuKavut Community Council Qalipu First Nation		stack be located and maintained in the Atlantic region. Alternative transportation options, such as transporting the capping stack by air, should also be considered. Recommend that the proponent maintain, prior to and during drilling, a list of suitable vessels that are available to deploy a capping stack. Concern about the proposed use of a capping stack in deep water.	including the proposed approach to capping stack mobilization and deployment, and the Agency notes that the C-NLOPB was satisfied with the information presented by the proponent. The Agency notes that the C-NLOPB's authorization of drilling activities is contingent on its confidence that the proponent have a satisfactory approach to risk management. The proponent would also be required to demonstrate their preparedness to appropriately respond in the event of an accident or malfunction, including preparation of detailed Spill Response Plan and Well Capping and Containment Plan, which would include discussion of any potential options to reduce overall response timelines. As part of the Well Capping and Containment Plan, the proponent would also be required to include procedures to provide up-to-date information to the C-NLOPB prior to drilling and at regular intervals during drilling, related to the availability of appropriate capping stack vessels. The Agency has identified key mitigation measures that would ensure the proponent fulfill these commitments (refer to Section 5.1.2 and Appendix A), which include the requirement to prepare Spill Response Plan and a Well Capping and Containment Plan, which would be submitted to the C-NLOPB for acceptance prior to drilling, and would establish well control strategies and measures, including the capping of a blowout.
KMKNO Qalipu First Nation	Emergency response plan training and implementation	The proponent must take all reasonable measures to reduce the probability of an accidental event and ensure it is prepared to respond	The Agency has identified key mitigation measures, follow-up programs and proposed EA conditions for accidents and malfunctions. These are described in Section 5.1 and Appendix A. Key

Source	Subject	Comment or Concern	Agency Response
		effectively if an event does occur. In addition to directed training and response exercises around emergency preparedness, experts should be engaged, prior to drilling program initiation, to provide training specific to operating in harsh weather environments (including specialized training for technical experts, decision-making factors and processes, and roles and responsibilities). Emergency response plans for incidents at the supply base, near-shore installations, and transportation routes should be developed.	mitigation measures include preparing a Spill Response Plan, undertaking a spill impact mitigation assessment, undertaking all reasonable measures to prevent accidents and malfunctions and to effectively implement emergency response procedures and contingencies developed for the Project. The C-NLOPB has also advised the Agency that its authorization of drilling activities is contingent on its confidence that the proponent would be able to appropriately respond in the event of an accident or malfunction. In addition, the proponent would be required to, in consultation with the C-NLOPB, establish and enforce practices and limits for operating in all conditions that may be reasonably expected, including poor weather, high sea state, or sea ice or iceberg conditions. The *Canada Shipping Act*, *2001* and its associated regulations apply to all vessels transiting within Canadian waters. For example, vessels of a prescribed class are required to have an arrangement with a response organization and to have a shipboard oil pollution emergency plan under the *Environmental Response Regulations* and the *Vessel Pollution and Dangerous Chemicals Regulations* of the *Canada Shipping Act 2001*.
KMKNO Miawpukek First Nation MMS MTI Nunatsiavut Government	Indigenous involvement in emergency response planning	Indigenous groups should be involved in the development and implementation of the Oil Spill Response Plans and other emergency response and contingency plans, including emergency response and	The Agency received additional information related to spill response plans and strategies while conducting previous exploration drilling EAs. This information was considered during this assessment.

Source	Subject	Comment or Concern	Agency Response
		preparedness planning, exercises and training. The proponent should ensure that information about accidental events would be shared with Indigenous groups, including consultation in relation to the findings of the dispersion modelling and to the scope of emergency preparedness and response planning.	The Agency has identified key mitigation measures, follow-up programs and proposed EA conditions for accidents and malfunctions. These are described in Section 5.1 and Appendix A, and include the following: • provide Indigenous groups with an opportunity to review and provide feedback on a draft version of the Spill Response Plan. Provide the approved version to Indigenous groups, and make it publicly available on the Internet prior to drilling; • include procedures to notify Indigenous groups and commercial fishers in the event of an accident or malfunction and communicate the results of monitoring of its potential adverse effects on the environment and human health in the Fisheries Communications Plan; and • include procedures to engage in two-way communication with Indigenous groups and commercial fisheries during a tier 2 or tier 3 spill in the Fisheries Communications Plan.
KMKNO Les Innus de Ekuanitshit MTI NunatuKavut Community Council	Potential shoreline impacts	Concern related to discharges and spills reaching shore and any resulting potential impacts to commercial or food, social and ceremonial fisheries.	The Agency notes that the probability of oil making contact with shorelines is relatively low. Mitigation measures proposed for accidents and malfunctions and commercial fishing (e.g., development of the Fisheries Communication Plan and compensation for any damages, including loss of food, social and ceremonial fisheries), would also mitigate potential effects on

Source	Subject	Comment or Concern	Agency Response
			Indigenous commercial and food, social and ceremonial fisheries.
KMKNO Les Innus de Ekuanitshit MMS MTI Première Nation des Innus de Nutashkuan Sipekne'katik First Nation NunatuKavut Community Council	Impact of a spill on species of importance to Indigenous groups	Concern regarding the potential effects of an accidental event or malfunction on species of importance to Indigenous communities (e.g., Atlantic Salmon, American Eel Bluefin Tuna, Swordfish).	The Agency notes that the C-NLOPB's authorization of drilling activities is contingent on its confidence that the proponent have a satisfactory approach to risk management. The proponent would also be required to demonstrate its preparedness to appropriately respond in the event of an accident or malfunction, including preparation of detailed spill response plans that meet the C-NLOPB's regulatory standards. Nonetheless, in taking a precautionary approach and also in considering the potential presence of species at risk, the Agency concludes that the potential effects of a worst-case accident or malfunction (i.e., unmitigated subsea blowout) on fish and fish habitat and marine mammals and sea turtles could be significant. By extension, and particularly considering potential effects on endangered or threatened populations of Atlantic Salmon and their recovery, as well as the context provided by Indigenous groups, the Agency has concluded that the potential effects of a worst-case accident or malfunction on the current use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples could be significant. The Agency also recognizes that the probability of occurrence for a major event is very low and thus these effects are unlikely to occur. On this basis, the Agency concludes that the Project is not likely to cause significant adverse environmental effects as a result of accidents and malfunctions.

Source	Subject	Comment or Concern	Agency Response
KMKNO Les Innus de Ekuanitshit Miawpukek First Nation MMS NunatuKavut Community Council	Potential contamination of resources and effects on current use and socioeconomic conditions and wellbeing of Indigenous communities	Concerns related to potential contamination of harvested species, including perceived contamination which could influence dietary changes if country foods were avoided. The potential psychosocial impacts of an oil spill should be assessed and the emergency response plan should include engagement with Indigenous groups and mitigation for the psychosocial stresses that may arise from a spill or blowout.	The Agency acknowledges that current use and health and socioeconomic conditions in Indigenous communities could be affected if project-related changes in the marine environment occur as a result of an accidental event or malfunction (e.g., cause decreased catch rates or a decrease in fish quality for human consumption). The Agency considers that mitigation measures identified for fish and fish habitat, accidents and malfunctions, commercial fishing (e.g., development of the Fisheries Communication Plan and compensation for any damages, including loss of food, social and ceremonial fisheries), would also mitigate potential effects on the current use and health and socioeconomic conditions of Indigenous peoples. In the event of a spill, as required by the C-NLOPB, the proponent may be required to monitor the adverse environmental effects of the spill. Monitoring could require that the proponent undertake sensory testing of seafood for taint and measure contaminant levels in commercial, recreational and traditionally harvested fish. The exact monitoring parameters would depend on the type and nature of spill, would be established in consultation with relevant authorities, and may include monitoring of hydrocarbons, body burden, sensory testing, and other parameters. Monitoring may be conducted in areas impacted by the spill as well as at appropriate reference locations, which would inform changes in baseline levels.

Source	Subject	Comment or Concern	Agency Response
			Additionally, the Agency has proposed a condition that requires the proponent to develop procedures to communicate with Indigenous fishers in the event of an accident or malfunction, including the results of monitoring in the event of a spill. Nonetheless, the Agency concludes that the potential effects of a worst-case accident or malfunction (i.e., unmitigated subsea blowout) on the current use of lands and resources for traditional purposes and the health and socioeconomic conditions of Indigenous peoples could be significant; however, the probability of occurrence for a major event is very low and thus these effects are unlikely to occur.
Innu Nation KMKNO Miawpukek First Nation Millbrook First Nation MMS NunatuKavut Community Council Qalipu First Nation	Effects of dispersants	Concern related to the potential effects of dispersants on fish. Request clarification on the differences between and the potential effects of subsea versus surface dispersant injection. Request that a net environmental benefit analysis be undertaken to help guide the development of the response methods and plans, including determining if dispersants should be used. Given that scientific understanding of dispersants and their effects on the environment is evolving, the analysis should reference, evaluate and integrate the most recently-available information and literature. The proponent should explore potential	The Agency has identified key mitigations and proposed EA conditions for accidents and malfunctions. These are described in Section 5.1 and Appendix A. Key mitigation measures include undertaking a spill impact mitigation assessment to consider all realistic and achievable spill response options and identify those techniques (including the possible use of dispersants) that would provide for the best opportunities to minimize environmental consequences and provide it to the C-NLOPB for review. Relevant federal government departments would provide advice to the C-NLOPB on the spill impact mitigation assessment through the ECCC Environmental Emergency Science Table. The spill impact mitigation assessment would be published on the internet for the information of Indigenous groups and the public.

Source	Subject	Comment or Concern	Agency Response
		for Indigenous involvement in this process.	
Cumulative Effects			
MTI Miawpukek First Nation Nunatsiavut Government WNNB	Atlantic Salmon - cumulative effects	The proponent must fully consider the cumulative effects of the Project on the marine environment, and in particular, Atlantic Salmon. To assess cumulative effects, the proponent should provide more detail and analysis that documents the population declines in Atlantic Salmon that have occurred within the traditional waters of Indigenous communities. Subsequently, the proponent should consider the impacts that climate change has had on the distribution of salmon and how the Project could potentially contribute and exacerbate an already declining population of salmon in the region. It would also be important to implement well-planned monitoring programs to understand the cumulative effects of oil and gas activities on this species.	The potential effects of offshore exploration drilling on Atlantic Salmon, including cumulative effects, has been a primary issue throughout this and previous EAs. The Agency notes DFO's advice that potential effects of the Project on fish and fish habitat are expected to be negligible to low, and spatially and temporally limited. DFO also confirmed that the mitigation measures outlined in the EA Report (Section 4.1) will adequately address the potential effects of the Project on fish and fish habitat, including Atlantic Salmon.
KMKNO Les Innus de Ekuanitshit Miawpukek First Nation MMS MTI	Cumulative effects of offshore drilling	Concern regarding cumulative impacts of drilling fluid releases, other discharges and other effects, both from routine operations and accidental events, on fish, including Swordfish, Atlantic Salmon, Bluefin Tuna and other species.	The Agency's cumulative environmental effects assessment considers the overall effect on valued components as a result of the Project's predicted residual environmental effects and those of other projects and activities that have occurred, are ongoing or are expected to occur in the future.

Source	Subject	Comment or Concern	Agency Response
Nunatsiavut Government NunatuKavut Community Council Première Nation des Innus de Nutashkuan WNNB		A regional assessment or a more comprehensive cumulative effects assessment for the Project as well as other proposed and potentially upcoming exploration and production projects must be conducted to provide a more accurate assessment of the potential magnitude of cumulative effects on migrating fish species, sea mammals and migratory birds. The EIS should consider the cumulative effects assessment in the possible scenario where all the proposed exploration projects transition into oil production facilities within the Regional Assessment study area. The EIS should examine and assess the potential environmental and cumulative impacts of increased oil production activities including an increase in general oil production operation activities, as well as simultaneous accidents, malfunctions, and oil spills in the study area. In the context of cumulative effects, a discussion on how warmer waters will influence the impacts of the drilling programs (many of which have long operational timelines) is required.	The Regional Assessment developed scenarios for future exploration activity in the offshore east of Newfoundland and Labrador, and identified potential overlap of predicted exploratory wells with ongoing and future activities in the region. It concluded that experience to date and the future exploratory drilling scenarios developed do not suggest a high level of spatial and temporal clustering of activity and effects in the region. Cumulative environmental effects of the Project are discussed in Section 5.3 of the EA Report. The Agency is of the view that the mitigation, follow-up and monitoring for project environmental effects would also contribute to the mitigation or monitoring of cumulative environmental effects. The Agency is of the view that the Project is not likely to cause significant adverse cumulative environmental effects.
Miscellaneous			
KMKNO Miawpukek First Nation	Monitoring and follow-up	Recommend that the proponent engages in additional follow-up monitoring, especially in relation to	The Agency identified various follow-up programs and proposed EA conditions. These are described throughout Sections 4 and 5 and

Source	Subject	Comment or Concern	Agency Response
MTI Nunatsiavut Government NunatuKavut Community Council		water quality, wildlife populations, fish tissue contamination and effects on species at risk and cumulative effects. Monitoring programs should include data collection that would improve the confidence level of assessing cumulative effects. The proponent should provide detailed information on how the Indigenous groups would participate in the development and implementation of monitoring and follow-up measures, including integrating traditional knowledge in these activities. Recommend that Indigenous community members be trained and employed as environmental monitors.	Appendix A. Results and information from follow-up and monitoring programs would be shared with Indigenous groups.
Nunatsiavut Government WNNB	Climate change/effects of the environment on the Project	The proponent should take into account changes to predicted weather and marine patterns due to climate change, particularly in regards to extreme weather events.	The Agency agrees that climate change may lead to changes in predicted weather and marine patterns, including changes to the frequency and severity of extreme weather events. It has proposed EA conditions that take these potential changes into account, including requiring the proponent to monitor meteorological and oceanographic conditions over the lifetime of the Project to forecast and respond to severe conditions. In addition, the proponent would be required to establish and enforce practices and limits for operating in all conditions that may be reasonably expected, including poor weather or high sea state and ensure that the MODU has the ability to quickly disconnect the riser from the well in the event of extreme weather conditions. Finally, the proponent would be required to report

Source	Subject	Comment or Concern	Agency Response
			annually to the C-NLOPB on whether there has been a need to modify operations based on extreme environmental conditions and on the efficacy of the practices and limits established for operating in poor weather or high sea state. These measures are intended to be adaptive to potential changes to predicted weather and marine patterns due to climate change that could occur over the life of the Project.
Les Innus de Ekuanitshit	Greenhouse gas emissions	Compatibility of oil and gas exploration projects with Canada's commitments to greenhouse gas reduction	While there are direct emissions of greenhouse gases from the Project, there are no upstream emissions. Exploration drilling projects are of relatively short duration (approximately five years) and routine activities will contribute a relatively small amount to provincial totals. Additionally, proponents of exploration drilling projects must adhere to applicable regulations and standards, including the *Newfoundland and Labrador Air Pollution Control Regulations* under the *Environmental Protection Act and the Management of Greenhouse Gas Act*; and regulations and emission limits under the *International Convention for the Prevention of Pollution from Ships*. Proponents will also operate within the *National Ambient Air Quality Objectives* and the *Canadian Ambient Air Quality Standards* framework. Environment and Climate Change Canada proposed that it would work with the C-NLOPB, the Government of Newfoundland and Labrador, and Natural Resources Canada to carry out a sector analysis of greenhouse gas emissions from offshore exploratory drilling. This analysis would follow the analytical approach and

Source	Subject	Comment or Concern	Agency Response
			guidance provided in the most up-to-date version of the Strategic Assessment of Climate Change and be completed by Fall 2021.
Les Innus de Ekuanitshit MTI	Icebergs and emergency response measures	How would iceberg movement be monitored and potential collisions be avoided? Are there emergency evacuation and shut-down procedures to reduce some of the effects?	The Agency has identified key mitigation measures and proposed EA conditions to reduce the potential for iceberg collisions. These are described in Section 5.2 and Appendix A. Key mitigation measures include: • in consultation with the C-NLOPB and ECCC, develop and implement a physical environment monitoring program in accordance with the *Newfoundland Offshore Petroleum Drilling and Production Regulations* and meeting or exceeding the requirements of the *Offshore Physical Environmental Guidelines*; • in consultation with the C-NLOPB, establish and enforce practices and limits for operating all conditions that may be reasonably expected, including poor weather, severe sea state, or sea ice or iceberg conditions; • in consultation with the C-NLOPB and as part of the required Safety Plan, develop an Ice Management Plan including procedures for detection, surveillance, data collection, reporting, forecasting and avoidance or deflection; and

Source	Subject	Comment or Concern	Agency Response
			• in consultation with the C-NLOPB, implement measures to ensure the MODUs have the ability to quickly disconnect the riser from the well in the event of an emergency or severe weather conditions.
Miawpukek First Nation MMS NunatuKavut Community Council	Decommissioning – effects of abandoned wellheads	Concern regarding the potential risks and effects of abandoned wellheads, including potential effects on commercial fisheries and risks of leaks or other accidents and malfunctions. The proponent must provide further justification for leaving wellheads in place. Proponents should be monitoring for methane leaks at abandoned wells.	The Agency also notes that the C-NLOPB has advised that, with respect to the risk for accidents and malfunctions, the integrity of abandoned wells would not be affected by where (or if) a wellhead is cut. The Agency discussed monitoring for methane leaks at abandoned wells with C-NLOPB, which advised that it is not required. This is because oil and gas operators use procedures to avoid encountering methane and other volatile organic compounds in the first place. Further, the operators use certain procedures to manage the drilling, completions and abandonment processes to make sure that abandoned wells do not have pathways for gas to migrate to the surface. The processes and procedures used are to ensure compliance with Part 6 of the *Offshore Petroleum Drilling and Production Newfoundland and Labrador Regulations*, which stipulates that all oil and gas operators are to ensure abandoned wells can be readily located and are left in a condition that: (a) provides for isolation of all hydrocarbon bearing zones and discrete pressure zones; and (b) prevents any formation fluid from flowing through or escaping from the well-bore.

Source	Subject	Comment or Concern	Agency Response

			The Agency has identified key mitigation measures and proposed EA conditions related to well abandonment, including:
			• preparing a well abandonment plan, including a wellhead abandonment strategy, and submitting it to the C-NLOPB for acceptance at least 30 days prior to abandonment of each well. If it is proposed that a wellhead be abandoned on the seafloor in a manner that could interfere with commercial fishing, develop the strategy in consultation with Indigenous groups and commercial fishers;
			• ensure that of the locations of abandoned wellheads, if left on the seafloor, are:
			  ○ published in Notices to Mariners;
			  ○ provided in Notices to Shipping; and
			  ○ communicated to fishers;
			• provide information on the locations of any abandoned wellheads, left on the seafloor, to the Canadian Hydrographic Services for future nautical charts and planning.

Appendix D: Species at Risk and COSEWIC-listed Species that May be Found in the Eastern Newfoundland Offshore Area, Including the Project Area

The Agency has taken a conservative approach to identifying potential species at risk by including all species that were identified by the proponent in the EIS and additional species the Agency believes may occur in the eastern Newfoundland offshore based on other sources, including other EAs and input from federal authorities. The likelihood of a species occurring in the area and the time of year it may be present can vary greatly from one species to another.

Information has been updated in accordance with the Species at Risk Registry and reviewed by DFO and ECCC.

Species	*Species at Risk Act* Status (Schedule 1)	COSEWIC Assessment
Fish		
Acadian Redfish (*Sebastes fasciatus*) – Atlantic population	Not listed	Threatened
American Eel (*Anguilla rostrata*)	Not listed	Threatened
American Plaice (*Hippoglossoides platessoides*) – Maritime population	Not listed	Threatened
American Plaice (*Hippoglossoides platessoides*) – Newfoundland and Labrador population	Not listed	Threatened
Atlantic Bluefin Tuna (*Thunnus thynnus*)	Not listed	Endangered
Atlantic Cod (*Gadus morhua*) – Laurentian North population	Not listed	Endangered
Atlantic Cod (*Gadus morhua*) – Newfoundland and Labrador population	Not listed	Endangered
Atlantic Salmon (*Salmo salar*) – Inner Bay of Fundy population	Endangered	Endangered

Species	*Species at Risk Act* Status (Schedule 1)	COSEWIC Assessment
Atlantic Salmon (*Salmo salar*) – Outer Bay of Fundy population	Not listed	Endangered
Atlantic Salmon (*Salmo salar*) – Eastern Cape Breton population	Not listed	Endangered
Atlantic Salmon (*Salmo salar*) – Nova Scotia Southern Upland population	Not listed	Endangered
Atlantic Salmon (*Salmo salar*) – South Newfoundland population	Not listed	Threatened
Atlantic Salmon (*Salmo salar*) – Quebec Eastern North Shore population	Not listed	Special concern
Atlantic Salmon (*Salmo salar*) – Quebec Western North Shore population	Not listed	Special concern
Atlantic Salmon (*Salmo salar*) – Anticosti Island population	Not listed	Endangered
Atlantic Salmon (*Salmo salar*) – Inner St. Lawrence population	Not listed	Special concern
Atlantic Salmon (*Salmo salar*) – Gaspé-Southern Gulf of St. Lawrence population	Not listed	Special concern
Atlantic Wolffish (Striped Wolffish) (*Anarhichas lupus*)	Special concern	Special concern
Basking Shark (*Cetorhinus maximus*) –Atlantic population	Not listed	Special concern
Cusk (*Brosme brosme*)	Not listed	Endangered
Deepwater Redfish (*Sebastes mentalla)* – Northern population	Not listed	Threatened
Deepwater Redfish (*Sebastes mentalla)* – Gulf of St. Lawrence-Laurentian Channel population	Not listed	Endangered
Lumpfish (*Cyclopterus lumpus*)	Not listed	Threatened

Species	*Species at Risk Act* Status (Schedule 1)	COSEWIC Assessment
Northern (Broadhead) Wolffish (*Anarhichas denticulatus*)	Threatened	Threatened
Porbeagle Shark (*Lamna nasus*)	Not listed	Endangered
Roundnose Grenadier (*Coryphaenoides rupestris*)	Not listed	Endangered
Shortfin Mako (*Isurus oxyrinchus*) – Atlantic population	Not listed	Endangered
Smooth Skate (*Malacoraja senta*) – Funk Island Deep population	Not listed	Endangered
Smooth Skate (*Malacoraja senta*) – Laurentian-Scotian population	Not listed	Special concern
Spiny Dogfish (*Squalus acanthias*) – Atlantic population	Not listed	Special concern
Spotted Wolffish (*Anarhichas minor)*	Threatened	Threatened
Thorny Skate (*Amblyraja radiata*)	Not listed	Special concern
White Hake (*Urophycis tenuis*) – Atlantic and Northern Gulf of St. Lawrence population	Not listed	Threatened
White Shark (*Carcharodon carcharias*) – Atlantic population	Endangered	Endangered
Winter Skate (*Leucoraja ocellata*) – Eastern Scotian Shelf - Newfoundland population	Not listed	Endangered
Marine Mammals		
Atlantic Walrus (*Odobenus rosmarus rosumarus*) – Central/Low Arctic population	Not listed	Special concern
Beluga Whale (*Delphinapterus leuca*) – St. Lawrence Estuary population	Endangered	Endangered

Species	*Species at Risk Act* Status (Schedule 1)	COSEWIC Assessment
Blue Whale (*Balaenoptera musculus*) – Atlantic population	Endangered	Endangered
Bowhead Whale (*Balaena mysticetus*) – Eastern Canada-West Greenland population	Not listed	Special concern
Fin Whale (*Balaenoptera physalus*) – Atlantic population	Special concern	Special concern
Harbour Porpoise (*Phocoena phocoena*) – Northwest Atlantic population	Not listed	Special concern
Killer Whale (*Orcinus orca*) – Northwest Atlantic/Eastern Arctic population	Not listed	Special concern
Narwhal (*Monodon monoceros*)	Not listed	Special concern
North Atlantic Right Whale (*Eubalaena glacialis*)	Endangered	Endangered
Northern Bottlenose Whale (*Hyperoodon ampullatus*) – Scotian Shelf population	Endangered	Endangered
Northern Bottlenose Whale (*Hyperoodon ampullatus*) – Davis Strait-Baffin Bay-Labrador Sea population	Not listed	Special concern
Ringed Seal (*Pusa hispida*)	Not listed	Special concern
Sei Whale (*Balaenoptera borealis*) – Atlantic population	Not listed	Endangered
Sowerby's Beaked Whale (*Mesoplodon bidens*)	Special concern	Special concern
Sea Turtles		
Leatherback Sea Turtle (*Dermochelys coriacea*) – Atlantic population	Endangered	Endangered
Loggerhead Sea Turtle (*Caretta caretta*)	Endangered	Endangered

Species	*Species at Risk Act* Status (Schedule 1)	COSEWIC Assessment
Birds		
Bank Swallow (*Riparia riparia*)	Threatened	Threatened
Barrow's Goldeneye (*Bucephala islandica*)	Special concern	Special concern
Bobolink (*Dolichonyx oryzivorus*)	Threatened	Threatened
Buff-breasted Sandpiper (*Tryngites subruficollis*)	Special concern	Special concern
Common Nighthawk (*Chordeiles minor*)	Threatened	Special concern
Harlequin Duck (*Histrionicus histrionicus*)	Special concern	Special concern
Ivory Gull (*Pagophila eburnea*)	Endangered	Endangered
Olive-sided Flycatcher (*Contopus cooperi*)	Threatened	Special concern
Peregrine Falcon anatum/tundrius (*Falco peregrinus anatum/tundrius*)	Special concern	Not at risk
Piping Plover (*Charadrius melodus melodus*)	Endangered	Endangered
Red Knot (*Calidris canutus rufa*) – Rufa subspecies	Endangered	Endangered
Red-necked Phalarope (*Phalaropus lobatus*)	Special Concern	Special concern
Roseate Tern (*Sterna dougallii*)	Endangered	Endangered
Ross's Gull (*Rhodostethia rosea*)	Threatened	Threatened

Species	*Species at Risk Act* Status (Schedule 1)	COSEWIC Assessment
Short-eared Owl (*Asio flammeus*)	Special concern	Special concern

Sources: BHP Petroleum (New Ventures) Corporation 2020; BP 2018; Chevron Canada Limited 2020; CNOOC 2018; Equinor Canada Ltd. 2020; Equinor Canada Ltd. 2017; ExxonMobil Canada Ltd. 2017; Husky 2018; and proponents' information requirement responses, 2018-2019. Species listings updated as per Canada's Species at Risk Public Registry, accessible at: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html.

Appendix E: Special Areas in Proximity to the Project

The table below lists special areas identified by the proponent in proximity to the project, categorized by type. Figure 2 of this report illustrates the locations of these special areas, and further detail can be found in the Central Ridge Exploration Drilling Program Abridged EIS (Section 11). Additionally, interactive mapping is accessible in the GIS Decision-Support Tool developed during the Regional Assessment (https://nloffshorestudy.iciinnovations.com/mapviewer/).

Special Area
Marine Protected Areas and Areas of Interest
Eastport Marine Protected Area
Laurentian Channel Area of Interest
Gilbert Bay Marine Protected Area
Newfoundland and Labrador Shelves Ecologically and Biologically Significant Areas
Orphan Spur
Notre Dame Channel
Fogo Shelf
Grey Islands
Gilbert Bay
Labrador Marginal Trough
Labrador Slope
Hamilton Inlet
Southern Pack Ice
Refined Placentia Bay/Grand Banks Large Ocean Management Area Ecologically and Biologically Significant Areas
Northeast Slope
Virgin Rocks
Lilly Canyon-Carson Canyon
Southeast Shoal
Eastern Avalon
Southwest Slope

Special Area
Smith Sound
Placentia Bay
Laurentian Channel
Haddock Channel Sponges
South Coast
St. Mary's Bay
Bonavista Bay
Baccalieu Island
Marine Refuges
Northeast Newfoundland Slope Closure
Hawke Channel Closure
Funk Island Deep Closure
Canadian Fisheries Closures within the Exclusive Economic Zone
Eastport Lobster Management Area
Funk Island Deep Box
Hawke Box
Lobster Area Closures
Mouse Island
Glover's Island
Gander Bay
Gooseberry Island
Penguin Islands
Snow Crab Stewardship Exclusion Zones
Crab Fishing Area 5A (2 zones)
Crab Fishing Area 6A (2 zones)
Crab Fishing Area 6B
Crab Fishing Area 6C
Crab Fishing Area 8A
Crab Fishing Area 8BX

Special Area
Crab Fishing Area 9A (2 zones)
Near Shore (2 zones)
Preliminary Representative Marine Areas
Virgin Rocks
South Grand Bank Area
Northwestern Conception Bay
Southern Coast of Burin Peninsula and Southeastern Placentia Bay
Migratory Bird Sanctuaries
Terra Nova
Ile aux Canes
Shephard Island
Coastal National Parks and Historic Sites
Cape Spear National Historic Sites
Signal Hill National History Site
Ryan Premises National Historic Site
Castle Hill National Historic Site
Terra Nova National Park
Coastal Provincial Ecological Reserves
Witless Bay Seabird Ecological Reserve
Baccalieu Island Seabird Ecological Reserve
Mistaken point Fossil Ecological Reserve
Funk Island Seabird Ecological Reserve
Cape St. Mary’s Seabird Ecological Reserve
Lawn Bay Seabird Ecological Reserve (Middle Lawn, Swale, and Colombier Islands)
Fortune Head Fossil Ecological Reserve
Coastal Provincial Parks and Protected Areas
Marine Drive Provincial Park Reserve
Chance Cove Provincial Park
Dungeon Provincial Park

Special Area
Bellevue Beach Provincial Park Reserve
Gooseberry Cove Provincial Park
Windmill Bight Provincial Park Reserve
Deadman's Bay Provincial Park
Frenchman's Cove Provincial Park
Dildo Run Provincial Park
Coastal Provincial Historic Sites
Cape Bonavista Lighthouse
Heart's Content Cable Station
United Nations Convention on Biological Diversity Ecologically and Biologically Significant Areas
Labrador Sea Deep Convection Area
Seabird Foraging Zone in the Southern Labrador Sea
Orphan Knoll
Slopes of the Flemish Cap and Grand Banks
Southeast Shoal and Adjacent Areas on the Tail of the Grand Bank
United Nations Food and Agriculture Organization Vulnerable Marine Ecosystems
Northeast Shelf and Slope (within Canadian Exclusive Economic Zone)
Sackville Spur
Northern Flemish Cap
Southern Flemish Pass to Eastern Canyons
Beothuk Knoll
Deep Water Coral Area
Flemish Cap East
South East Shoal and Adjacent Shelf Edge/Canyons
Division 3O Coral Closure
NAFO Fisheries Closure Areas
Tail of the Bank (1)
Flemish Pass/Eastern Canyon (2)
Beothuk Knoll (3)

Special Area
Eastern Flemish Cap (4)
Northeast Flemish Cap (5)
Sackville Spur (6)
Northern Flemish Cap (7)
Northern Flemish Cap (8)
Northern Flemish Cap (9)
Northwest Flemish Cap (10)
Northwest Flemish Cap (11)
Northwest Flemish Cap (12)
Beothuk Knoll (13)
Eastern Flemish Cap (14)
Orphan Knoll Seamount
Newfoundland Seamounts
Fogo Seamounts (1)
Fogo Seamounts (2)
3O Coral Area Closure
Important Bird and Biodiversity Areas
Quidi Vidi Lake
Witless Bay Islands
Cape St. Francis
Baccalieu Island
Grates Point
Mistaken Point
The Cape Pine and St. Shotts Barren
Placentia Bay
Terra Nova National Park
Funk Island
Cape Freels Coastline and Cabot Island
Cape St. Mary’s

Special Area
Wadham Islands and Adjacent Marine Area
Corbin Island
Middle Lawn Island
Green island
United Nations Educational, Scientific and Cultural Organization World Heritage Sites
Mistaken Point Ecological Reserve
Red Bay National Historic Site
L’Anse aux Meadows National Historic Site

Source: Equinor Canada Ltd. 2020